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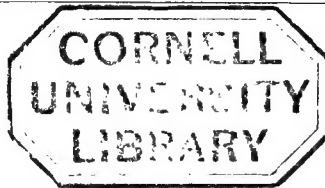
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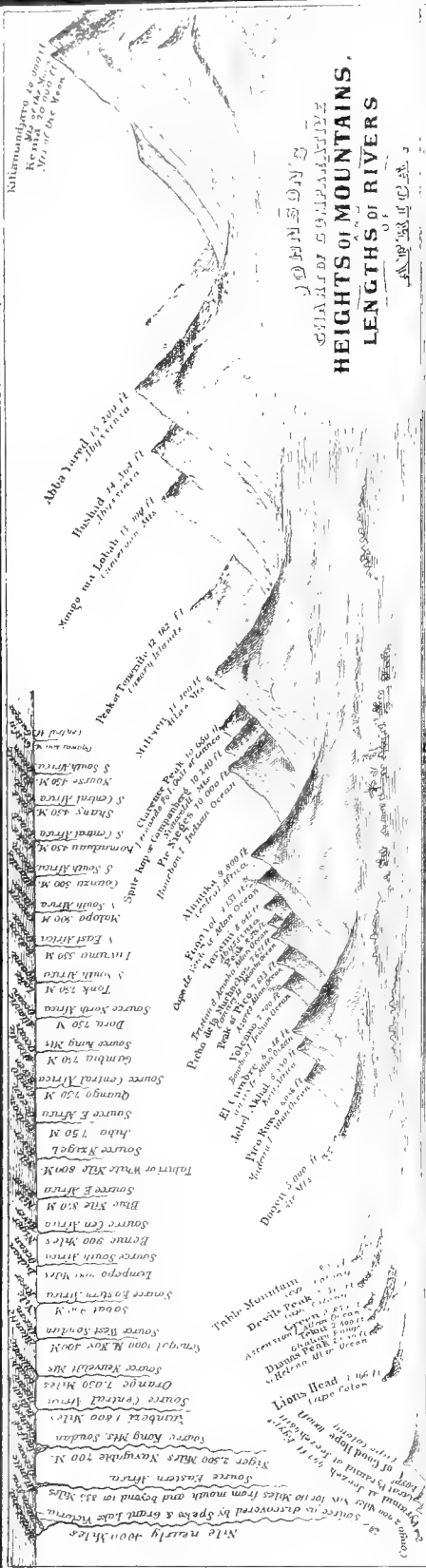








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# CERIGNOLA—CERTIORARI.

**Cerigno'la**, an episcopal town of Italy, in the province of Foggia, 24 miles S. E. of Foggia. It has a college and several convents; also manufactures of linen. The Spaniards gained here a decided victory over the French in 1503, and the French commander, the duke of Nemours, was killed in that action. Pop. 24,446.

**Cer'igo** [anc. *Cythera*; Gr. *Κύθηρα*], one of the Ionian Islands, now constituting, with the neighboring small islands, an eparchy of the nomarchy of Argolis and Corinth, in the kingdom of Greece, is in the Mediterranean, and is separated by a narrow strait from the Morea. Area, 107 square miles. The surface is mountainous and rocky. The soil is not rich, but produces some wheat, olives, grapes, etc. Here is a remarkable stalactitic cavern. The ancient *Cythera* was sacred to Venus, and said to be her favorite residence. Capital, Capsali. Pop. in 1879, 13,259.

**Cerinthus**, the founder of one of the earliest heretical sects in the Christian Church, was, according to Irenæus, a contemporary of the apostle John, and flourished, according to Eusebius, under the reign of Trajan, 98-117. He was a converted Jew, born and educated in Egypt, but afterward removed to Asia Minor, where he propagated his ideas. His system is decidedly Gnostic. He taught that the world was not made by the supreme God, but by a certain power which was separate and distinct from God, though an emanation from Him. He also taught that Jesus was not born by a Virgin, but was the natural offspring of Joseph and Mary; that after His baptism the Christ came down into Him in the form of a dove, and that toward the end the Christ again flew away from Jesus. The Gospel of John is said to have special reference to Cerinthus.

**Ce'rite**, or **Och'roite**, a name of a mineral which contains a silicate of cerium, and is found in Sweden. It occurs in granular pieces of a clove-brown, cherry-red, or gray color, and has a splintery fracture and adamantine lustre. It contains in 100 parts—peroxide of cerium, 26.55; oxide of lanthanum, 33.38; silica, 16; carbonic acid, 4.62; peroxide of iron, 3.53; alumina, 1.68; lime, 3.56; water, 9.1.

**Cer'ium** (symbol Ce; equivalent 92), a rare metal which is obtained from cerite. It is not employed in the arts and manufactures, but its oxalate is a valuable anti-emetic medicine in certain cases. Combined with oxygen, it forms two oxides. It is difficult to procure it in a separate or metallic state.\*

**Cerre'to Sanni'ta**, a town of Italy, in the province of Benevento, is on a slope of the Apennines, 22 miles N. E. of Capua. It has a cathedral with fine paintings, a collegiate church, and manufactures of coarse woollen cloth. Pop. 5168.

**Cerro-de-Pas'co**, or **Pasco**, a town of Peru, department of Junin, is 138 miles N. E. of Lima, and 13,673 feet above the level of the sea. It is ill-built and irregular. The population is variable, and consists of miners. Here are rich silver-mines. Pop. 14,000.

**Cerro Gordo**, capital of Holmes co., Fla. (see map of Florida, ref. 1-B, for location of county), 105 miles W. N. W. of Tallahassee, and about 100 miles N. E. by E. from Pensacola, is on the navigable Choctawhatchie River. Pop. not in census of 1880.

**Cerro Gordo**, a celebrated battle-field and mountain-pass in Mexico, through which the National road from Vera Cruz to the city of Mexico passes. Here Gen. Scott defeated a greatly superior force of Mexicans under Santa Anna, April 18, 1847. Following up his success at Vera Cruz, Scott's army had arrived at Plan del Rio, a small plain 50 miles from Vera Cruz, when intelligence reached him that the pass of Cerro Gordo had been fortified by Santa Anna. The level ground terminates at Plan del Rio, from which the road ascends in a long circuit among lofty hills, whose commanding points had been fortified by the enemy. His right rested on a precipice overhanging an impassable ravine, his entrenchments extending to the road, on which

was placed a battery. On the other side the lofty and difficult height of Cerro Gordo commanded the approaches in all directions. Half a mile to the rear of this height the Mexican army, numbering upwards of 13,000, with five pieces of artillery, were encamped. Resolving to attempt to turn the enemy's left and attack in rear while threatening his front, Scott caused daily reconnoissances to be made in the hope of finding a route by which to reach the Jalapa road and cut off the retreat of the Mexicans. A road was made through difficult slopes and over chasms, which was only abandoned when a further prosecution of the work would have brought on an action. Scott now determined to gain the Jalapa road by assaulting and carrying the height of Cerro Gordo, and on the night of April 17 issued his plan of battle, which was successfully executed. Twiggs was reinforced during the night by Shields' brigade, consisting of one New York and two Illinois regiments. In selecting their ground for bivouacking and an opposing height for a battery, a sharp combat took place, but the height was occupied and a battery of three 24-pounders placed thereon. During the night an 8-inch howitzer was with great difficulty and labor placed opposite the enemy's right battery.

Early on the 18th the general attack commenced. Pillow's brigade twice assaulted the enemy's line of batteries on the left; but, though unsuccessful, they served to distract their opponents; Twiggs' division, storming the strong and vital point of Cerro Gordo, pierced the centre, gained command of all the intrenchments, and cut them off from support; Riley's brigade of infantry pushed on against the main body of the enemy, and the guns of their own fort being turned on them, they fled in confusion; Shields' brigade bravely assaulted the left, carried the rear battery of five guns on the Jalapa road, and rendered important aid in completing the rout of the enemy. At an early part of the engagement Gen. Shields received a severe but not fatal wound, being shot through the lungs. The moment the fate of the day was decided the reserve forces were pushed on towards Jalapa in advance of the pursuing columns of Twiggs' division and Shields' brigade (the latter now under Col. E. D. Baker), and Gen. Patterson was sent to take command. The rout was complete; 3000 prisoners were taken, 4000 or 5000 stand of arms, and 43 pieces of artillery. Our loss in the two days was 431, of whom 63 were killed. The immediate results of this important battle were the occupation of Jalapa the next day.

**Cer'ro Gor'do de Potosi'**, a famous mountain of Bolivia, is immediately S. W. of Potosi. It contains rich silver-mines. Altitude, 16,150 feet.

**Certal'do**, a town of Italy, in the province of Florence, is picturesquely situated on the Elsa, 18 miles S. W. of Florence. It was the birthplace of Boccaccio, whose house is still preserved. Pop. 6562.

**Certificate** [from the Lat. *certus*, "certain," and *facio*, to "make"], in law. (1) A writing made by a court, or signed by a judge or officer, giving notice of the existence of certain facts. A certificate of a judge is frequently resorted to for the purpose of determining the amount of costs to be recovered in an action, as, for example, to state whether the title to real property came in question at a trial. (2) A writing issued by any one, though not a judge or officer of court, having the means of knowledge, stating certain facts, such as a "certificate of registry" by custom-house officers setting forth the national character of a ship. Certificates of various kinds became of much importance under the recent stamp acts of Congress, stamps being imposed upon them by law. (See the stamp laws *passim*.)

**Certiora'ri** [Lat. "to be made more certain"], a writ issued from a supreme court to an inferior court or a special body having judicial powers, such as commissioners, magistrates, assessors of taxes, etc., acting in a summary manner or in a method different from the common law. Its object is to review the proceedings of the inferior court or tribunal, or to remove them before trial and judgment, and it is applicable either to civil or criminal cases. When used as a means of review of an actual decision or determination made by the inferior tribunal, its office is to correct errors made in point of law, rather than to reconsider the subject on matters of fact. Thus, if a board of assessors of taxes should decide that a bank could be taxed under State au-

\* This metal takes its name from the planet Ceres, following the analogy of the names Mercury, Palladium, etc. Old writers speak of gold as "Sol," the Latin for "Sun," silver as "Luna," the "Moon." Copper was called Venus; lead, Saturn; tin, Jupiter; and iron, Mars. These terms were used by the alchemists, and seem to have had some reference to astrology.

thority upon that portion of its property which is invested in the bonds of the U. S. government, it would decide a point of law which might, by means of a writ of *certiorari*, be submitted to the various State courts, and finally to the Supreme Court of the U. S. This writ may also be resorted to for the purpose of supplying any defects in the return of its proceedings by the inferior tribunal to the superior court. It may be considered in this aspect as auxiliary to the main purpose of removing the record itself.

**Certo'sa di Pavi'a, La**, a celebrated monastery near Pavia, in Italy, in the province of Pavia, in the Gothic style, was founded in 1396 by Visconti, the first duke of Milan. Here is a magnificent church 235 feet long, adorned with fine paintings, sculptures, and mosaics.

**Ceru'men** [from the Lat. *cera*, "wax"], a Latin term denoting the yellow waxy matter secreted by certain glands lying in the passage that leads from the external opening of the ear to the membrane of the tympanum. It possesses a peculiarly bitter taste, and physiologists have believed that in consequence of this property it prevents insects from entering the auditory canal.

**Ce'ru'se** [Lat. *cerusa*], a name of white lead, which is a carbonate of lead, and is extensively used by house-painters, who mix it with linseed oil. It has been employed by ladies as a cosmetic.

**Ce'rusite**, or **Cerussite**, native carbonate of lead, occurs in fibrous, compact, and earthy masses, and in numerous crystalline forms which may be referred to a right rhombic prism. When pure, it consists of 16.42 per cent. of carbonic acid and 83.58 of oxide of lead, or 77 per cent. of metallic lead. When perfectly pure, it is colorless and transparent, with an adamantine lustre, which is resinous on fractured surfaces. Next to galena, cerusite is the most common ore of lead.

**Cerut'ti** (GIUSEPPE ANTONIO), an Italian Jesuit, born June 13, 1738. His principal work is an "Apology for the Order of Jesuits." He was a friend of Mirabeau, whom he assisted in some of his works. Died Feb. 2, 1792.

**Cervan'tes Saave'dra, de** (MIGUEL), a celebrated Spanish author, born at Alcalá de Henares Oct. 9, 1547. He was educated in the universities of Salamanca and Madrid. He enlisted about 1570 in the papal army, and was wounded at the famous naval battle of Lepanto in 1571. Having been captured by the Algerines about 1575, he was detained in slavery at Algiers and endured great sufferings. He was ransomed in 1580, returned to Spain, and served several campaigns in the Spanish army. In 1584 he produced "Galatea," a pastoral romance; the same year he married Catalina de Palacios Salazar y Voicediano. He afterwards wrote numerous dramas, among which was a tragedy called "Numancia." Some of these were performed with success, but they did not enrich him, and he continued to suffer from poverty. He resided at Seville between 1588 and 1600. His celebrity is founded on a satirical work called "Don Quixote de la Mancha," which was designed to correct the taste of his countrymen, who delighted in the extravagant romances of chivalry. The first part of "Don Quixote" appeared in 1605, and obtained immediate and immense popularity. The second part was published in 1615. Cervantes resided at Madrid from 1605 until his death. Among his other works are his "Novelas Exemplares" ("Moral Tales," 1613), and a poem entitled "Viaje al Parnaso" ("Journey to Parnassus," 1614), which is greatly admired. He died on the same day as Shakespeare, April 23, 1616.

"Don Quixote," says Hallam, "is the only book in the Spanish language which can now be said to possess much of a European reputation. It is to Europe in general what Ariosto is to Italy and Shakespeare to England. Numerous translations, and countless editions of them, in every language, bespeak its adaptation to mankind; and no critic has been found paradoxical enough to withhold his admiration. . . . Few books of moral philosophy display so deep an insight into the mechanism of the mind as 'Don Quixote.' And when we look also at the fertility of invention, the general probability of events, and the great simplicity of the story, we shall think Cervantes fully deserving of the glory that attends this monument of his genius." (*Introduction to the Literature of Europe*.) (See T. ROSCOE, "Life and Writings of Cervantes," 1839; LOCKHART, "Life of Cervantes," 1822; PELLICER, "Vida de Cervantes," 1800; TICKNOR, "History of Spanish Literature," vol. ii.; A. NISARD, "Revue Française VII.," 1838.)

**Cer'via**, a town of Italy, in the province of Ravenna, on the Adriatic, 12 miles S. E. of Ravenna. It has a cathedral and several convents; also salt-works, from which about 50,000 tons of salt are annually obtained. Pop. 5820.

**Cer'vidæ** [from *ceruus*, a "deer"], a family of animals of which the deer is the type. (See APPENDIX.)

**Cervin, Mont** [Ger. *Matterhorn*], a sublime peak of the Pennine Alps, is on the frontier between Piedmont and Switzerland, and 12 miles W. N. W. of Monte Rosa. It has an altitude of 14,825 feet above the level of the sea. The part which is above the height of 11,000 feet is almost inaccessible steep, and is described as an obelisk of naked rock. The pass of Mont Cervin is practicable in summer for horses and mules at an elevation of 10,938 feet.

**Cesalpi'no**, often Anglicized as **Cesal'pin** (ANDREA), an eminent Italian physiologist and botanist, born at Arezzo, in Tuscany, in 1519. He was professor of medicine and botany at Pisa, and became about 1595 physician to Pope Clement VIII. He wrote several medical treatises, among which is "Ars Medica" (1601), and an important work "On Plants" ("De Plantis," 1583), in which he propounded an improved system of botany. He was the first who proposed a natural system of classification on philosophical principles. Died Feb. 23, 1603. (See FUCHS, "Andreas Cæsalius," etc., 1798.)

**Ces'ari** (GIUSEPPE), an Italian painter, sometimes called IL CAVALIERE D'ARPINO and GIUSEPPINO (Fr. *Le Josephin*), was born at Arpino or Rome about 1565. He worked mostly in Rome, was patronized by several popes, and was very successful and popular. He was the chief of the conventional school, opposed by the naturalists, the Caracci, Caravaggio, and their scholars. His works display much skill in execution, but are deficient in simplicity. Died in 1640.

**Cesarotti** (MELCHIORE), b. at Padua, Italy, in 1730; educated at the university of his native city and early became professor there of rhetoric, and in 1768 of Greek and Hebrew. When Italy was invaded by the French, he advocated their cause, and was made knight of the iron crown by Napoleon I. Cesarotti wrote "On the Philosophy of Language" and "On the Philosophy of Taste," etc. Died in 1808. His works were published in 42 vols. 8vo. (1800-13).

**Cese'na**, a town of Italy, in the province of Forlì, and on the railway between Bologna and Ancona, 18 miles by rail S. E. of Forlì. It is situated on the slope of a hill which is close to the river Savio. It has a cathedral; a Capuchin church, in which is a fine painting by Guercino; a library founded in 1452; and several convents. It has sulphur-mines in the vicinity. Pop. 38,223.

**Cesenat'ico**, a seaport-town of Italy, in the province of Forlì, on the Adriatic, 8 miles E. N. E. of Cesena. It is partly enclosed by walls. Pop. 5725.

**Cesnola, di** (LUIGI PALMA). See APPENDIX.

**Cespe'des** (MANUEL CARLOS), the leader of the Cuban insurrection, and president of the Cuban republic, born April 18, 1819, was educated at the University of Havana, became a lawyer at Bayamo, issued in Oct., 1868, an address to the Cubans, in which he proclaimed the republic and the independence of Cuba. On April 10, 1869, Cespedes was elected by the Constituent Cortes president of the republic. Killed by the Spaniards Feb. 27, 1874.

**Cespedes** (PABLO DE), b. at Cordova, Spain, in 1538; educated at Alcalá de Henares; studied theology and Oriental languages there; went to Rome on leaving the university and studied painting under Federigo Zuccheri, especially the works of Raphael and of Michael Angelo. Cespedes returned to Spain, and in 1577 was installed in a prebend of the cathedral at Cordova. He was noted as a poet, painter, architect, and sculptor. A "Last Supper," at Cordova, is his best picture; wrote poem on "Art of Painting." Died in 1608.

**Cessart, de** (LOUIS ALEXANDRE), a French engineer, born in Paris in 1719, planned the naval works at Cherbourg, and published a valuable treatise on hydraulic works. Died in 1806.

**Cess-pool**, a well for the reception of the drainage of a locality. It is apt to be a source of very unwholesome emanations.

**Ces'tius, Pyr'amid of**, an antique Roman monument standing close to the Porta San Paolo of Rome, is 125 feet high. It is built of brick and tufa, faced with Carrara marble. The internal walls were decorated with paintings. This pyramid is supposed to have been erected before the Christian era.

**Ces'toid Worms** [from the Lat. *cestus*, a "band," alluding to their ribbon- or tape-like form], an order of entozoa, including the tapeworms (of which some ten species are found in man) and nearly 200 smaller species, some barely visible, some 100 feet or more in length. They are found in all classes of vertebrate animals, living when perfect in the intestines, but in the scolex or larva state inhabiting the living tissues. Cestoid worms are divided into more or less perfectly marked androgynous or bisexual segments (proglottides), which are formed successively behind the neck of the cestoid, each segment acquiring a sort of individual life. Cestoid worms are remarkable for hav-

ing no mouth or digestive apparatus; the animal which they inhabit performs the operation of digestion for them, so that they have only to absorb nutriment by osmotic action. Each segment impregnates itself, becomes in time detached, passes out of the intestine, and finally bursts and discharges its numerous ova; which, scattered by wind and water over grass, etc., are devoured by various animals. Then the ovum hatches into a free embryo or "proscœlex," which pierces the walls of the intestinal canal, enters the blood-vessels, finds a lodgment in an appropriate tissue, where it encysts itself, and changes into the "scolex" or "hydatid" state, as in "measly pork." Then, if the living scolex is swallowed by an appropriate animal, it develops into the complete tapeworm. Sometimes it imperfectly develops its segments even while in the cystic state, and is then called a strobila.

**Cestracion.** See **HETERODACE.**

**Ces'tus** [Fr. *ceste*, from the Gr. *κεστός*, "embroidered"], a girdle or band which women wore round the waist in ancient times. The cestus of Venus was supposed to have the power of exciting love. The gauntlet used by ancient pugilists to protect their hands was called *cestus* or *cæstus*.

**Cetacea**, or **Cetaceans** [Gr. *κῆτος*, a "whale"], an order of mammals characterized by a fish-like form, adapted to strictly aquatic life, and a tail which spreads horizontally. Like other mammals, they have warm blood, respire by the lungs, and the young are born alive and nourished by the mother's milk. There are two existing sub-orders—the toothless cetacea (Mysticete) and the toothed cetacea (Denticete). The former comprises the Balænidæ, or right-whale family, and the Balænopteriðæ, or fin-backs; the latter, the Physeteriðæ, or sperm-whales, the Ziphiidæ, the Delphinidæ, or true dolphins, the Iniidæ, and the Platanistidæ, or fresh-water dolphins. Another sub-order (Zeuglodonta) was represented by certain only tertiary forms.

**Cetot'olites** [from the Gr. *κῆτος*, a "whale," *οἶς*, *ὄστρον*, an "ear," and *λίθος*, a "stone"], fossil cetacean teeth and ear-bones found in the red crag of Suffolk (England), belonging to the pleiocene period. They appear to have been washed out of some earlier stratum. They are valuable as a source of superphosphate manure.

**Cetraria.** See **ICELAND MOSS.**

**Cette**, a fortified seaport of France, in the department of Hérault, on the Mediterranean, on a strip of land between the sea and the broad inlet of Thau, the outlet of the Canal du Midi, and on the railway to Bordeaux, 18 miles S. W. of Montpellier. It has a good harbor and a considerable coasting and inland trade, large fisheries, manufactures of made wines, perfumery, glass, soap, etc., large shipyards and salt-works, and the extensive export trade of the Canal du Midi, of which it is the port, and with which it is connected by the canal of Cette across the tongue of land. The harbor is protected by two large moles and a breakwater. The city was founded in 1660. It forms a half circle about the cliff-like hill, on which is the fortress. Pop. 28,125.

**Cetti'gne**, the capital of the principality of Montenegro, is situated 19 miles E. of the Austrian town of Cattaro, about 3000 feet above the sea. It contains a convent, which was founded in 1458, and is the residence of the bishop; the state prison, and the palace of the prince. In the Peace of Cettigne of Sept., 1862, Montenegro recognized the sovereignty of the Porte. Pop. 2000.

**Ce'tus** [Gr., "the Whale"], a great constellation, one of those called southern by Ptolemy. It contains a number of nebulae and the variable star Mira, or *o Ceti*.

**Ceu'ta** (anc. *Septa* or *Septum*), a fortified seaport-town on the N. coast of Africa and on the Mediterranean, opposite to Gibraltar, which is 17 miles distant. It is in Morocco or Fez, but it has belonged to Spain since 1640. The castle occupies the summit of a mountain which is the ancient *Abyla* and one of the Pillars of Hercules. Ceuta is the chief of the Spanish *presidios* on the African coast. It is the seat of a Roman Catholic bishop, and has several convents and a convict establishment. It occupied the site of the old Roman colony *Ad Septem Frates*. It was strongly fortified by Justinian, but was, nevertheless, taken by the Goths in 618. Through Ceuta, Count Julian brought the Saracens into Spain in the eighth century. Under Arabic rule the town was noted for its manufacturing industry; it is said to have had the first paper-mill ever constructed and operated in the West. It was conquered from the Moors in 1415 by King John I. of Portugal. Pop., with-out the garrison and convicts, 7114.

**Cévennes** (anc. *Cebenna Mons*), a mountain-range in the S. of France, forms the watershed between the Rhone and the Garonne. It extends from the vicinity of Carcas-sonne in a N. N. E. direction to the Canal du Centre. The

central mass of the Cévennes is in the departments of Ardèche, Lozère, and Upper Loire. The highest summit is Mont Mezin or Mézen, which has an altitude of 5764 feet. Some of the peaks are extinct volcanoes. These mountains were a stronghold of the Protestants called Camisards, and were the scene of several religious wars.

**Ceylon**, see 'lon [native *Singhala*; anc. *Taprobane*], an island of Asia, belonging to the British, in the Indian Ocean, about 55 miles from the southern extremity of Hindostan, from which it is separated by Palk Strait. It lies between lat. 5° 55' and 9° 51' N., and between lon. 79° 41' and 81° 54' E. Length from north to south, 266 miles; greatest width, 140½ miles. Area, 25,364 square miles. The southern and eastern coasts are bold and rocky, and present a very picturesque appearance, which is increased by the luxuriant tropical vegetation, the verdant slopes of its mountains, and groves of noble palms draped in perennial green. The surface is finely diversified by mountains, valleys, and plains. The highest summit is Pedrotallagalla, which rises 8280 feet above the level of the sea. The celebrated mountain called Adam's Peak is 7280 feet high, and is remarkable for its conical form and the sacred associations with which it is connected. The Singhalese have a tradition that Booddha ascended to heaven from this peak. The mountains of Ceylon are mostly formed of gneiss and granite, and dolomite occurs in the more level parts of the island. Among the minerals are iron, tin, coal, plumbago, and salt. Many sapphires, rubies, emethysts, and other precious stones are found here. The climate is humid and hot, but more pleasant and moderate than the mainland of India. The average annual rainfall is about eighty inches.

Ceylon is remarkable for the luxuriance and variety of its flora. Among its indigenous trees are the cocoa-palm, palmyra, and other species of palms, the coral tree (*Eurythrina Indica*), the bread-fruit, the cinnamon, the satin-wood, and ebony. The bo tree or peepul (*Ficus religiosa*) attains a great age, and is deemed sacred by the natives. Coffee, cotton, rice, tobacco, and pepper are cultivated here. The chief articles of export are coffee, cinnamon, cocoanuts, coconut oil, coir, hides, pearls, and plumbago. Among the wild animals found here are the buffalo, bear, deer, leopard, and elephant. The last are very numerous.

The native population is composed mostly of Singhalese, whose historical records, extending back through many centuries, are partially corroborated by existing ruins of cities and temples, which indicate that Ceylon in a remote antiquity was inhabited by a numerous and civilized people. The most celebrated among its monuments is the cave-temple of Dambool, which was built about 100 B. C., and is profusely adorned with images and sculpture. It was dedicated to Booddha. Booddhism is still the prevailing religion of the island. The principal religious creeds numbered, in census of 1881, 1,698,070 Buddhists, 197,775 Mohammedans, and 147,977 Christians. The native Christians are mostly Singhalese and Tamils. Among the remarkable antiquities of Ceylon are numerous colossal ruined tanks, constructed for the irrigation of the soil.

Ceylon has three harbors—Point de Galle on the S. coast, Trincomalee on the N. E. coast, and Colombo on the S. W. coast. The harbor of Trincomalee is one of the finest in the world, and is capable of admitting a number of the largest ships. It is the principal British naval-station in the Indian seas. The Oriental mail-steamers, which ply between England and Calcutta, touch at this island, which has an extensive commerce. The value of the exports from Ceylon to the United Kingdom in 1881 was £2,136,350; of the imports from the United Kingdom, £806,948; public revenue in 1881, £1,283,108; expenditures, £1,268,743; public debt, £1,943,000. In ancient times it was visited for the purpose of traffic by the Egyptians, Greeks, and Romans. Ceylon is divided into seven administrative provinces, called the Western, North Central, Central, Southern, Northern, North-western, and Eastern provinces. Capital, Colombo. Kandy, Trincomalee, Point de Galle, Jaffnapatam, and Singapadaya are also important cities. Ceylon had about 170 miles of R. R. in 1882.

**History.**—Original inhabitants, Yakkhos; these conquered by Singhalese 543 B. C.; Malabars conquered Ceylon about A. D. 1200, but the Singhalese partly recovered it in 1235; Portuguese came in 1505; driven out by the Dutch in 1658, and these by the English in 1795; Ceylon annexed to British crown in 1802; whole island conquered 1815; most prosperous of British colonies.

**Population** in 1881, 2,761,396; of these the native tribes constitute over 2,250,000; they are Singhalese, emigrants from Hindostan 543 B. C., and Booddhists: Kandyans, or Highlanders, and Malabars, both Brahmans; Moormen, originally Persians or Arabs, Mohammedans; Veddars or outcasts, of the lowest scale, without religion. The remainder are Eurasians or burghers, Romanists or Protest-



ants, and Europeans, mostly Protestants. (See SIR JAMES E. TENNENT, "Ceylon, Physical, Historical, and Topographical.") L. P. BROCKETT.

**Cezim'bra**, a seaport-town of Portugal, in Estremadura, on a bay of the Mediterranean, 19 miles S. of Lisbon. It has valuable fisheries. Pop. 5797.

**Chablais**, the most northern part of Savoy, bordering on Lake Geneva. It was the oldest possession of the House of Savoy, and was ceded to France by King Victor Emmanuel in 1860. Capital, Thonon.

**Cha'brias** [Χαβρίας], an able Athenian general, who had command of an army in 392 B. C. In 378 he commanded in a war against the Spartans. He gained a naval victory over the Spartans at Naxos in 376, and was killed at the siege of Chios, where he commanded a fleet, in 357 B. C. He invented a famous manœuvre, which consisted in receiving a charge in a kneeling posture, with shields resting on the ground and the spears pointed against the enemy.

**Chachapoy'as**, a town of Peru, capital of the department of Amazonas, 400 miles N. E. of Lima, was founded by Francisco Pizarro in 1536, and was once flourishing, but on account of continued revolutions has gradually decreased. It is the seat of a Roman Catholic bishop, and has a theological seminary and a fine cathedral. Pop. 3366.

**Cha'co, El Gran**, an extensive region of South America, is near the middle of the continent. It is partly in Bolivia and partly in the Argentine Republic. It is bounded on the E. by the Paraguay River, and traversed by the Pilcomayo. The surface is generally level, and the S. portion is said to be an arid and desert plain, but the soil in some parts is fertile. It has no civilized inhabitants.

**Chacornac** (JEAN), a French astronomer, born at Lyons, France, June 21, 1823. During the years 1853-54 he was in charge of the observatory of Marseilles, and in the latter year was appointed astronomer of the Paris Observatory. He was an astronomer of reputation, and distinguished for his discoveries of asteroids, as well as for his writings on the planetary systems. Napoleon III. made him chevalier of the Legion of Honor 1858. He contributed the atlas to the "Annals of the Observatory of Paris," 1858 and 1863. Died at Paris Sept. 26, 1873.

**Chad'bourne** (PAUL ANSEL), LL.D., born at N. Berwick, Me., Oct. 21, 1823, was educated at Williams College, and studied theology in the Hartford Theological Seminary; was appointed principal of the high school at Great Falls, and then professor of chemistry and natural history in Williams College (1853-67) and in Bowdoin College (1859-66). In 1859 he visited Ireland, and in 1860 he led a scientific expedition to Greenland. He was elected president of the University of Wisconsin and professor of metaphysics in the same (1867-70). He published "Natural Theology" (1867) and "Instinct in Animals and Men" (1872). He was editor-in-chief of "The Wealth of the United States;" chosen president of Williams College in 1872; in July, 1880, tendered his resignation, to take effect at the end of the next college year, and became president of Massachusetts Agricultural College 1882. Died in Boston Feb. 23, 1883.

**Chad'wick** (EDWIN), an Englishman, noted as a sanitary reformer, was born in the environs of Manchester Jan. 24, 1801. He was appointed secretary to the poor-law board in 1834, and published in 1842 an important "Report on the Sanitary Condition of the Laboring Population." As a member of the new board of health appointed in 1848, he distinguished himself by his efficient efforts to improve the sanitary and social condition of the people.

**Chære'mon**, an Athenian tragic poet, from several of whose dramas passages are quoted by Athenæus, although Suidas in his brief notice of him calls him a comic poet. Little is known of his life, but he is referred to by Ehippus, who seems to speak of him as a contemporary, and he is criticised by Aristotle. He may be placed therefore about 380 B. C. He fell below the dignity of the great tragic poets of the preceding century, and wrote dramas better fitted to be read than to be acted. Ten titles of plays written by him are known, besides the "Centaurus," which is called by Athenæus a "drama in many metres," and by Aristotle a "mixed rhapsody of all metres." There are also three epigrams in the Anthology bearing his name. (The fragments of his tragedies are collected in WAGNER's and in NAUCK's "Fragmenta Tragicorum Græcorum.")

HENRY DRISLER.

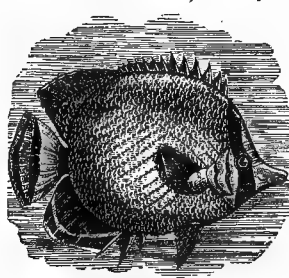
**Chære'mon of Alexandria**, a Stoic philosopher and historian who flourished in the times of the early Roman emperors. He is often spoken of as librarian of the Alexandrian Library, but this is probably an incorrect inference from the language of Suidas, who calls him the teacher of Dionysius, who was librarian of this library, and who

succeeded Chæremon in his philosophical school. He went from Alexandria to Rome to take charge, along with Alexander of Ægæ, of the education of Nero. He wrote a work on hieroglyphics, and one on the history and religion of Egypt, a fragment from which, concerning the Egyptian priests, is preserved, and makes the loss of the rest regretted. He wrote a treatise on comets and a grammatical work. (The fragments of his writings are collected in MÜLLER's "Hist. Græcorum Fragmenta," vol. iii., pp. 495-499.)

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**Chærone'a** [Gr. Χαίρωνεια], an ancient town of Bœotia, 5 miles N. of Lebadea, was the native place of Plutarch. Here Philip of Macedon gained an important victory over the Athenians and Thebans in 338 B. C., and Sulla defeated the army of Mithridates in 86 B. C. The site is occupied by the modern village of *Kapurna*. A few years ago a colossal lion was excavated from the mound which was raised in honor of the Thebans who were killed in battle here in 338 B. C. This lion is described by Colonel Mure as a "noble piece of sculpture, and the most interesting sepulchral monument in Greece."

**Chætodon'tidæ**, a family of the acanthopterous marine



Chætodon.

fishes named *Squamipennes* ("scaly-finned"), because of the incrustation of parts of the dorsal and anal fins with scales. The scales are strongly ctenoid (comb-shaped). The typical genus *Chætodon*, and those nearly allied to it, have hair-like teeth; some of the family, however, have trenchant teeth, and some have teeth both on the jaws and palate. Their colors

are often gay, and disposed in stripes or bands. Many singularities of form occur in this family. The flesh of most of the Chætodontidæ is of fine flavor. *Chelmon rostratus* and *Toxotes jaculator*, both Asiatic fishes, are remarkable for catching insects by shooting drops of water at them from their mouths; but some of the latest authorities exclude these fishes from the family, of which the southern coasts of the U. S. have several species.

**Chaff** [Lat. *palea*; Fr. *paille*], the common name of the dry and membranaceous scales which constitute the floral envelopes of the graminaceous plants, and enclose the grain or seed. These scales are the glumes and paleas (*paleæ*) of botanical language.

**Chaf'finch** [from *chaff* and *finch*, because the bird searches in chaff for grain], a common European, Asiatic, and African song-bird, the *Fringilla cœlebs*, which devours not only seeds, but young plants, but is very valuable as a destroyer of noxious insects. It is esteemed for the table in Southern Europe, and in Germany is prized for its loud song, in which some birds greatly excel. Good singers are sold for extraordinary prices.

**Cha'gres**, a small seaport-town of Colombia, on the Isthmus of Panama and on the Caribbean Sea, at the mouth of the Chagres River, about 9 miles W. S. W. of Spainwall. It is a miserable collection of huts, with a shallow harbor.

**Chagrin' Falls**, Cuyahoga co., O. (see map of Ohio, ref. 2-H, for location of county), on R. R. and the Chagrin River, 17 miles E. S. E. of Cleveland. It has several iron-foundries and paper-mills. P. in 1870, 1016; in 1880, 1211.

**Chain**, or **Gunter's Chain**, in surveying, is a measure twenty-two yards long, composed of 100 iron links, each of which is 7.92 inches long. Ten square chains make an acre = 4840 square yards.

**Chain Cable**. See CABLE.

**Chain Mail**, or **Chain Armor**, consisted of hammered iron links connected together in the form of a garment. Such armor, which was much used in the twelfth and thirteenth centuries, was more flexible and convenient to the wearer than that which was formed of plates.

**Chains, Hanging in**. It was once customary for judges in England to direct the bodies of malefactors, after execution, to be hung in chains upon a gibbet, in order to strike terror into other offenders, and that it might afford "a comfortable sight to the relations and friends of the deceased." An act to abolish the practice was passed July 25, 1834, by Parliament.

**Chain-Shot**, a name of missiles used in naval warfare, consisting of two balls which are connected by a chain about eight inches long, and are discharged from a cannon.

**Chala'za** [Gr. *χάλαζα*, a "hailstone"], in botany, a membrane which unites the nucleus and integuments at the base of the ovule. It often differs in color from the rest of the integuments, and is conspicuous in the ripened seed. The cords which attach the yolk of an egg to the lining membrane at the ends of the shell are also called chalazae.

**Chalce'don** [Gr. *Χαλκηδών*], an ancient Greek city of Bithynia, on the Bosphorus, opposite to Byzantium, from which it was about  $1\frac{1}{2}$  miles distant. On all the coins of Chalcedon the name is written *Χαλκηδών*. It was founded 685 B. C., and became a large town, containing numerous temples. The Romans obtained possession of it in 74 B. C., and under the Roman empire it was a free city. The philosopher Xenocrates was born here about 396 B. C. In 451 A. D. a general council of the Church was held at Chalcedon, on the subject of the doctrinal disputes of the Nestorians and Monophysites. This, the fourth œcumenical council, condemned the heresy of Eutyches.

**Chalced'ony** [Gr. *χαλκηδών*], a precious stone which was so named because it was found near the ancient Chalcedon, is a beautiful variety of quartz. It is identical with common quartz or siliceous in chemical composition. It occurs in trap and other rocks in many parts of the world. It is generally translucent, sometimes semi-transparent, and exhibits various colors, among which are milk-white, reddish-white, blue, green, and brown. Chalcedony is much used in jewelry for necklaces, brooches, etc. Among collections of antique gems are many beautiful engraved specimens of chalcedony.

**Chalced'onyx**, a name given to agates formed of chalchong, or a white opaque chalcedony, alternating with a grayish translucent chalcedony.

**Chalcid'idæ**, a family of lacertilian reptiles found in warm regions in both continents. They are popularly considered snakes, having no visible legs. They have movable eyelids, small ears, and a short thick tongue. —Also the name of a family allied to the ichneumon flies, which are of great service in the destruction of noxious insects upon which their larvæ feed.

**Chal'cis**, the chief town of the island of Eubœa in Greece, 18 miles N. E. of Thebes, on the Strait of Euripus (at this point only 40 yards wide), and connected with the mainland by a bridge. Is said to have been colonized from Athens. Aristotied died there 322 B. C. It was taken by the Venetians 1205 A. D., by the Turks 1470, and by the Greeks 1821. Pop. 6000. It is the only town in Greece where any Mohammedans remain.—2. An ancient city of N. Syria, 10 or 12 miles S. of Chalybon (modern *Aleppo*), on the old caravan-route to Heliopolis (*Baalbek*); said to have been founded by Seleucus Nicator (312–280 B. C.). In 638 A. D. it was destroyed by the Arabs under Abu Obeidab, and its name was changed to *Kenniserin*. The ruins are extensive.—3. An ancient city of Coele-Syria, mentioned repeatedly by Josephus in connection with the Herods. Its ruins, nearly a mile in circuit, now called *Anjar*, are close to the post-road between Beirut and Damascus. R. D. HITCHCOCK.

**Chaldæ'a** [Gr. *Χαλδαία*], the ancient name of a country of Asia, bordering on the Euphrates and the Persian Gulf, and bounded on the S. W. by Arabia Deserta. Chaldæa proper was the southern part of Babylonia, but the name was sometimes used to designate a more extensive region. The term Chaldæans (or Chaldees) was applied by the Hebrew prophets and other ancient writers to the inhabitants of the city of Babylon and all the subjects of the Babylonian empire. Thus, Isaiah calls Babylon "the beauty of the Chaldees' excellency" (chap. xvii. 19), and Pliny speaks of Babylon as *Chaldaicarum gentium caput*. The Chaldæans appear to have been the great pioneers in the cultivation of astronomy. They were also famous as astrologers and magicians. When the book of Daniel and the historians Curtius, Strabo, and Diodorus speak of the Chaldæans as the learned class of the Babylonian people, or even as a particular section (the astrologers) of that class, they have no warrant whatever in reality for doing so. Strabo mentions another nation of Chaldæans or Chaldees, originally Chalybees, but they had nothing to do with the Babylonian people; they were of Arian descent, related to the Kurds or Karduchians. (See *BABYLONIA*.)

**Chaldæ'an Chris'tians**, a branch of the Church of Rome, consisting of those Nestorians who acknowledge the pope. They are of the Eastern rite, and are under the patriarch of Babylon and twelve bishops, three of whom reside in Persia. They number about 70,000 souls.

**Chal'dee Lan'guage**, or **East'ern Arama'ic**, a Semitic dialect, in which parts of the books of Daniel and Ezra were written, as well as several verses in Genesis, Judges, etc. It resembled the Hebrew and Syriac. It does not appear to be certain that this was the common

language of ancient Babylon. The Targums were written in a later Chaldee. (See *WINER'S "Chaldee Grammar,"* and *HUFFELD* in the "Theologische Studien" for 1830.)

**Chal'der**, an old Scottish dry measure containing sixteen bolls.

**Chaldron**, *chaul'dron* or *chau'dron* [Lat. *caldarium*; Fr. *chaudron*], a dry measure used for coals, and containing thirty-six bushels. Coal is now sold by weight in the U. S.

**Chaleurs Bay**, an inlet of the Gulf of St. Lawrence, Canada, separates Quebec from New Brunswick. It extends E. and W. about 90 miles, and is about 22 miles wide at the broadest part. It affords good anchorage, and can be navigated without danger. It has important mackerel fisheries.

**Chal'ice** [Lat. *calix*, a "cup, a goblet;" Fr. *calice*, a "drinking-cup," a "bowl"]. This term was formerly used as a name for an ordinary drinking-cup, but it is now almost exclusively applied to a communion-cup, a vessel used for the wine in the sacrament of the Eucharist. Chalices are commonly made of silver or gold.

**Chalk**, *chawk* [Lat. *creta*; Fr. *craie*], a calcareous earth, a soft variety of limestone or carbonate of lime. Its color is generally white. It is friable, easily pulverized, has an earthy fracture, and is very meagre to the touch. In geology, it is a sedimentary rock of great extent and importance, and a member of the cretaceous formation, which is more recent than the Jurassic and older than the tertiary formation. Chalk is abundant in England and in several other countries of Europe, and good commercial chalk is reported to exist in Dakota. The strata often contain flint nodules, distributed in layers through it like the hornstone in the earlier limestone. They are more or less rounded, and are all of concretionary origin. Chalk is a mineral of animal origin, and is mostly composed of the shells or carapaces of microscopic marine animals. According to Ehrenberg, a cubic inch of chalk often contains more than a million of microscopic organisms, among which far the most abundant are the rhizopods (called also Foraminifera). Chalk is extensively used in the preparation of lime, and is commonly employed by carpenters to mark boards. The material sold under the name of whitening or Spanish white, and used to make putty, is chalk in a purified state. Purified chalk is also employed by artists as a pigment, and is administered in medicine as an antacid. (See *CRETACEOUS SYSTEM*.)

**Chalk, Black**, also called **Drawing Slate**, a mineral used by artists for drawing and writing, is a variety of clay which derives its color from the carbon which it contains. It is easily cut or broken, and makes a black mark on white paper. It is found in primitive mountains in Spain, France, Italy, etc., and also in the coal-formation in Scotland.

**Chalk, Red, or Reddle**, is an argillaceous oxide of iron, of a brownish-red color, containing a large portion of clay. It is used by carpenters and painters.

**Challenges**. See *JURY*, by PROF. T. W. DWIGHT.

**Challis**, capital of Custer co., Idaho Ter. (see map of Idaho, ref. 4–B, for location of county). Pop. in 1880, 614.

**Chalmers** (ALEXANDER), a Scottish writer, born at Aberdeen Mar. 29, 1759. He is famous as the author of a "General Biographical Dictionary," in 32 vols. (1812–17), and as the editor of a well-known edition of the British poets, with notes. Died Dec. 10, 1834.

**Chalmers** (GEORGE), a Scottish antiquary and lawyer, born at Fochabers in 1742. He was clerk to the board of trade from 1786 to 1825. His greatest work is entitled "Caledonia: An Account, Historical and Topographical, of North Britain" (3 vols., 1807–24), which displays profound research and much erudition. Among his other works is a "Life of Mary Queen of Scots" (1818). Died in 1825.

**Chalmers** (LIONEL). See *APPENDIX*.

**Chalmers** (THOMAS), D.D., LL.D., D. C. L., a Scottish divine, was born at Anstruther, Fifeshire, Mar. 17, 1780, and was educated in the University of St. Andrew's. In 1803 he was ordained minister of the parish of Kilmany. His favorite studies for some years before and after this event were mathematics and natural philosophy. He published in 1808 an "Inquiry into the Extent and Stability of the National Resources." While composing an article on "Christianity" for Brewster's "Encyclopædia" in 1809, he examined the evidences of its truth, and acquired convictions which rendered him a more earnest and devout preacher of the gospel. He married Miss Grace Pratt in 1812, and was elected minister of the Tron Church, Glasgow, in 1815. He soon gained distinction as an eloquent and powerful pulpit orator, and delivered a series of dis-

courses on astronomy in connection with religion, which were published in 1817, and were immensely popular. In 1819 he became minister of St. John's parish, Glasgow, in which he established schools and made strenuous efforts to improve the morals of his parishioners. He was appointed professor of moral philosophy in the University of St. Andrew's in 1823, and obtained the chair of theology in the University of Edinburgh in 1828. He published in 1832 a work entitled "Political Economy," and in 1833 his Bridgewater treatise "On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man," which was received with great favor. Dr. Chalmers was the leader of the Evangelical party, which was involved with the "Moderate" party in a contest in relation to patronage. This contest resulted in the disruption of the Church of Scotland in May, 1843. Dr. Chalmers and 470 other clergymen then seceded and organized the "Free Church." He expended the latter years of his life in perfecting his "Institutes of Theology" and in officiating as principal of the Free Church College. He died May 30, 1847. (See "Memoirs of his Life and Writings" (4 vols., 1850-52), published by his son-in-law, Rev. WILLIAM HANNA; FRANCIS WAYLAND, "Memoirs of the Christian Labors of Thomas Chalmers.")

**Chalonnès-sur-Loire**, a town of France, department of Maine-et-Loire, on the river Loire, here crossed by a suspension bridge, 11 miles S. W. of Angers. Pop. in 1881, 5139.

**Châlons-sur-Marne** (anc. *Catalauni* or *Catalaunum*), a city of France, capital of the department of Marne, is on the right bank of the Marne and on the railway from Paris to Strasburg, 107 miles E. of Paris. It is situated in a fertile plain, which is part of the former province of Champagne, and has a stone bridge across the river. It is a bishop's see, and contains a fine cathedral, a botanic garden, and a public library of about 25,000 volumes; also manufactures of cotton, linen, and woollen fabrics. Champagne wine is produced in the vicinity. In the Catalaunian Plain adjacent to Châlons the Roman general Aetius and Theodoric the Visigoth gained a great victory over Attila in 451 A. D. In the early part of the Dark Ages, Châlons was one of the most important commercial cities of Europe, and had about 60,000 inhabitants. In 1857 the celebrated Camp de Châlons was established near Châlons, in which always one or two French army corps were kept for drilling; it was evacuated by the French in Aug., 1870, and entirely abandoned in 1871. Pop. in 1881, 23,199.

**Châlon-sur-Saône**, or **Châlons-sur-Saône** (anc. *Cabillonum*), a town of France, department of Saône-et-Loire, is on the right bank of the Saône and on the railway from Dijon to Lyons, 77 miles by rail N. of Lyons. It is at the head of steamboat navigation, and has an active trade, being the eastern terminus of the Canal du Centre, which connects the Saône with the Loire. The chief public buildings are a cathedral founded in the thirteenth century, St. Peter's church, and the town-hall. It has a theatre and a large public library; also manufactures of glass, jewelry, hosiery, linen fabrics, pottery, etc. Pop. in 1881, 21,618. It is identified with the ancient *Cabillonum*, which became the capital of Burgundy under Gontran, king of Burgundy, who died in 593 A. D.

**Chalybeate** [from the Gr. *χάλυξ* (gen. *χάλυκος*), "iron" or "steel"], containing iron in solution, applied to waters which are impregnated with iron. There are two kinds of chalybeate water—the carbonated, which contains carbonate of iron, and may be recognized by forming an ochreous deposit of red oxide of iron on the stones near the mouth of the spring; and the sulphated, which contain sulphate of iron (copperas) in solution. (See **WATER**.)

**Cham** [French for Ham, son of Noah], assumed name of ΑΜΕΔΕΕ DE NOË, a French caricaturist, born Jan. 26, 1819, studied with Delacroix and Charlet. His first grotesque sketches appeared in 1842, and then followed an uninterrupted series in almanacs and in "Charivari." D. Sept. 7, 1879.

**Chamæleon** (Gr. for "ground-lion"), a genus (*Chamæleo*) of saurian reptiles constituting a family (*Chamæleontidae*), representing a separate tribe (*Dendrosauria*) of lizards. About fifty species are known, inhabiting Africa and Asia, but most numerous in the island of Madagascar; one is found in Southern Europe. They have a compressed body, with granular scales; the head almost fixed, but the eyes with a wonderful power of motion, each eye being covered by a lid pierced with one small hole; ears beneath the skin; the tail prehensile; the movements extremely slow; the tongue cylindrical and extensible, in appearance resembling a common angle-worm; the toes in two opposable sets, fitted for grasping boughs, etc. Many fables have been related of the chameleon, such as that it lives upon air, has the power of changing color at will, or assuming

the color of the object upon which it is placed. The food of the chameleon is insects, which it catches by darting out its long, sticky tongue; but its lungs are large, and it has a habit of enormously dilating itself with air. Its changes of color are not altogether voluntary, and it does not appear to assimilate its color to the object upon which it is placed. But its colors are somewhat changeable. This has been explained (1) by the action of the nervous energy, which, as in blushing, may perhaps affect the circulation of the blood in the skin, and it is certain that fear or other emotions will cause the color to change; (2) by the varied amount of air in the animal's lungs; (3) by the action of light; (4) by the presence of two differently colored layers of pigment-cells in the skin, so arranged as to move upon each other and produce various effects of color. It is probable that all these conditions may contribute to the result.

It is said that that lack of nervous co-ordination between the two sides which in most animals is only seen in diseased or defective organizations, is either normal to the chameleon or is very easily produced in it. It is even asserted that one side of the reptile may be awake while the other is asleep. If modern science finds this creature so remarkable, it is not strange that the ancients made the chameleon the possessor of many marvellous powers.

**Chamæleon**, of Heraclea on the Pontus, a Peripatetic philosopher, a disciple of Aristotle or Theophrastus. He was the author of several philosophical treatises, chiefly on moral subjects, and of a variety of writings on the ancient Greek poets—e. g. *Æschylus*, *Anacreon*, *Thespis*, *Homer*, *Lasus*, *Pindar*, *Sappho*, *Simonides*, and *Stesichorus*. These essays seem to have treated of the lives of the poets, as well as to have entered into the criticism of their works. His commentary on Homer must have been of considerable extent, as the fifth book is referred to by Tatian. Titles of fifteen different works, with a few fragments, are preserved by Athenæus and others. (An account of his life and writings is given by KÖPKE, Berlin, 1856; CLINTON, "Fasti Hellenici," vol. iii., p. 493.)

HENRY DRISLER.

**Chamærops**, a genus of palms having fan-shaped leaves and flowers in spathes about six to eight inches long. The *Chamærops humilis*, often called palmetto, is the only species of palm indigenous in Europe. The fruit is a triple, spongy drupe, which is edible. The leaves are used for making brooms, hats, and seats of chairs. The fibre of the leaves is a valuable material for cordage and paper, and is imported into France to be used in the manufacture of carpets. The blue palmetto of the Southern U. S. is *Chamærops Hystrix*. Other species of this genus are found in tropical countries.

**Chamber**, an apartment of a house, a private apartment, a lodging-room; a hollow or cavity, as the chamber of the ear. In politics, the term is applied to a legislative assembly, as the (former) Chamber of Deputies in France. The room which the U. S. Senate occupies is called the Senate Chamber. Chamber of commerce is the title of an association or body of merchants which is commonly formed in each large commercial city for the promotion of the mercantile interests and general prosperity of the place.

**CHAMBER** of a cannon or of a small firearm is a contracted part of the bore at the breech end. The chamber contains the charge of powder, but it is too small to admit the shot or shell. These cavities are of various forms, spherical, cylindrical, conical, etc. Carronades and mortars are usually chambered.

**Chamber-Counsel**, a lawyer or counsellor-at-law who gives opinions in his private chamber, but does not conduct causes in court.

**Chamberlain** [Lat. *camerarius*; Fr. *chambellan*; It. *camerlingo*], an officer attached to the court of a monarch, and who formerly had charge of the private apartments of the palace. He was originally the keeper of the treasure-chamber. The office of chamberlain was one of the grand offices of the Crown in France. The lord chamberlain of England is an officer of high rank in the royal household, and has the function of endorsing the king's answer on petitions presented to him, and often communicates His (or Her) Majesty's pleasure to Parliament and to the council. He has control over all the officers and servants of the royal chambers except those of the bed-chamber. All tradesmen and artificers in the service of the sovereign



Chamæleon.

are appointed by him. He is a member of the privy council.

The lord great chamberlain, another officer, is an official of the British court of noble birth and holding the title by inheritance. He has charge of the House of Lords during sessions, walks by the right hand of the sovereign in certain processions, and performs many other duties.

**Chamberlain, Dak.** See APPENDIX.

**Chamberlain (D. H.).** See APPENDIX.

**Chamberlain (JOSHUA LAWRENCE), LL.D.,** a noted American general and educator, born in Bangor, Me., Sept. 8, 1858, graduated at Bowdoin College in 1882, entered the volunteer service of the U. S. in 1862, and became a major-general in 1865. He received six wounds while in the army. From 1866 to 1870, inclusive, he was governor of Maine, and in 1871 he became president of Bowdoin College; resigned 1883.

**Cham'berlen (HUGH),** an English physician, born in 1664, practised in London. He invented the obstetric forceps. Died in 1728.

**Cham'bers, in law.** A judge is said to act at "chambers" when a legal proceeding is carried on before him out of court, either at his office or residence or other convenient place, including the court-room itself. Business done before a judge at chambers, as distinguished from that transacted in court, is increasing in modern times. The codes of procedure in some of the American States expressly provide that certain acts shall be done by the court, and others by a judge, referring in the last instance to an act done at chambers. Through the same medium a great change has been worked in England in the practice of the court of chancery. Formerly the details of business in that court were transacted by an officer termed "master in chancery," who exercised an almost independent jurisdiction, acting without communicating with the judge until he made his report of his conclusions, which was then submitted to the court as a basis for its decree. By the 16 Vict., ch. 80, the office of master was abolished, and the business formerly committed to him was directed to be transacted under the direction and control of the judge, or, in other words, at chambers. Under this system each of the judges has under his control chief clerks and junior clerks, who act in his behalf in taking accounts and making inquiries, and who are more directly responsible to him than were the masters under the earlier practice. Under the law of 1873 for the reorganization of the English courts (36 and 37 Vict., ch. 66), the duties of chamber clerks after that act goes into effect (Nov. 2, 1874) are to be performed by officers of the court in the permanent civil service of the Crown. The same law also provides for official and special referees, who may, under the direction of a court or judge, perform acts similar to those formerly entrusted to masters in chancery. T. W. DWIGHT.

**Chambers (EZEKIEL F.), LL.D.,** born in Kent co., Md., Feb. 28, 1788, graduated at Washington College, Md., in 1805, became a lawyer, served in the war of 1812-15, and was made a brigadier-general of militia. He was U. S. Senator from Maryland (1826-35), taking a prominent position; was a judge in the State courts (1834-51), and in 1852 declined the secretaryship of the navy. Died Jan. 30, 1867.

**Chambers (GEORGE), LL.D.,** born in 1786 at Chambersburg, Pa., graduated at Princeton in 1804, became a very prominent lawyer, was a member of Congress (1833-37), and became in 1851 a justice in the supreme court of Pennsylvania. He prepared a number of valuable papers on the early history of the State, some of which were destroyed at the burning of Chambersburg in 1863. Died Mar. 25, 1866.

**Chambers (ROBERT), LL.D.,** a Scottish writer and publisher, born at Peebles July 10, 1802. He became a bookseller in Edinburgh, and wrote several works, among which is "Traditions of Edinburgh" (1824). He entered into partnership with his brother William in 1832, after which they published many cheap and popular works entitled "Information for the People," "Cyclopædia of English Literature," "Papers for the People," "Chambers's Encyclopædia" (1859-68), etc. Died Mar. 17, 1871.

**Chambers (TALBOT W.), D. D., LL.D.** See APPENDIX.

**Chambers (WILLIAM), LL.D.,** a Scottish author and editor, brother of ROBERT, was born at Peebles Apr. 16, 1800. He founded Chambers's "Edinburgh Journal" in 1832, and became a partner with his brother in an extensive publishing-house of Edinburgh. They were distinguished for their enterprise and their successful efforts to supply the people with cheap and instructive literature. (See CHAMBERS, ROBERT.) He was the author of several works, among which is "Things as they are in America." He was chosen lord provost of Edinburgh in 1865. Died May 20, 1883.

**Chambersburg, R. R. junction,** capital of Franklin co., Pa. (see map of Pennsylvania, ref. 6-E, for location of county), on the Conococheague and Falling Spring creeks, 52 miles S. W. of Harrisburg. It is in the southern portion of the fertile limestone valley between Blue and South mountains. It has manufactories of wool, paper, and iron, an academy, a female seminary, and well-conducted public schools. It was settled by the Scotch-Irish. On the 30th of July, 1863, a body of Confederate cavalry under Gen. McCausland entered the town and laid it under tribute of \$200,000 in gold or half a million in currency; this demand not being complied with by the inhabitants, McCausland ordered the town to be fired; loss, \$1,000,000. About two-thirds of the place was destroyed and 2500 persons were deprived of their homes. It has been entirely rebuilt. Pop. in 1870, 6308; in 1880, 6877.

**Chambéry [It. *Chamberi*],** a city of France, capital of the department of Savoy, is beautifully situated on the river Leysse, in a rich vine-clad valley about 60 miles E. S. E. of Lyons. It is on the railway which connects France with Italy and passes through a tunnel near Mont Cenis. It contains an old castle of the dukes of Savoy, a cathedral, several convents, and a public library. Here are manufactures of silk gauze, lace, hats, etc. It was formerly subject to the king of the Sardinian States, but was ceded to France in 1860. Pop. in 1881, 19,622.

**Cham'bliss (JOHN R.),** an American Confederate officer, born in Virginia in 1833; graduated at West Point 1853, and resigned from the army in 1854 to devote himself to agricultural pursuits in Virginia. He was actively identified with the State militia, being colonel, etc. At the outbreak of the civil war he espoused the Confederate cause, and was appointed a brigadier-general, serving with gallantry. At the battle of Deep Bottom, Va., Aug. 16, 1864, while leading a brigade of cavalry, he was killed.

G. C. SIMMONS.

**Chambliss (WILLIAM P.),** an American lawyer and soldier, born in Virginia; served during the war with Mexico as lieutenant, subsequently captain, Third Tennessee Volunteers. At the close of the war he resumed the practice of his profession at Pulaski, Tenn.; was elected member of the State legislature 1853-54; Mar., 1855, he was commissioned in the army a first lieutenant Second Cavalry, and stationed in Texas, where he was mainly engaged, till 1861, against the Comanches and other hostile Indians; promoted captain Fifth Cavalry April, 1861, and major Fourth Cavalry 1864. He was engaged in the actions of Manassas and Peninsular campaigns of 1862 up to June 27, when, at the battle of Gaines's Mill, after having been wounded six times, he was taken prisoner while leading a cavalry charge. Resigned from the army Nov., 1867, and became superintendent of a railway and mining company in Canada.

G. C. SIMMONS.

**Cham'bly Ba'sin,** a beautiful post-village of Cham'bly co., province of Quebec (Canada), at the mouth of the Cham'bly and St. John's Canal and on Richelieu River, 16 miles E. of Montreal, has an important trade with Lake Champlain, and is the seat of Cham'bly College. It has a large hospital for the sick and poor, under the care of the Sisters of Charity. Pop. in 1881, 1506.

**Cham'bly Can'ton,** a manufacturing village of Cham'bly co., province of Quebec (Canada), 1 mile above Cham'bly Basin, at the rapids of the Richelieu, which furnishes water-power for extensive lumber and woollen mills, a foundry, etc. Pop. in 1881, 988.

**Cham'bly, Capture of Fort, in 1775.** The fort at Cham'bly was situated 12 miles below St. John, at the rapids of the Sorel, which form the outlet of Lake Champlain. Gen. Carlton thought that the fort was safe and could not be reached by the republicans as long as the British held the post above, and he consequently kept only a small garrison there. Gen. Montgomery, however, who was besieging St. John, was informed of the state of affairs by Canadian scouts, and sent Col. Bedel of New Hampshire, assisted by Maj. Brown and Livingston and provided with a sufficient number of troops, to capture the post. The plan for the attack was laid by Canadians who were familiar with the place and all its surroundings. The artillery, whose conveyance to the point where it was needed presented the greatest difficulties, was placed in bateaux and during a dark night brought past the fort at St. John to the head of Cham'bly Rapids, where the guns were mounted and taken to the place of attack. Only a slight resistance was made, after which the garrison surrendered. A large quantity of provisions and military stores was taken, besides the colors of the Seventh Regiment of British regulars. The colors were sent to the Continental Congress as trophies of victory, and, indeed, the capture of the fort hastened the surrender of St. John.

**Chambon-Feugerolles, Le**, a French town in the department of Loire. Its manufactures consist chiefly of iron and steel fabrics. Pop. in 1881, 8160.

**Chambord**, a village and royal château of France, department of Loire et Cher, 8 miles E. of Blois. Here is a magnificent château begun by Francis I. in 1526, and finished by Louis XIV. It stands in the midst of a beautiful park 21 miles in circumference, and is built of black stone. It was the residence of Diana of Poitiers, and afterward of King Stanislas of Poland, the father-in-law of Louis XV. After his death it was given to Marshal Saxe by Louis XV., and was presented to Marshal Berthier by Napoleon I. In 1821 it was purchased by subscription for the duke of Bordeaux, who is usually styled Count de Chambord. It is surmounted by a great number of turrets and minarets. Its most prominent features are six enormous round towers, each sixty feet in diameter. Pop. in 1881, 264.

**Chambord, de** (HENRI CHARLES FERDINAND MARIE DIEUDONNÉ D'ARTOIS), COMTE, and DUC DE BORDEAUX, was born in Paris Sept. 29, 1820. His father was the duke of Berry, a son of King Charles X., who abdicated in his favor in Aug., 1830. From that date he was recognized by the French legitimists as the heir to the throne, and he received the title of Henry V. He married in 1836 a daughter of the duke of Modena, but he had no children, and remained the only surviving member of the elder branch of the Bourbon family. He passed many years at the castle of Frohsdorf, near Vienna. He claimed the throne by divine right, and avowed his devotion to the antiquated political ideas of which the white flag is the symbol. After the deposition of Napoleon III. (1870) he issued a proclamation to the French people, which was not approved even by the royalists. Personally he was a man of great probity, and by no means destitute of literary and scientific interests. Died Aug. 24, 1883.

**Chambre Ardente** [Fr. "fiery chamber"], an extraordinary court, chiefly held for the trial of heretics, was first convened by Francis I. of France in 1535. Its name was given on account of the unusual severity of its sentences, burning alive being one of its most common punishments. Henry II.'s reign was especially distinguished for the cruelties practised by this court against the Huguenots. The last victim of the *Chambre Ardente* was one Voisin, executed in 1680, in the reign of Louis XIV., on a charge of sorcery.

**Chambre Introuvable**, a sarcastic name given to the French Chamber of Deputies which was elected after the second restoration of Louis XVIII., in July, 1815. The majority of it were fanatical royalists, were hostile to the ministry, and supported an extremely reactionary policy. They showed no inclination to repress the outrages committed in the south of France by mobs of royalists and fanatics, who massacred many Protestants and liberals. This chamber was dissolved in 1816.

**Chamis'so, von** (ADELBERG), a poet and naturalist, born in Champagne, in France, Jan. 27, 1781. He removed with his parents to Berlin in 1790, learned the German language (in which all his works are written), and served for some years in the Prussian army. In the capacity of naturalist he accompanied an exploring expedition which sailed from Russia in 1814, and circumnavigated the globe. He wrote several works on natural history, but his reputation rests chiefly on his lyrical poems and ballads, which are very popular, and the highly original tale of "Peter Schlemihl" (1814), translated by William Howitt (1843). Died Aug. 28, 1838. (See J. E. HRRIG, "Leben und Briefe von A. von Chamisso," 2 vols., 1839.)

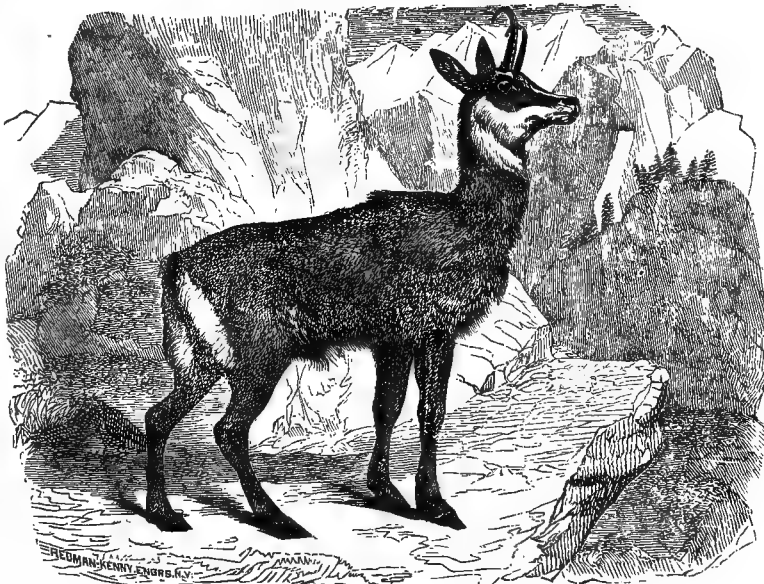
**Chamois** [Ger. *Gemse*], a goat-like antelope (*Rupicapra Tragus*) of the mountains of Central and Southern Europe and Western Asia, found especially in the Alps. It is about the size of a large goat, and is remarkable for its great speed, for its ability to leap enormous chasms, and for its

delicate power of scent. It is highly prized as food, and chamois-hunting is a favorite though perilous amusement in Switzerland and the Tyrol. Its summer haunts are in the high Alps, near the snow-line. Its skin furnishes true chamois leather, but the article generally sold under that name is made of sheep skin. It is gregarious, and in the Caucasus, the Taurus, and the Carpathians, flocks of more than a hundred may be seen; but in the Swiss Alps their number has been much reduced.

**Cham'omile**, a name given to several herbs of the order Compositæ, but especially to *Anthemis nobilis* and *Matricaria Chamomilla*, both European herbs closely resembling each other, and nearly identical in order and properties, though the latter is milder, and in Germany is more generally esteemed as a medicine. The one first mentioned is common in American gardens. Chamomile is much used in domestic medicine, has tonic, stimulant, and diaphoretic powers, and was once used as a febrifuge. Its smell is agreeable, and depends upon the presence of a volatile oil. The chamomile flowers imported from England are of the first, those from Germany of the second, species. They are largely, but illegally, used in England in flavoring beer—a practice which is said to be injurious to health.

**Chamouni, Valley of**, in the French department of Haute-Savoie, a wonderful valley in the Alps, 15 miles long and three-quarters of a mile broad, traversed by a small stream, the Arve, 3400 feet above the sea. It is entered on the N. E., from Martigny, by the Col de Tête Noire, and at the other end by diligence from Geneva, 53 miles distant, through the valley of the Arve. It is enclosed by Mont Blanc and the Aiguilles Rouges and Mont Brevin. The glaciers Mer de Glace and Argentièrre are the most remarkable in Switzerland. This beautiful vale, now visited by innumerable travellers each summer, was scarcely known until it was explored and described by the Englishmen Pococke and Wyndham in 1740. Many peculiar plants grow in the valley, and furnish a remarkably rich-flavored honey. In 1099 a Benedictine monastery was established at the village Chamonix or Prieuré. In early times this region was known as *Les Montagnes Maudites*—a name still retained for the roughest part between the Dome of Mont Blanc and the Mer de Glace.

**Champagne**, a former province in the N. E. part of France, was bounded on the E. by Lorraine and on the S. by Burgundy. It was drained by the Marne, Seine, Aube, and other rivers. It is now mostly comprised in the departments of Marne, Aube, Ardennes, Haute-Marne, and Yonne. The surface is diversified with plains and hills, on which latter is grown the famous CHAMPAGNE WINE (which see). In the twelfth century Champagne was independent or governed by native princes. Thibaud, count of Champagne and king of Navarre, who died in 1253, was the most powerful feudatory of the French king. By the marriage of Philip IV. of France with Joanna, the heiress of the king of Navarre about 1285, Champagne was annexed to France.



Chamois.

**Champagne Wine.** a name applied to wines of vari-



ous kinds, white or red, still or sparkling, which are produced in Champagne. Of these the sparkling and foaming varieties (*vin mousseux* and *demi-mousseux*) are best known. After the vintage-season this wine stands till December, is then racked off, and fined or purged with isinglass; in the following March it is bottled and corked with care, the bottles being placed with the corks downward, so that the sediment may be drawn off. When this has been removed, some brandy and sugar are introduced, and the bottles are resealed. While this process is going on the breakage of bottles is often very great, and buyers estimate the value of the wines partly by the breakage—the best wines breaking the most bottles.

Even in France, but still more in other countries, a very large part of the so-called champagne wine is factitious, being made of cider, light Rhenish and other cheap wines, and other substances. Happily, in most cases these preparations are quite as harmless, and often quite as palatable, as the genuine product of the Champagne vineyards; for some of the imitations are nearly perfect representatives of the appearance, taste, and bouquet of the original article.

Champagne wine is prized in medicine as a restorative in certain low conditions, especially when the stomach is very irritable and will hardly tolerate any other stimulant, the carbonic acid present acting as a sedative to that organ.

**Champagny** (JEAN BAPTISTE VOMPÈRE DE), duke of Cadore, born at Roanne 1756, died in Paris 1834. Educated in the military academy of Paris, he entered the navy in 1780, and was present in five battles. Elected a member of the States-General, the National Assembly, and the Constituent Assembly, he did good work whenever the navy was concerned. In 1793 he was imprisoned, and not released until the overthrow of Robespierre. Napoleon was eager to secure his services, and sent him in 1801 as ambassador to Vienna. In 1804 he was minister of the interior, and in 1807 minister of foreign affairs, which latter position he resigned in 1811. After the restoration of the Bourbons he lived in retirement.

**Champaign**, a city and R. R. junction of Champaign co., Ill. (see map of Illinois, ref. 6-F, for location of county), 128 miles S. S. W. of Chicago, and 48 miles S. E. of Bloomington, is favorably situated in the midst of a fertile agricultural district. There is a finely improved park of ten acres in the place. Street-cars connect it with Urbana, the county-seat, 2 miles E. The public library contains about 1000 volumes. It has a young ladies' seminary. Pop. in 1870, 4625; in 1880, 5103.

**Cham'pak, or Chum'pac** (*Michelia Champaca*), an East Indian tree remarkable for the beauty of its flowers and foliage. The flowers are of a pale yellow tint, and have a sweet, oppressive perfume, much celebrated in Oriental poetry, and alluded to in the writings of Shelley. This tree is venerated by the Brahmans and Boeddhists.

**Champanan**, a British district in the province of Behar under the authority of the lieutenant-governor of Bengal, is bounded N. by the independent state of Nepal, E. by the district of Tirkut, S. by the district of Saran, and W. by the Oudh district of Gorakhpur. Area, 3531 square miles; pop., 1,440,815. The surface forms one vast level, with the exception of the north-western corner, where the ground rises and begins to undulate as it approaches the mountains of Nepal. The land is excellently cultivated, and produces large crops of rice, corn, barley, sugar, opium, indigo, etc. Gold is found, washed down by the rivers.

**Champ de Mars**, a large oblong park or public square in Paris, between the Seine and the Military School. It is devoted to military exercises and public gatherings, and was the site of the temporary buildings of the Expositions of 1867 and 1878. Its name has a double reference to the *Campus Martius* of ancient Rome and other Italian cities, and to the old Frankish field-meetings for legislative and other purposes, held annually in March or May, and historically known as *Champs de Mars* or *de Mai*. In times of social fermentation or actual convulsion it has always been the rendezvous of the malcontents, and some of the sublimest, as also some of the most ludicrous, scenes of the Revolution were enacted there.

**Champeaux** (WILLIAM OF). See GUILLAUME DE CHAMPEAUX.

**Champ'erty** [remotely from the Lat. *campi pars*, "part of the field"], in law, is the act of aiding a person in the prosecution of a lawsuit or other legal proceeding, with an agreement to share in the proceeds of the litigation or to make some profit from it. It is distinguished from "maintenance," in which there is no such element of gain. The two acts are, however, closely allied, and governed by substantially the same principles. Champerty may present itself either in the civil or criminal law. Criminal proceedings are not frequently prosecuted against champertors,

as they scarcely accord with existing public opinion. The topic is of most importance in the civil law. A contract affected by champerty is usually void, though sometimes this rule is modified by statute. It was a doctrine of the English common law, based on this general idea of opposition to champerty, that a right of action cannot be assigned. This proposition has long been discarded in equity courts, both in England and America, and the assignee has been regarded as a beneficiary, and the assignor as a trustee, so that an action can only be brought in a common-law court in the name of the assignor. This mere formality has been abolished in a number of the American States under the lead of the legislation of New York, and the assignee is now permitted to sue in his own name. The old doctrine has been wholly swept away in England during this year (1873), and the assignee is now declared to have the title both in law and equity, acquiring, however, in substance the same rights as before in equity. Accordingly, the assignee can there sue in his own name, and in general act as legal owner (36 and 37 Vict., ch. 66, § 25). There has not been a disposition to extend the doctrine of assignability to pretended titles to land. Should an owner who has been evicted from his land by one claiming title assume to transfer it, the act would be void. This doctrine is recognized in a considerable number of the American States; and even in New York, under the legislation already referred to, the assignee in this case cannot acquire a right to sue in his own name. This doctrine is in part grounded on the opinions of an English statute passed in the time of Henry VIII., and recognized here. The doctrines of champerty would prevent an attorney from entering into an agreement with his client to receive a portion of the subject in litigation as a compensation for his services. This rule has been changed in a number of the American States by legislation, though even there it might be considered as illegal for an attorney to take an assignment of a claim with a view to its prosecution. The rules of the ancient law on this subject would seem to be giving way, and the modern view would seem to tend to allow freedom to deal in rights of action as well as in tangible property. In the progress of time it is probable that scarcely any trace of the old law will remain, except so far as to prohibit attorneys from purchasing claims with intent to collect them, and to prevent combinations or conspiracies to promote litigation, which should be dealt with in the same manner as other conspiracies are treated. (See MAINTENANCE.) T. W. DWIGHT.

**Champfleury**, the assumed name of JULES FLEURY, a French author, chief of the realistic school, born Sept. 10, 1821. He was a companion of Murger, Dupont, and De Banville, and produced in 1847 "Chien-Caillo," immediately pronounced by Victor Hugo a chef d'œuvre. Among his numerous works are "Les Excentriques" (1852), "Aventures de Mariette" (1853), and "Les Bourgeois de Molinchart" (1854).

**Champigny**, a village near Paris, France, on the Marne, was on Nov. 30 and Dec. 2, 1870, the scene of protracted and bloody encounters between the French troops under Ducloux and the Germans. On Dec. 3 the French recrossed the Marne.

**Cham'pion** [from the Lat. *campus*, a "field" of battle, or from an Anglo-Saxon root signifying "to fight"], a person in the Middle Ages, and even in more recent times, who appeared and took part in judicial combats as the hired representative of women, children, feeble persons, and other non-combatants. The practice was of very ancient origin, but the occupation of the professional champion came to be looked upon as very disreputable. He was obliged to wear a peculiar dress and armor, and he was not allowed to fight on horseback. In the lists he appeared with hair and nails cut short. In the more romantic periods of chivalry, however, knights and gentlemen might contend, especially with those of their own rank, in behalf of injured ladies and children, and were called champions. The crown of England since the time of William the Conqueror has had a champion at coronations—a mounted yeoman, armed to the teeth, who challenges all who deny the king to be the true sovereign. This practice is said to have been first introduced under Richard II., but it still forms a part of the coronation ceremony.

**Champion Hills**, Hinds co., Miss., about midway between Jackson and Vicksburg, the scene of a desperate struggle May 16, 1863. The forces under Gen. Grant were marching from Jackson, Miss., towards Vicksburg, when they were met at this point by a Confederate force under Gen. Pemberton. A desperate battle of five hours' duration ensued, the Confederates being forced to retire to the Big Black River. The Confederate loss was heavy in men and artillery. The battle was mainly fought on the side of the U. S. forces by Hovey's division of McClernand's, and Lo-

gan's and Crocker's division of McPherson's corps, which suffered heavily in killed and wounded. This battle is also known as that of Baker's Creek.

**Champlain**, Clinton co., N. Y. (See map of New York, ref. 1-J, for location of county), on R. R. and the Chazy River, about 20 miles N. of Plattsburg. It has manufactures of iron, etc. Pop. in 1870, 1880; in 1880, 1890.

**Champlain** (SAMUEL DE), French geographer and hydrographer, the founder of Quebec and governor of New France, the present Lower Canada, born at Brouage in France about 1570, died at Quebec Dec. 25, 1635. Having taken an active part in the wars of the League on the side of Henry IV., he received a pension from that monarch, and in 1599 he commanded a vessel in the Spanish fleet sailing for Mexico. On his return to France, Governor Charter of Dieppe, who had obtained letters-patent from the king for the continuation of the discoveries of Jacques Cartier and the establishment of colonies in New France, offered him an opportunity to take part in the expedition of Pont-Gravé. He accepted the offer, left Honfleur March 5, 1603, entered the St. Lawrence in May, and published a description of the voyage, accompanied with maps, after his return to France. He afterward made several expeditions to Canada, of which especially the third one (1608-10) is noteworthy on account of the foundation of Quebec, the defeat of the Iroquois, and the discovery of Lake Champlain. In 1612 he was appointed lieutenant-governor under the prince of Condé, who wore the title of viceroy, and in 1620 he began the fortification of Quebec. In 1628 the city was, nevertheless, taken by the English; but by the treaty of peace in 1632 Canada was restored to France. In the same year he published his "Voyages à la Nouvelle France." A complete edition of his works, with facsimiles of his maps, appeared at Quebec in 1870, edited by Laverdière and Casgrain.

**Champlain, Lake**, forms part of the boundary between New York and Vermont, and extends from Whitehall, N. Y., northward to Canada. It is about 125 miles long, and is narrow in proportion to its length. The southern half averages less than two miles wide, and in many places is less than a mile. In the northern part, where large islands occur in it, the width is ten miles or more. The greatest depth is about 280 feet. The water of this lake is discharged by the Sorel or Richelieu River, which issues from its N. extremity. The chief towns on its shores are Burlington and Plattsburg. Occupying a basin between the Adirondacks and the Green Mountains, this lake is remarkable for its beautiful and picturesque scenery. Numerous steamboats ply daily between Whitehall and Canada in the summer. A naval battle was fought on Lake Champlain between Gen. Arnold and the British Oct. 13, 1776, in which the latter had the advantage. Sept. 11, 1814, Com. McDonough gained an important victory over the British fleet near Plattsburg. This lake is connected with the Hudson River by the Champlain Canal.

**Champlin** (JAMES TIFT), D. D., born in Colchester, Conn., June 9, 1811, valedictorian of the class of 1834 Brown University, where he was tutor 1835-38. From 1838 to 1841 pastor of Baptist church Portland, Me.; from 1841 to 1857 professor of ancient languages in Waterville College (now Colby University); from 1857 to 1872 president of that institution. During his connection with the college (which contributed greatly to its prosperity) Dr. Champlin published an edition of "Demosthenes on the Crown" (1843), "Demosthenes' Select Orations" (1848), "Æschines on the Crown" (1850), "A Text Book on Intellectual Philosophy" (1860), "First Principles of Ethics" (1861), "A Text Book of Political Economy" (1868), besides other works. D. Mar. 15, 1882.

**Champlin** (Gen. STEPHEN G.) entered the U. S. service at the outbreak of the late civil war as major of the Third Michigan Volunteers, was severely wounded at Fair Oaks, became a brigadier-general of volunteers in 1862, and took part in the battles of Antietam and Fredericksburg. Died Jan. 29, 1864.

**Champney** (BENJAMIN), artist, born at New Ipswich, N. H., Nov. 20, 1817, practised lithography in Boston, and studied art in Europe, which he visited several times. He has painted many landscapes of the Alps and the White Mountains.

**Champney** (JAMES WELLS), a genre painter, born at Boston, Mass., July 16, 1843, practised wood-engraving and designing, served for a time as a volunteer in the late civil war, taught drawing for some years, practised painting in Europe four years, and returned to the U. S. in 1870.

**Champollion** (JEAN FRANÇOIS), a celebrated French linguist and Egyptologist, born at Figeac (Lot) Dec. 23, 1790. He studied several Oriental languages in Paris, and became in 1809 professor of history in the academy of

Grenoble. In 1814 he published a "Geographical Description of Egypt under the Pharaohs." From the inscriptions on the Rosetta Stone he obtained a key to the mysterious symbols and hieroglyphics of ancient Egypt. His reputation is founded chiefly on this important discovery, which he announced to the Academy of Inscriptions in 1822. In 1824 he published a "Summary of the Hieroglyphic System of the Ancient Egyptians," in which he proves that the phonetic alphabet is the key to the whole hieroglyphic system. In 1828 he visited Egypt, the monuments of which he explored in company with Rosellini. Having spent sixteen months in Egypt, he returned home, and was admitted into the Institute in 1830. A chair of Egyptian antiquities was founded for him in the College of France. He died Mar. 4, 1832. Among his chief works (published after his death by his brother Jean Jacques) are an "Egyptian Grammar" (1836-41) and an "Egyptian Dictionary" (1842-44). The results of the researches of Champollion and Rosellini in Egypt appeared in a great work entitled "Monuments of Egypt and Nubia considered in Relation to History, Religion, etc." (4 vols., 1835-45). Bunsen expressed the opinion that his discovery of the art of deciphering the hieroglyphics was the greatest discovery of the century. (See SILVESTRE DE SACY, "Notice sur Champollion," 1833; ROSELLINI, "Tributo di Riconoscenza alla Memoria di G. F. Champollion," 1832.)

**Champollion-Figeac** (JEAN JACQUES), a French antiquary, a brother of the preceding, was born at Figeac in 1778. He published, besides other works, "Chronicles of the Greek Kings of Egypt" (1819), a "Treatise on Archaeology" (1843), and "Paleographic Documents Relating to the History of Fine Arts and Belles Lettres in the Middle Ages" (1868). He became in 1849 librarian to Louis Napoleon. He edited some posthumous works of his brother. Died May 9, 1867.

**Chance** [from the late Lat. *cadentia*, a "fall" or "throw" of the dice], a word popularly used to denote that which happens without special causation or evident design; a convenient term which does not, however, correspond to the real facts of any supposable case. To the religious mind the idea of chance is objectionable, as not harmonizing with the doctrine of the Divine providence; to the philosopher it is equally objectionable, as being inconsistent with the uniform operation of natural laws. The word as used in the expression "theory of chances" is simply synonymous with PROBABILITY (which see).

**Chan'cel** [from the Lat. *cancelli*, "lattice-work"], the part of a church where the altar or communion-table is placed, or the portion of a church occupied by the clergy, and usually separated from the nave by a screen of lattice-work. The chancel of Gothic churches corresponds in position to the apsis of the ancient basilicas. In England the term chancel is usually confined to parish churches which have no aisles or chapels around the choir.

**Chancellor** [Lat. *cancellarius*; Fr. *chancelier*; Ger. *Kanzler*], the title of a civil officer of high rank in several countries. The cancellarius was a notary or scribe under the Roman emperors. The chancellor of France was for several centuries one of the most powerful ministers of state and keeper of the seal. His office was abolished about 1790, and the functions of chancellor were transferred to the minister of justice. In the new German empire, established in 1871, the Kanzler is one of the chief functionaries, and Prince Bismarck now holds the office. The British cabinet always includes two ministers of state, called respectively chancellor of the exchequer and lord chancellor. The former acts as minister of finance (see EXCHEQUER), and the latter is keeper of the great seal. (See CHANCELLOR, LORD HIGH.)

CHANCELLOR OF A UNIVERSITY is the chief officer of a collegiate institution, sometimes elected for a term of years, and sometimes for life.

**Chan'cellor**, an American law officer in some of the American States who has the powers of a court of equity, and whose proceedings are based on the practice and jurisdiction of the English court of chancery. In other States jurisdiction in law and equity is vested in the same court, as in the State of New York, where the supreme court has this compound jurisdiction.

**Chancellor** (CHARLES W.). See APPENDIX.

**Chancellor, The Lord High**, an officer in England who presides over the high court of chancery, and who also has various special powers of a legal nature. He is also prolocutor of the House of Lords. His office is conferred upon him by the delivery of the great seal. There may also be an officer termed "the lord keeper of the great seal," whose functions are substantially the same. The duties of the office are sometimes discharged by commissioners, instead of by a single person, when the great seal



is said to be "in commission." Some of the powers of the chancellor are in that case, by statute, exercised by the senior commissioner. The judicial powers of the chancellor are considerably changed by 36 and 37 Vict., ch. 66, which goes fully into effect on Nov. 2, 1874. After the chancellor then in office ceases to hold it the duties attached to it will be principally of an appellate character, the chancellor becoming president of "Her Majesty's court of appeal," which tribunal will exercise the appellate powers at present vested in the House of Lords and in the judicial committee of the privy council. (See Foss, "Judges of England," CAMPBELL'S "Lives of the Lord Chancellors," and BLACKSTONE'S "Commentaries," for further information.) The chancellor of the duchy of Lancaster may also be referred to in this connection. He has a jurisdiction in certain matters of equity resembling that exercised by the lord chancellor, though not so general in its nature.

**Chan'cellorsville**, a small village of Spottsylvania co., Va., near the Rappahannock River, about 65 miles N. by W. from Richmond.

On assuming command of the Army of the Potomac, Jan., 1863, Gen. Hooker found it in a weakened and despondent condition; its numerical force had been greatly decreased by sickness and desertions, which latter were still frequent. On the contrary, the recent successes of the Confederates had inspired them with boldness and enthusiasm. Hooker devoted the remaining winter months to repairing the demoralized condition of his army, and gathering back those away from duty; his efforts were so far successful that by April he had not only restored confidence, but by additions found himself in command of a well-equipped army of upwards of 132,000 men, composed of (about) 120,000 infantry and artillery, and the remainder cavalry, encamped around Falmouth, Va. The Confederate army under Lee, still encamped on the opposite bank of the Rappahannock, held a line running north-east to south-west, its right wing extending to Port Royal on the Rappahannock, its left wing resting about two miles above Fredericksburg on the same river; thus affording only two lines of retreat—one to Richmond, the other to Gordonsville. Its strength was probably upwards of 60,000 men.

Everything being in readiness, Hooker decided to move at once upon Lee. The larger portion of the cavalry was placed under Gen. Stoneman, and (April 13) despatched in advance of the main army for the purpose of destroying the Confederate communications and harassing the retreat which it was deemed must result from the contemplated advance. Owing to frequent rains, which swelled the rivers, Stoneman did not get fairly away till the 27th, and Hooker gave orders for his general movement to commence the next day.

Gen. Hooker's plan of attack was as follows: His army was divided into seven corps—of these three were to be massed about two miles below Fredericksburg, to cross there and make a bold feint, two of the corps to immediately return and join Hooker; in the mean while the remaining four corps were to cross above Fredericksburg.

This plan was successfully executed. The 1st Corps (Reynolds), 3d (Sickles), and 6th (Sedgwick), all under command of Sedgwick, were moved on the 28th to the position assigned them, and on the 29th one division of the 6th crossed the river about two miles below Fredericksburg and drove in the pickets; a division of the 1st crossing about two miles lower down; the other divisions, with the 3d Corps, remaining on the north bank in plain view of Lee's army, whose columns were soon seen coming up from Port Royal. On the 30th, Sickles silently withdrew his corps and proceeded to join Hooker. In the mean while the crossing of the Rappahannock above had been going on; the 11th Corps crossed first (28th), followed by the 12th, then the 5th (29th); this column moved along, crossed the Rapidan at Germanna and Ely's Ford; both columns then advancing towards Chancellorsville, at the junction of the Gordonsville turnpike with the Culpeper and Orange C. H. plank road. By the evening of the 30th the 2d Corps (two divisions) had crossed and were massed at the same point, and Gen. Hooker had arrived and taken up his headquarters at Chancellorsville. Lee though thus far outgeneraled appears to have been undismayed, and quickly realizing the movement below to be a feint, concentrated his army in front of Hooker, leaving but a small force in his works on the Fredericksburg heights.

Reconnaissances having been made by Hooker on Friday morning (May 1) towards Fredericksburg without opposition, an advance of the 5th and 12th Corps was ordered to be made on two roads leading towards Fredericksburg, which was soon met by the Confederates; a favorable position had been secured, however, when orders were received from Gen. Hooker to fall back to the inferior one of the

night before. The right of Hooker's army was held by Howard (11th Corps), then a division of Sickles (3d Corps), who had now arrived from below, then Slocum (12th Corps), Couch (2d Corps), with Meade (5th Corps) on the left. The other divisions were held in reserve.

During the night and on Saturday a movement of Confederates was observed along Sickles' front and in direction of our right, which being continued Birney (in command 1st div. 3d Corps) reported to Sickles, who received orders to make a reconnaissance in force and ascertain the nature of the movement, which being promptly executed struck the rear of the advancing column, capturing many prisoners, from whom the intelligence was gained that the movement was under command of Stonewall Jackson. Up to this time the movement had been interpreted as a retreat, but in anticipation of its purpose being a flank attack, Howard had been notified of the fact, and ordered to be on the alert. Sickles now obtained permission to move in force upon the flank of the advancing column, and being reinforced by a brigade from the 12th and one from the 11th Corps, together with 1000 cavalry and a horse-battery under Pleasonton, had completed his preparations, when informed that Jackson had struck his blow and was in his rear. Although not entirely unanticipated, it was believed the attack on the right would be resisted; but, being surprised, Devens' division gave way, followed by that of Schurz, and though Burbeck's brigade gallantly resisted, it was finally compelled to fall back, and the woods now swarmed with the fugitive corps, closely pursued by the victorious Confederates, and the position of Sickles was critical; but fortunately, at this moment, Pleasonton, returning from the front with about 500 cavalry, and comprehending the disaster, ordered the 8th Pennsylvania to charge into the woods, while he hastily got his own battery and such other guns as he could stop, twenty-two in all, into position, double shotted them, and aiming low was just in time to receive the enemy, who, having overcome the slender opposition of the cavalry, now rushed furiously and repeatedly right up to the guns, but were each time repelled with great loss; and the further advance in this direction was finally stayed. Meantime, Berry's division (3d Corps), with Hays' brigade (2d Corps), and the artillery under Captain Best, though unable to check the flying troops of the 11th Corps, had, after a severe contest, checked the advance in front. It was during this attack that Stonewall Jackson was mortally wounded—at the hands of his own men, it is said—the greatest loss the South had yet been called upon to bear.

During the day Lee kept up a vigorous attack in front of Hooker, especially along Hancock's line, but was always handsomely repulsed by the troops in the advanced line of rifle-pits. During the night Hooker contracted and reformed his lines. The 1st Corps (Reynolds) arrived during the evening, and was posted on the right with Meade; the 11th Corps, which had been reorganized, was placed in the intrenchments on the left.

At daylight the attack was renewed, the Confederates opening a musketry fire along the whole line; but the great effort was in the same direction as the day before, the possession of the plank road to Chancellorsville; and here they met the same troops which had sustained and repelled their assaults of the day before. Berry's and Birney's divisions (3d Corps), supported by Whipple's (3d) and Williams' (12th Corps), supported the artillery of Sickles, against which the Confederates threw themselves again and again, only to be cut down and hurled back, until Sickles for want of ammunition was compelled to retire to a second line. Sickles had before retiring sent for assistance to enable him to hold his position; but Hooker, who had been stunned by a ball which struck a pillar against which he was leaning, was unconscious at the time, and his appeal was unanswered. French and Hancock of the 2d Corps had done gallant work in charging and driving back the Confederate left; but Sickles was not reinforced; yet though his ammunition was exhausted he continued to maintain his position, repelling successive charges at the point of the bayonet till he was again compelled to retire, and the whole line was now withdrawn a mile back from Chancellorsville, which position was strongly fortified.

Sedgwick meanwhile (May 2) had received orders to cross the Rappahannock and advance on Chancellorsville until he should come up with the rear of Lee's army, which he was to attack simultaneously with Hooker's attack on the front. This order was not received by Sedgwick till nearly midnight, but he soon had his corps in motion, and by noon had stormed and carried Cemetery and Marye heights, and after reforming his command moved on the road to Chancellorsville; but he was soon met by the force he had driven from the heights, reinforced by a portion of the army of Lee, who being now disengaged from Hooker

turned to check Sedgwick's advance; severe fighting continued till dark Sedgwick being unable to force the confederates from the strong position they had taken; the chance of joining Hooker was now small and the next day made it impossible, for the army of Lee now concentrated against him in large numbers forcing him by night time across the river at Bank's ford he having rescued his corps from its critical position by desperate fighting but with fearful loss. On the 5th Hooker recrossed his whole army over the Rappahannock without opposition and the terrible struggle was ended. The losses on the Union side, 18,000; Confederate, 13,000.

Stoneman returned on the 8th having been nine days in the rear of Lee's army, and had advanced to within two miles of Richmond but his operations conferred no benefit to the Federal army.

**Chance-Medley**, in law, the killing of a person in self-defence upon a sudden and unpremeditated encounter or a casual affray.

**Chancery, Court of.** See **COURTS**, by **GEORGE CHASE, LL.B.**

**Chan'da**, or **Chandah**, a town of Hindostan, on the Upper Godavery, 105 miles by the Peninsular Railway S. of Nagpoor. High stone walls flanked with round towers enclose a space seven miles in circuit, occupied by houses, plantations, and a citadel.

**Chandāl'a**, the name given in India to a member of the lowest of all the impure classes. (See **CASTE**.)

**Chandeleur Islands**, a range of low islands in the Gulf of Mexico, off the E. coast of St. Bernard's parish, La., separating Chandeleur Sound from the Gulf. The sound has also numerous small islands. At the N. end of the northernmost island stands Chandeleur lighthouse, in lat. 30° 3' 8" N., lon. 88° 51' 38" W. It is built of brick, and is 56 feet high, with a fixed white light.

**Chan'deree'**, a decayed town of India, in Malwah, near the river Betwa, about 110 miles S. of Gwalior. Here is a hill-fort which was formerly deemed impregnable. The ruins seen here indicate former splendor and importance.

**Chandernagore**, a French town in India, on the river Hoogley, about 20 miles above Calcutta; lat. 22° 50' N., lon. 88° 23' E. It was founded by the French in 1676, and once rivalled Calcutta. It was taken by Lord Clive in 1757, and restored to the French in 1816. Pop. 28,512.

**Chandler (ABIEL)**, born at Concord, N. H., Feb. 26, 1777, graduated at Harvard in 1806, taught school eleven years, and became a successful merchant of Boston, Mass. He died Mar. 22, 1851, left \$50,000 to found the scientific school connected with Dartmouth College, and bequeathed a considerable sum to the New Hampshire Insane Asylum.

**Chandler (Prof. CHARLES FREDERICK)**, Ph. D., M. D., LL.D., was born at Lancaster, Mass., Dec. 6, 1836, was educated at the Lawrence Scientific School of Harvard College, at Göttingen, and Berlin, and received the degree of doctor of philosophy in Göttingen in 1856. In 1857 he took charge of the chemical department of Union College at Schenectady, N. Y. In 1864 he was appointed professor of analytical and applied chemistry in the School of Mines of Columbia College, about to be organized in New York, which position he still holds. In 1858 he was appointed to the chair of chemistry in the New York College of Pharmacy, in 1872 to a portion of the duties of the chair of chemistry, and in 1876 the full chair of chemistry and medical jurisprudence, in the Coll. of Physicians and Surgeons. In 1865 he became chemist to the Metropolitan Board of Health, which position he retained till 1873, when he was appointed pres. of the board. In the same year he received the degrees of M. D. from the Univ. of New York and LL.D. from Union College. In 1869 he was elected a member of the Chemical Society of Berlin, in 1871 of London, in 1872 of Paris, and in 1874 of the National Academy of Sciences, and has been chairman of the sanitary committee of the New York State board of health. In 1870 he established, with his brother, Prof. W. H. Chandler, of Lehigh University of Bethlehem, Pa., the "American Chemist," a monthly journal devoted to chemical science. Though chiefly employed in instruction, he has published a number of papers on chemical subjects, among which are "The Inaugural Dissertation," Göttingen, 1856, containing miscellaneous chemical researches; "Report on Waters for Locomotives and Boiler Incrustations," 1865; "Examinations of Various Rocks and Minerals," published in the geological reports of Iowa and Wisconsin; "Investigations on Numerous Mineral Waters of Saratoga, Ballston, Chittenango," etc., and of various waters designed for the supply of cities; as well as papers on the purification of coal-gas, on petroleum, and on milk. Most of these papers have appeared in the "American Chemist" and in the annual reports of the health department of New York.

**Chandler (JOHN)**, born in what is now Monmouth, Kennebec co., Me., then a part of Massachusetts, in 1760. He was the son of parents in the most humble circumstances, and although apprenticed to learn the trade of a blacksmith, he became afterwards, by his own industry and perseverance, very wealthy. On the outbreak of war with Great Britain in 1812, he was commissioned a brigadier-general, being at that time a major-general of militia. He represented his district in Congress (1805-08), and was U. S. Senator from Maine (1820-29). D. Sept. 25, 1841.

**Chandler (JOSEPH R.)**, a distinguished philanthropist and diplomat, born in Kingston, Mass., in 1792. He was for several years a member of Congress from Philadelphia, where he was a lawyer and journalist, and was U. S. minister at Naples (1858-61). D. July 10, 1880.

**Chandler (RALPH)**, U. S. N., born Aug. 23, 1829, in the State of New York, entered the navy as a midshipman Sept. 27, 1845. He served on the W. coast of Mexico during the Mexican war, and participated in several slight engagements with the enemy near Mazatlan. In the sloop-of-war Vandalia at the battle of Port Royal, Nov. 7, 1861, commanded the steamer Maumee in both attacks on Fort Fisher, and was recommended for promotion by Rear-Admiral Porter. FOXHALL A. PARKER.

**Chandler (WILLIAM E.)**, born at Concord, N. H., Dec. 26, 1835; graduated at Harvard Law School in 1855; member of N. H. legislature 1862-64; was first solicitor and judge-advocate-general of navy department 1865; first assistant Sec. of the Treasury 1866-67; chairman of Republican State committee of N. H. 1863-65; sec. National Republican committee 1868 and 1872; member of Republican National Convention in 1880; became Sec. of the Navy Apr. 12, 1882.

**Chandler (ZACHARIAH)**, born at Bedford, N. H., Dec. 10, 1813, removed to Detroit, Mich., in 1833, and engaged successfully in mercantile business; was elected mayor of Detroit in 1851; U. S. Senator from Michigan (1857-75), and from Feb. 18, 1879, till his death; chairman of committee on commerce, etc. Secretary of the Interior under President Grant 1875-77; chairman of Republican national committee in 1868 and again in 1876. Died at Chicago, Ill., Nov. 1, 1879.

**Chand'poor'**, a town of British India, in the North-west Provinces, about 75 miles N. E. of Delhi. P. 12,000.

**Chang and Eng.** See **ENG AND CHANG**, by **PROF. ABRAHAM JACOBI, M. D.**

**Changarnier (NICOLAS ANNE THÉODULE)**, a French general, born at Autun April 26, 1793. He served with distinction in Algeria, to which he went in 1830, became a colonel in 1838, and a general of division in 1843. In May, 1848, he was appointed governor-general of Algeria, but before the end of the year he obtained the command of the national guard at Paris and of the first military division. He became a member of the National Assembly in 1849, but continued to command the army or garrison of Paris until 1851. At the *coup-d'état* of Dec. 2, 1851, he was arrested and confined for a short time. He afterwards passed many years in exile. After the outbreak of the Franco-German war he offered his services to the emperor, and although he did not receive a command, he took a leading part in the defence of Metz, and signed, with Bazaine and other generals, the capitulation. D. Feb. 14, 1877.

**Chang-Chau-Foo**, a city in China, in the province of Fo-Kien, 25 miles N. W. from the port Amoy, on a tributary of the Kian-Long-Kiang. The city is surrounded by a wall four and a half miles in circumference. The entrance is over a bridge 780 feet in length, with twenty-two water-passages. In the city is a magnificent Buddhist temple built in the eighth century, which has two towers of seven stories. The streets are unusually broad, and are adorned with fine shops, ornamented arches, and trees. The inhabitants are amiable. There is a considerable manufacture of silk, besides sugar, mirrors, crystal, and quicksilver. The exports consist mostly of tea, sugar, porcelain, and paper. Pop. 1,000,000.

**Chang-Choo-Foo**, a large city of China, province of Kiang-Soo, 75 miles S. E. of Nankin; lat. 31° 55' N., lon. 121° 43' E.

**Chang-Sha'**, a city of China, capital of the province of Honan, on the river Heng-Kiang, about 360 miles N. of Canton. It is well built and surrounded with a wall. It is a centre of the silk manufacture and also of the silk-trade.

**Chank Shell**, the popular name of the shell of several species of *Turbinella*, a genus of gasteropodous mollusks, natives chiefly of the Indian and Pacific oceans. These shells are worn as ornaments by Hindoo women, and some specimens are said to be valued at £100 sterling. More

than two million of them have been exported from Madras in one year. Some of them are used as medicine-cups, and are held sacred. It is especially the heavy porcelaneous shells of the *Turbinella purum* and the *Turbinella roya* which are sawn into bangles and bracelets, worn by Indian women, or manufactured into various tools and utensils.

**Chan'nel**, a port of entry in Newfoundland, is the most western town of any importance in that island. The cod and halibut fishery is carried on here. It is connected by steamers with St. John's, 300 miles distant. It has considerable trade. Pop. 534.

**Chan'nel Isl'ands**, a group of islands off the N. W. coast of France, belonging to Great Britain, but governed by their own laws. They are the only parts of the dukedom of Normandy now belonging to the English crown. King John in 1204 lost all the rest. The chief islands of the group are Jersey, Guernsey, Alderney, and Sark. The area of the whole is 73 square miles. Pop. in 1881, 87,731.

**Chan'ning** (EDWARD TYRREL), LL.D., an American scholar, born at Newport, R. I., Dec. 12, 1790. He was one of the founders of the "North American Review," to which he contributed many critical and biographical articles. He became professor of rhetoric at Harvard in 1819, and retained that position nearly thirty-two years. Died Feb. 8, 1856.

**Channing** (WALTER), M. D., an American physician, a brother of the preceding, was born at Newport, R. I., April 15, 1786; studied medicine in Edinburgh, and began its practice in Boston in 1812; was professor of obstetrics and medical jurisprudence at Harvard from 1815 to 1854, and published several works. D. at Boston July 27, 1876.

**Channing** (WILLIAM ELLERY), D. D., eminent alike in the Unitarian ministry and as one of the first of American writers, was born at Newport, R. I., on the 7th of April, 1780. The surroundings of his childhood and early youth seem to have favored the early development of that spirituality and moral dignity which marked his character in after life. He entered Harvard in 1794, where he graduated in 1798 with the highest honors. The oration delivered by him on this occasion was received by the audience with tumultuous acclamations. Soon after this, while living in Richmond, Va., in the capacity of tutor, the evils of slavery seem to have impressed him most painfully: at this time also he writes in a letter (showing that he already looked forward to entering the ministry), "Religion is the only treasure worth pursuing. I consider the man who recommends it to society as more useful than the greatest sage and patriot who adorns the page of history." In the summer of 1800 he returned by sea to Newport, and to the hardships he endured on that voyage may be ascribed the permanent indisposition with which he had to contend during all his after life. In 1802 he took the position of regent at Harvard, meantime continuing his theological studies. In 1803 he became pastor of the Federal Street church in Boston. As a preacher he attained at once a brilliant distinction, and he was soon recognized as standing in the foremost rank of the Unitarian ministry, both as respects eloquence and personal influence. In 1814 he delivered, on the fall of Napoleon, what is perhaps the finest of all his efforts as an orator—viz. a discourse on "The goodness of God in delivering the Christian world from military despotism." In 1820 Harvard College conferred upon him the degree of doctor of divinity. In 1822 he visited Europe, and while in England made the acquaintance of Wordsworth, Coleridge, and many others. The rare sweetness and earnestness of his character caused Coleridge to say of him, "He has the love of wisdom and the wisdom of love." He was deeply interested in the peace movement, to which he lent his support, without, however, taking the extreme ground of entire non-resistance. His "Remarks on the Life and Character of Napoleon Bonaparte," which appeared in the "Christian Examiner" in 1828, probably contributed more than any other of his writings to carry his fame into all civilized countries. Perhaps the greatest of his theological discourses is that on the "Evidences of Christianity," delivered in 1821 at Harvard; the subject has seldom, if ever, been more admirably treated. He gave his earnest sympathy to the anti-slavery and temperance movements, and his last public discourse was in commemoration of the abolition of slavery in the British West India Islands. He died Oct. 2, 1842, and was buried at Mount Auburn.

Channing's range both of thought and study was very large, and he appears to have possessed in an eminent degree that comprehensive sympathy which belongs only to great and gifted natures. He was averse to controversy, fearing to be led or to lead others away, by the excitement of such discussions, from the simple quest of truth. He appears to have been, moreover, most anxious not to bias

the convictions of others by his personal influence or by his eloquence, but to leave every mind in the enjoyment of absolute freedom. So deep, indeed, was his sense of the sacredness of the human mind and conscience, that he was unwilling to force them even with the power of irresistible persuasion. He sought, above all, to teach the love of truth, and desired not so much that others should accept his opinions or convictions as that they should be perfectly true to their own.

It has been said, by a writer in "Fraser's Magazine," "Channing is unquestionably the finest writer of the age." His style is always forcible, clear, and elegant, and it often rises into graceful and lofty eloquence. "I do not believe," says Dr. Peabody, "there is a line in all his writings which ever received a different coloring from any thought of its influence on his own reputation. . . . He wrote not for himself, but as one dedicated to truth." His works have been collected in six 12mo volumes, published in Boston (1848), and again in crown 8vo (London, 1855). Some of his writings have also been translated into French and German. (See "Memoirs," by his nephew, W. H. CHANNING, 1848.)

J. THOMAS.

**Channing** (WILLIAM ELLERY), a son of Dr. Walter Channing, born June 10, 1818, has been connected with various journals, has published several volumes of poems, and has written in prose, "Thoreau, the Poet-Naturalist" (1873), and "Conversations in Rome."

**Channing** (WILLIAM HENRY), a Unitarian minister, a nephew of William E. Channing, was born in Boston May 25, 1810. He graduated at Harvard in 1829, and preached in the cities of New York, Boston, Cincinnati, and Liverpool, England. He contributed to the "North American Review," and published, besides other works, a "Memoir of William Ellery Channing" (3 vols., 1848). Died Dec., 1884.

**Chant** [from the Lat. *cantus*, a "song"; Fr. *chant*; It. *canto*], a name originally given to plain vocal music, especially to such as was used in Christian congregations. It is now limited to such musical compositions as are sung to words which are not metrical, or if metrical words are used, the verbal cadences are not observed in the music. St. Ambrose and Pope Gregory the Great greatly improved the chant, which was, and still is, chiefly used in liturgical worship, though in non-liturgical services passages of Scripture are often chanted in simple harmonies.

The reading of the service in a half-chanting style by the clergyman is called *intonation*; and a somewhat similar method of reading the Scripture in Jewish synagogues is called *cantillation*.

**Chantenay**, a town of France, in Loire-Inférieure, on the Loire, 1 mile S. W. of Nantes. Pop. in 1881, 11,808.

**Chantilly**, a beautiful town of France, department of Oise, on the railway from Paris to Amiens, 23 miles N. N. E. of Paris. It has a fine hospital, and celebrated manufactures of blond lace and porcelain. Annual races are held here. Here is a ruined castle which was the residence of the great prince of Condé. This castle, which was one of the finest in France, was destroyed during the Revolution in 1793. The forest contains 6500 acres. Pop. 3942.

**Chantilly**, a post-village of Fairfax co., Va., about 20 miles W. of Washington. On the afternoon of the 1st of Sept., 1862, the right of Gen. Pope's army was attacked by the Confederate army under "Stonewall" Jackson. A severe struggle ensued, which was continued in the midst of a terrific thunder-storm till dark. Gens. I. I. Stevens and Phil Kearney of the U. S. army were both killed in this engagement.

**Chan'trey** (Sir FRANCIS), an English sculptor, born in Derbyshire April 7, 1781, was a son of poor parents. He learned the trade of carver in Sheffield, and removed to London about 1804, after which he devoted himself to sculpture. He was a pupil of Nollekens, and excelled in portraits and monumental sculpture. In 1818 he was chosen a member of the Royal Academy. Among his best works are a bronze statue of William Pitt in London, a statue of Canning at Liverpool, and a statue of Washington in the State House at Boston, Mass. He was knighted in 1837. Died Nov. 15, 1841.

**Chan'try** [Fr. *chanterie*, from *chanter*, to "sing"], a term signifying (1) an endowment or bequest to provide masses to be sung for the soul of the testator or the souls of others; (2) the office or position held by one who celebrates such masses; (3) a chapel erected especially for the celebration of the masses thus provided for. Such chantries are sometimes within, or perhaps more frequently outside, but attached to, some church or monastery, and are often richly adorned with paintings and statuary.

**Chanute**, city and R. R. junction, Neosho co., Kan. (see map of Kansas, ref. 7-J, for location of county), is 95 miles S. of Lawrence. Pop. in 1880, 887.

**Chanzy** (ANTOINE EUGÈNE ALFRED), a notable French general, born at Nouart, a village in the Ardennes, March 18, 1823, died at Chalons Jan. 4, 1883. He was educated for the navy, and made a trip with the squadron of Admiral Lalande to the East in 1839-40. After his return, however, he entered the military school of St. Cyr in 1841, and was made a lieutenant of Zouaves in 1843. He served in Algeria, distinguished himself in the Italian campaign of 1859, became a colonel and commander of a subdivision of the Algerian province of Oran in 1864, and a general of brigade in 1868. In Oct., 1870, he was called to France with the rank of a general of division, and in December he so distinguished himself in the battles near Orleans that the provisional government appointed him commander-in-chief of the Army of the West, consisting of four corps. In Jan., 1871, his army was almost annihilated by three Prussian army-corps of vastly superior numbers in the battles at Le Mans. In Feb., 1871, he was elected a member of the National Assembly, and in March he was for a time held as a prisoner by the insurgents of Paris. In 1875 he was elected one of the seventy-five life senators, and not only in military, but also in political circles was he one of the most popular men in France, the friend and not the rival of Gambetta. In 1879, when the Senate and the Chamber of Deputies assembled to elect a new president, he obtained ninety-nine votes, though he was not a candidate. He wrote "The Second Army of the Loire."

**Chapa'la**, a lake in Mexico, is an expansion of the Rio Grande de Lerma, and lies on the table-land of Anahuac. It is mostly included in the state of Jalisco. Area, estimated at 1350 square miles.

**Chap-Books**, the name given to a humble variety of literature which was formerly vended by itinerant chapmen. They were small volumes printed on coarse paper, dealing with popular theology or history, the lives of godly or famous personages, fortune-telling and the reading of dreams, and giant, witch, and goblin tales in verse or in prose. The older black-letter chap-books, without dates, are extremely rare.

**Chap'el** [Lat. *capella*; Ger. *Kapel*; Fr. *chapelle*], a building erected for the purposes of public worship, but not possessing the full characteristics of a church. In this sense places of worship erected by dissenters are called chapels in England, and the term is also applied to supplementary places of worship in the Established Church, such as parochial chapels, chapels-of-ease, free chapels, and the like. It is sometimes applied to a domestic oratory or to a place of worship erected by a private individual. Chapels-of-ease are structures built to accommodate parishioners who live at a great distance from the church.

**Chapel Hill**, Orange co., N. C. (see map of North Carolina, ref. 2-G, for location of county), on R. R. and New Hope River, 28 miles W. N. W. of Raleigh. It is the seat of the University of North Carolina, founded in 1789. Pop. in 1880, 831.

**Chapin** (ALONZO BOWEN), D. D., an American Episcopalian divine, born in Connecticut Mar. 10, 1808. He became a lawyer when a young man, but was ordained in 1838, and afterwards became distinguished as an author and editor of religious periodicals. Died July 9, 1858.

**Chapin** (AARON LUCIUS), D. D., an American clergyman, born Feb. 6, 1817, in Hartford, Conn., graduated at Yale in 1837, and at the Union Theological Seminary in New York in 1842. He was professor in the New York Institution for the Deaf and Dumb 1838-43. He was ordained pastor of the First Presbyterian church in Milwaukee, Wis., Jan. 24, 1844, and was inaugurated as the first president of Beloit College, Wis., July 24, 1850, which office he still retains. He received the degree of D. D. from Williams College in 1853, was for some years one of the editors of the "Congregational Review," and has contributed several articles to that and other like journals, and published occasional sermons.

**Chapin** (CALVIN), D. D., an American Congregational divine, born at Springfield, Mass., July 22, 1763, graduated at Yale in 1788, and was eminent for his services in the missionary, Bible, and temperance societies. Died Mar. 17, 1851.

**Chapin** (EDWIN HUBBELL), D. D., born in Union Village, Washington co., N. Y., Dec. 29, 1814, educated at the seminary in Bennington, Vt., was made D. D. at Harvard University in 1856, commenced preaching in 1837, first settled over a society of Universalists and Unitarians in Richmond, Va.; removed to Charlestown, Mass., in 1840; thence to Boston in 1846, to New York in 1848, where he became pastor of the Fourth Universalist Church, corner Fifth Avenue and Forty-fifth street, one of the wealthiest societies in the city. Dr. Chapin was a powerful and effec-

tive pulpit orator, a frequent lecturer before lyceums, etc., and exercised great influence for good. His speech before the Peace Convention at Frankfort-on-the-Main, in 1850, commanded great attention. He was the author of "Moral Aspects of City Life" (1853), "True Manliness" (1854), several volumes of sermons and religious lectures, and some occasional discourses. His "Crown of Thorns" had a large circulation. D. Dec. 26, 1880.

**Chap'lain** [Lat. *capellanus*, from *capella*, a "chapel"], a clergyman attached to a chapel without a parish, to the household of any dignitary or nobleman, to a public institution, regiment, or an army post, or ship of war. Army chaplains once carried the relics of a patron saint at the head of the troops. The U. S. army has both post and regimental chaplains. The U. S. Senate and House of Representatives, as well as most State legislatures, also have chaplains. Many prisons and large almshouses have chaplains attached. The British army and navy have chaplains from the churches of England and Scotland and the Roman Catholic Church. Forty-eight Anglican and six Scottish ministers are chaplains to the British sovereign.

**Chap'let** [Fr. *chapelet*], a garland or wreath to be worn on the head; the circle of a crown; a string of beads used by the Roman Catholics (see ROSARY) by which they enumerate their prayers; in architecture, a little moulding carved into round beads, pearls, olives, etc.

**Chaplin** (DANIEL), an American officer of volunteers, born in Bridgeton, Me., Jan. 22, 1820. During the civil war Col. Chaplin displayed admirable qualities, and rose to the command of the first regiment of Maine heavy artillery, which became, through his strict discipline, one of the finest artillery regiments in the defences of Washington. On the opening of Gen. Grant's campaign in 1864, Col. Chaplin's regiment was attached to the Army of the Potomac, and participated in all the battles of that memorable campaign; and it was at the head of his men, in the battle of Weldon R. R., Aug. 20, 1864, that Col. Chaplin was mortally wounded. He was brevetted brigadier and major-general for gallant and meritorious conduct.

G. C. SIMMONS.

**Chaplin** (JEREMIAH), D. D., born at Rowley, Mass., Jan. 2, 1776, graduated at Brown University in 1799, was three years tutor in Brown University, pastor of Baptist church Danvers, Mass., 1802-18, and president of Waterville College 1820-32. Died at Hamilton, N. Y., May, 1841.

**Chapman** (ALVAN WENTWORTH), M. D., born at Southampton, Mass., Sept. 26, 1809, graduated at Amherst Coll. 1830, and removed to Appalachicola, Fla., where he attained fame as a botanist. He was a judge of the probate and county courts (1865-66), collector of U. S. internal revenue (1865-66), and collector of customs at Appalachicola (1866-69). The genus *Chapmannia* was named in his honor. He has published "Flora of the Southern U. S." (1860).

**Chapman** (SIR FREDERICK E.). See APPENDIX.

**Chapman** (GEORGE), an English poet and translator, born in 1557. He became a resident of London and a friend of Shakspeare and Spenser. He produced numerous comedies and tragedies, and was the first translator of Homer into English verse. His version of the "Iliad" was published in 1598, and that of the "Odyssey" in 1614. Of his tragedies, the most noticeable are "Bussy d'Ambois" and "Cæsar and Pompey," among his comedies, "All Fools," "Monsieur d'Olive," "The Gentleman Usher," and "The Widow's Tears." Died in 1634.

**Chapman** (GEORGE THOMAS), D. D., an Episcopalian minister, born in England Sept. 21, 1786, came to the U. S. in 1795, and graduated at Dartmouth in 1804. He received ordination in 1816, became a popular preacher, and published several volumes of sermons, etc.

**Chapman** (J. A. M.), D. D. See APPENDIX.

**Chapman** (JOHN GADSBY), an American artist, was born in Alexandria, Va., and received his training as a painter in Italy, which was for many years his home. He executed the painting called the "Baptism of Pocahontas," in the Capitol at Washington, and published a drawing-book.

**Chapman** (NATHANIEL), M. D., born in Alexandria co., Va., May 28, 1780, was educated at Philadelphia and in Europe. In 1804 he settled in Philadelphia, where he was professor of materia medica (1813-16) and of the practice and institutes of medicine and clinical medicine (1816-50) in the University of Pennsylvania. He wrote several medical works, among which was "Lectures on the Theory and Practice of Medicine." Died July 1, 1853.

**Chapman** (REUBEN) was elected governor of Alabama in 1847, and served his term with the sympathy of his party and the respect of all. D. May 17, 1882.

**Chapman** (WILLIAM), an American officer, born in 1810 in Maryland, graduated at West Point in 1831, and Feb. 20, 1862, became lieutenant-colonel of Third Infantry. He

served chiefly at frontier posts 1831-61; in Black Hawk expedition 1832; at Military Academy as assistant instructor 1832-33; as adjutant Fifth Infantry 1833-38; in military occupation of Texas 1845-46; in the war with Mexico 1846-48; engaged at Palo Alto, Resaca de la Palma, Monterey, Vera Cruz, San Antonio (wounded), Churubusco (brevet major), Molino del Rey (brevet lieutenant-colonel), Chapultepec, and city of Mexico; in Florida hostilities 1857; on Utah expedition 1857-60. In the civil war he served in the Virginia Peninsula 1862; engaged at Yorktown and Malvern Hill; in North Virginia campaign 1862, engaged at Manassas (brevet colonel). Retired from active service Aug. 26, 1863, and chiefly employed in command of draft rendezvous at Madison, Wis., 1863-65, and various special duties.

GEORGE W. CULLUM.

**Chapman (WILLIAM).** See APPENDIX.

**Chapoo**, a town of China, in the province of Che-Kiang, on the estuary of the Tshen-Tang. Although its harbor is shallow and the tides very rapid, Chapoo has become a place of great commercial importance, as the whole Chinese trade with Japan is carried on from this town.

**Chap'paqua**, a post-village of New Castle township, Westchester co., N. Y. (see map of New York, ref. 8-J, for location of county), on the Harlem R. R., 32 miles from New York. This place is known as the country residence of the late Hon. Horace Greeley, and also that of I. T. Williams, for twenty years his friend and legal counsellor. It has some manufactures and an excellent boarding-school, under the patronage of the Society of Friends; there is also a saline chalybeate spring near the place. Pop. in 1880, 330.

**Chappe (CLAUDE)**, a French engineer, born at Brillon in 1763, was the inventor of a telegraph. He produced in 1792 a system of signals and a machine which he called a telegraph, by which a despatch was transmitted from Paris to Lille, 48 leagues, in thirteen minutes and forty seconds. Numerous lines of his telegraph were soon extended through other parts of France. Died Jan. 23, 1805.

**Chapped Hands** are sometimes a sort of chilblain on the hands, and, like chilblain, this disease appears to pass by insensible gradations into a form of eczema, while many cases of chapped hands are simply eczematous, without any recognizable connection with chilblain. Glycerine, borax, benzoated oxide-of-zinc ointment, and various like applications are useful.

**Chaptal (JEAN ANTOINE)**, COMTE DE CHANTELOUP, an eminent French chemist, born at Nogaret, Lozère, June 5, 1756. He graduated as M. D. at Montpellier in 1777, and became professor of chemistry at that place in 1781. He supported the popular cause in the Revolution, and introduced the manufacture of certain chemicals for which France had previously been dependent on foreigners. About 1796 he was chosen a member of the Institute. He was minister of the interior for five years (1801-05), and afterwards a senator. His chief works are "Chemistry Applied to the Arts" (1806) and "Elements of Chemistry." Died July 30, 1832. (See FLOURENS, "Eloge historique de Chaptal," 1835.)

**Chap'ter** [Fr. *chapitre*, from the Lat. *capitulum*, a diminutive of *caput*, a "head"], a division of a book. The division of the Bible into chapters as at present is commonly ascribed to the cardinal Hugo de St. Cher, who lived in the thirteenth century, but there is reason to suppose that it may be much older. The purpose of dividing the text into chapters and verses evidently was to facilitate reference. Sometimes, though not often, the logical connection is completely ignored. In many histories the chapter is the principal division. The term is also applied to the canons of a cathedral, who in a collective capacity form a chapter, over which the dean presides. This chapter is the bishop's council. The place in which it meets is called the chapter-house. The institution naturally grew out of the ancient presbytery by an approach to the monastic ideal of moral life. (See BOUVI, "De Capitulis," Paris, 1852.)

**Chapter-house**, a building or apartment where the monks of an ecclesiastical establishment, or the dean, canons, and prebendaries of a cathedral or collegiate church are convened. They are sometimes merely burial-places.

**Chapul'tepec**, a strong Mexican fortress, stormed by the American forces under Gen. Scott Sept. 13, 1847. It is situated about 2 miles S. W. of the city of Mexico, and consists of an isolated eminence about 150 feet high, fortified by a strong citadel which crowns the hill, designed to protect the causeway forming the approach to the city. Its approaches were also strongly guarded by outworks at its base and on its acclivities. The castle contained, besides a strong garrison, the military school of the republic.

In the plan for the capture of the city of Mexico the reduction of Chapultepec was considered indispensable to success. The extraordinary natural strength of this place, and the skill and money which had been expended to make it impregnable, rendered this a hazardous undertaking. To mask the intended attack, Twiggs, with Riley's brigade and Taylor's and Steptoe's batteries, was left at the southern gates of the city, and kept up an effectual fire during the 12th Sept., and down to the afternoon of the 13th, compelling the enemy to withdraw within the walls of the city, and thus holding a good part of the Mexican army, under Santa Anna, on the defensive. Heavy batteries at well-selected points were established on the night of the 11th, and a vigorous fire was opened on the castle and outworks on the morning of the 12th, continuing with good effect throughout the day and on the morning of the 13th, while preparations for the attack were being made. Pillow's and Quitman's divisions were to assault the former on the W., and Quitman on the S. E. side, Worth's division to support Pillow, and Smith's brigade of Twiggs' division to support Quitman. An assaulting party of 260 men, under Capt. McKenzie, Second Artillery, was furnished Pillow, and Twiggs' division supplied a similar one, under Capt. Casey, Second Infantry, to Quitman. The signal for attack was to be the momentary cessation of firing from the heavy batteries. About 8 A. M. of the 13th notice was sent to Pillow and Quitman that the concerted signal was about to be given, and both columns shortly after moved forward with great vigor, the batteries throwing shot and shell upon the enemy over the heads of the attacking columns.

Pillow's approach on the W. side lay through an open grove filled with sharpshooters, who were quickly dislodged; on emerging into an open space at the foot of a rocky hill, Pillow was severely wounded, the immediate command devolving upon Gen. Cadwalader. Clark's brigade of Worth's division was now sent to Pillow's support. A strong redoubt, midway, was to be carried before reaching the heights. The advance was over rocks, chasms, and mines, and in the face of a heavy fire of cannon and musketry. Without wavering the redoubt was carried, and the enemy driven from shelter to shelter, without time to fire a single mine unless endangering the lives of their own men. The ditch and main wall of the work was reached, scaling-ladders were brought in use, and a lodgment soon made, followed by streams of troops.

Simultaneously with Pillow's advance on the W., Quitman approached the S. E. of the same works over a causeway strongly fortified and defended. Smith's brigade had been thrown out to the right to turn the batteries near the foot of Chapultepec and support Quitman's storming-party. The contest was desperate for a short time, but the valor of the Americans overcame every obstacle, the batteries and works were carried, and the ascent was continued; the enemy were driven from their stronghold, and the Stars and Stripes floated from the heights of Chapultepec. This victory virtually ended the war, the city of Mexico being entered the next day, the 14th. The American loss in killed and wounded during the 12th, 13th, and 14th was 863; the Mexican loss was much greater.

**Chara'ceæ** [from *Chara*, one of the genera], a natural order of aquatic cryptogamous plants, approaching the Equisetaceæ in their aerogenous habits and their verticillate tubular branches, but differing from them in having lateral, scattered fruit of two kinds. Some of the species have also incrustations of carbonate of lime, analogous to the siliceous coating of some Equisetaceæ. But their simple cell-structure is believed by many theorists to ally them with the lower Algæ. The phenomena of cyclosis were first observed in the cells of characeous plants. The fossils called gyrogonites are calcareous incrustations which once covered the reproductive organs (nucules) of these plants. The Characeæ are abundant in fresh and salt stagnant water, especially in temperate regions. The species are few.

**Char'acter** [Gr. *χαρακτήρ*; Fr. *caractère*; Ger. *Charakter*], a mark or figure engraved on an object; a letter or type used in writing or printing; the peculiar qualities impressed on a person by nature or habit; distinctive qualities of heart, mind, and manners. The term is often used to denote a person or actor in an epic poem or drama. In art, the expression of character, either of animate or inanimate objects, is, after correct delineation, the most important part of the work. In botany, and other branches of natural history, character is an enumeration or brief description in scientific terms of the essential and distinctive marks of a species, genus, order, etc.

**Charade** [Fr.], a social amusement, consisting sometimes of the division of a word into its constituent syllables or letters, and then making some statement as to each syllable and the whole word, the company being required to guess the word. In "acting charades" each syllable is



introduced prominently, but not too conspicuously, into the successive scenes of a dialogue, the whole word being brought into the last scene. Sometimes the name *charade* is used to designate any parlor drama.

**Cha'rax of Pergamus**, priest and philosopher, flourished probably in the times of Antoninus Pius and M. Aurelius. He wrote a Greek history in forty books, in which he speaks of Augustus as having lived long ago, and of Nero and his successors. This history must have been very prolix, as in the ninth book he is treating of the return of the Heraclidae. He wrote also a work entitled *Χρονικά*, in at least sixteen books, and philosophical treatises. (The fragments of his writings are collected in MÜLLER'S "Fragmenta Historicæ Græcorum," vol. iii., pp. 636-645.)

HENRY DRISLER.

**Char'coal** [Fr. *charbon*; Lat. *carbo*], a common name of a variety of carbon; a carbonaceous substance obtained by heating wood and other vegetable matters in close vessels, or by partially burning them. The term is also applied to the solid residuum which results from the destructive distillation of animal matter and peat. (See **BOXE BLACK** or **ANIMAL CHARCOAL**.) The composition of charcoal depends on the temperature at which it is produced. At high temperatures all the oxygen and hydrogen of the materials are expelled, and the black charcoal consists of carbon and the mineral matter (ashes) originally present. When produced at lower temperatures, the charring is imperfect, and a reddish charcoal results, which contains both hydrogen and oxygen. It burns without flame or smoke, and produces a greater heat than an equal weight of wood. It is used as an ingredient in the composition of gunpowder, as an agent in clarifying liquors, and for other purposes, among which is the smelting of ores. It has an extraordinary capacity for absorbing gases. It is said that it will absorb ninety times its bulk of ammoniacal gas. It is infusible, is not soluble in acids or other liquids, is not liable to decay, and is not altered by any degree of heat if it be not exposed to the air or to oxygen. It is a very bad conductor of heat, and hence powdered charcoal is placed round tubes to prevent the escape of heat. Powdered charcoal is used to preserve or sweeten tainted flesh. Common charcoal intended for fuel is made by burning or heating a pile of wood without free access of air. The sticks of wood, which are not more than four feet long, are arranged in a conical pile around a central aperture, and covered with turf, sods, or other material which prevents the free access of air. Charcoal-dust, mixed with earth and moistened, makes a good outer covering. An opening is left at the top for the escape of smoke and vapor. The pile is usually ignited at the top, and continues burning with a slow smouldering fire for a week or more. The charcoal used as an ingredient of gunpowder is made from wood which is free from resin, such as willow or poplar. Charcoal is often prepared by roasting wood in iron cylinders. By this method there is a larger proportion of charcoal saved, and the product is of better quality; there is also a large quantity of pyroigneous acid secured, which is of great value in the arts.

*Charbon Roux* (i. e. "red charcoal"), is charcoal obtained by subjecting wood to heated air or steam raised to the temperature of 572° F. By this process from 36 to 42 per cent. of charcoal rouge is obtained, whereas not more than 25 per cent. of charcoal is obtained by the ordinary method. It has a dark-red color, and contains 75 per cent. of carbon. It is extensively used in Europe in the manufacture of gunpowder and iron blooms.

HENRY HARTSHORNE.

**Charcoal Blacks** are made both from animal and vegetable substances—e. g. burnt ivory, bones, vine-twigs, peach-stones, nut-shells, the smoke of oil or rosin condensed, etc. Those which are derived from vegetable substances when mixed with white are usually of a blue tint. (See **LAMPBLACK**.)

**Chardin** (Sir JOHN), a French traveller, born in Paris Nov. 26, 1633. As a dealer in jewels and gems he made a journey to India and Persia in 1664. Having passed many years in Persia, and studied its language, history and customs, he became a resident of London in 1681, and was knighted by Charles II., who sent him on a mission to Holland about 1682. He published "Travels in Persia and the East Indies" (3 vols., 1686-1711), a work of much merit, especially in everything relating to Persia, full of interest, and very accurate. Died Jan. 26, 1713.

**Char'don**, capital of Geauga co., O. (see map of Ohio, ref. 2-I, for location of county), on R. R. and a ridge 14 miles from Lake Erie and 170 miles N. E. of Columbus, has a fine court-house and school-building. Pop. in 1870, 885; in 1880, 1081.

**Charente**, a river of France, rises in Haute-Vienne, and flows in a very tortuous course westward through the

departments of Charente and Charente-Inférieure, and enters the Atlantic opposite the Isle of Oléron. Total length, about 157 miles. It is navigable for steamboats from its mouth to Saintes, and by means of twenty-seven locks is navigable for 102 miles.

**Charente**, a department in the W. part of France, has an area of 2294 square miles. It is intersected by the rivers Charente and Vienne. The surface is undulating, and in some parts hilly; the soil is mostly calcareous and dry. Several deep limestone caverns occur here. Extensive forests of chestnut trees grow on the hills. Truffles are found in abundance. A large part of Charente is occupied by vineyards, the product of which is mostly converted into brandy. The chief article of export is Cognac and Jarnac brandy. Here are manufactures of iron, paper, and leather. Capital, Angoulême. Pop. in 1881, 370,822.

**Charente-Inférieure**, a department in the W. part of France, is bounded on the W. by the Atlantic, and on the S. W. by the estuary of the Gironde, and is intersected by the river Charente. Area, 2635 square miles. The surface is nearly level; the soil is very fertile. The staple products are grain, wine (which is mostly converted into brandy), hemp, and flax. The salt-works on the sea-coast are the most valuable in France. It has manufactures of glass, earthenware, and leather. Capital, La Rochelle. Pop. in 1881, 466,416.

**Charenton**, a town of France, department of Seine, on the right bank of the Marne, 5 miles S. E. of Paris. It has large chemical-works. A bridge across the river connects this town with Charenton St. Maurice, where is the large national asylum for lunatics. This bridge has been the scene of several conflicts between armies contending for the possession of Paris. Pop. 6190; of St. Maurice, 4981.

**Cha'res** [Χάρης], an Athenian general notorious for his corruption and incompetence, was chosen commander-in-chief in the Social war, which began in 358 B. C. This war was provoked by his extortions.

**Chares**, a Greek statuary, born at Lindus, was a pupil of Lysippus and the founder of the Rhodian school of sculpture. He lived about 300 B. C. Among his works was the Colossus at Rhodes, regarded as one of the Seven Wonders of the World. It was a bronze statue of Apollo, or rather of the sun-god, about 105 feet high, and was thrown down by an earthquake in 224 B. C.

**Chares of Mytilene** is mentioned by Plutarch in his Life of Alexander as holding the office of *εἰσαγγελεὺς* (one who bears messages and introduces persons to the royal presence) to that monarch. His position gave him the opportunity of collecting many facts and anecdotes about Alexander, which he afterwards published in a work, of which the tenth book is quoted by Athenæus, and which is several times referred to as authority by Plutarch. (The fragments of his works are collected in MÜLLER'S "Scriptores de Rebus Alexandri," p. 114-120; "Alexandri Magni Historiarum Script.," ed. Geier, pp. 290-308.)

HENRY DRISLER.

**Charge**, in heraldry. The ordinaries and figures depicted on an escutcheon or shield are called charges, and a shield with such figures is said to be charged. The charges ought to be few and strongly marked. The shield belonging to the head of the house has fewer charges than the shields of collateral or junior members.

**Charge**, in law, a burden imposed on a thing; a duty or obligation imposed upon a person; sometimes merely a formal and distinct allegation. More specifically, it is used in the following connections: (1) A burden imposed upon land, particularly in a court of equity. It is a common course in a will to "charge" the deviser's estate with the general payment of debts or legacies, or with the payment of a particular debt or legacy. In such a case the land is burdened with the debt, so that it is a lien or encumbrance upon it; and this would follow it into the hands of a purchaser. A charge of this kind may be created by implication. Thus, if a testator should provide as follows, "After the payment of \$1000 to A, I devise my mansion-house to B," that sum would be charged upon the land as owned by B, and would follow it in case of sale or other transfer. (2) A charge upon the person. A will or other instrument may be so drawn as to confer a benefit upon a person, and at the same time impose upon him an obligation. Should he accept the benefit, he will by implication take upon himself the burden or obligation, though it may outweigh the benefit. No person is bound to accept such a devise or provision, so that the charge in the case supposed is in truth created by the grantee's or devisee's own act, in conjunction with the grantor's or testator's direction. (3) Directions to a jury. In a jury trial, as the decision of questions of law appertains to a judge, and matters of fact belong to the jury, it is a common practice for the judge to instruct

or "charge" the jury upon the questions of law. These instructions the jury are legally bound to follow. The idea lying at the root of the word "charge" in this case would seem to be the obligation or duty of the jury to accept the version of the law propounded by the judge. (4) In equity practice the words "charge and discharge" are found in connection with the taking of accounts in that court of moneys paid and received. The *charge* means the statement of debts due by the party against whom the account is rendered, and *discharge* means the items of credit presented by the latter. These might be so presented as to make counter-statements necessary. This practice, in its details, is disfigured by much technicality, and has been abandoned both in England and in some of the American States, and much simpler methods are now resorted to. (5) In equity pleadings there is a statement made by the plaintiff, known as the charging part of the bill (or complaint), in which he sets forth certain facts, anticipatory of a defence which he supposes that the defendant will make. The word *charge* here means a distinct and formal affirmation, and the pleader sets forth the defendant's claim as a mere pretence on his part, and alleges on his own part the facts in opposition to it.

T. W. DWIGHT.

**Chargé d'Affaires**, a French phrase used by many nations as the title of a diplomatic agent of lower grade than a minister. He is accredited, not to the sovereign, but to the department of foreign affairs. He sometimes acts as deputy or substitute of the ambassador in the absence of the latter.

**Chariot** [Lat. *currus* or *bigris*; Fr. *char* or *chariot*], a vehicle used by the ancients in war and in journeys of pleasure. The ancient chariot had only two wheels, which revolved on axles, and was generally drawn by two horses. It was closed in front and open behind. War-chariots were used by the ancient Greeks, Romans, Philistines, Britons, and other nations. The four-horse chariot in which Roman generals rode when they entered Rome in triumph was called a *quadriga*. (See CARRIAGES, etc., by L. P. BROCKERT, M. D.)

**Charis'ius**, an Attic orator, a contemporary of Demochares, nephew of Demosthenes. He wrote, like Isocrates, orations for others, and in this, as Cicero says in his "Brutus," he imitated Lysias. His orations must have been extant in the time of Quintilian, for he speaks favorably of them. Three passages are quoted by Rutilius Lupus, in his work "De Figuris," in a Latin translation to illustrate certain rhetorical figures.

HENRY DRISLER.

**Charisius** (AURELIUS ARCADIVS), a learned jurist who lived under Constantine and his sons, and filled the office of "magister libellorum." He wrote several works on legal subjects. Extracts from three of his writings are contained in the "Digest."

HENRY DRISLER.

**Charisius** (FLAVIUS SOSIPATER), of Campania, a celebrated grammarian, whose date is uncertain, but who preceded Priscian, as the latter quotes from him, and he flourished in the latter part of the fifth century. He was a man of some distinction, and is styled "magister urbis" in the inscription of his work, which is a Latin grammar in five books, "Institutionum Grammaticarum libri quinque," written for the use of his son. Portions of the work have been lost; the remainder is given in the various collections of Latin grammarians, most recently by Lindemann and Keil.

HENRY DRISLER.

**Char'itable U'ses**, property, either real or personal, held by a trustee to be devoted by him to charitable purposes. The word "charitable" in this connection is nearly synonymous with public. Trusts for charitable purposes would include funds in the hands of trustees devoted to the repair of highways or streets in cities, the support of paupers, the foundation of colleges, churches, and hospitals, etc. etc. (The subject will be more fully treated under TRUST, by J. N. POMEROY, LL.D.)

**Char'ites** (sing. *Cha'ris*), [Gr. *Χάρις*, *Χάριτες*; Lat. *Gratiae*], the Graces of classic mythology, were said to be the daughters of Jupiter. They were patrons of poetry and art, and presided over festivals and social enjoyments. There were three Graces, whose respective names were Aglaia, Euphrosyne, and Thalia.

**Char'iton**, a river of the U. S., rises in the S. part of Iowa. Having crossed the boundary between Iowa and Missouri, it flows southward through Adair, Macon, and Chariton counties of the latter State, and enters the Missouri River 3 miles above Glasgow. Total length, about 250 miles.

**Chariton**, capital of Lucas co., Ia. (see map of Iowa, ref. 7-H, for location of county), is on Chicago Burlington and Quincy R. R. and the Chariton River, 55 miles W. of Ottumwa. It has a large public hall. Pop. in 1870, 1728; in 1880, 2977.

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**Char'iton**, of Aphrodisias in Caria, is the probably assumed designation of the writer of a Greek romance. Neither his name nor his real country is known, and the position which he assigns himself, that of secretary to the orator Athenagoras of Syracuse, mentioned in Thucydides, cannot be true. His work, which treats of the loves of Chæreas and Callirrhoe, and of the mishaps and adventures thence arising, is in eight books, and has come down to us almost entire. An outline of the incidents is given in Dunlop's "History of Fiction." It has been edited with copious notes by D'Orville, with a Latin translation by Reiske, revised edition, Leipsic, 1783.

HENRY DRISLER.

**Char'ity, Sisters of** [Fr. *sœurs* (or *filles*) *de la charité*, or *sœurs grises*, i. e. "Gray Sisters," so called from their dress], a name applied to several orders of celibate women in the Roman Catholic Church. The first congregation of this name was established at Châtillon, in France, by Saint Vincent de Paul in 1629. Confirmed by the see of Rome, this congregation greatly multiplied, and its houses are now found in all parts of the world. This order is devoted to the care of the sick and the protection of foundling or destitute children and aged persons, and hence is popularly regarded with more favor than almost any other order of nuns. It alone, of all religious orders, was able to weather the storm of the Revolution in France. In spite of the edict of 1790, which suppressed all religious orders, the Sisters of Charity continued their activity and were not interfered with. In 1800, Napoleon officially recognized them and gave them public support. No wonder that under such circumstances the community developed an extraordinary energy; it became, indeed, the centre into which was gathered the whole practical religious energy of the time. Their special name is "Sisters of St. Vincent de Paul," and different from them, though having the same rules and the same purpose, is another order of Sisters of Charity, called "Daughters of St. Borromeo." It was founded in 1652 by Abbot Epiphanius Louys of Estival, at that time general of the order of the Premonstrants. Its name is derived from the circumstance that its first members served in the hospital of St. Carlo Borromeo at Nancy. It also became very flourishing in France.

Mrs. Eliza Ann Seton of Maryland in 1809 founded a congregation of Sisters of Charity under a distinct rule, which is still followed to a considerable extent in the U. S., though many of its houses have united with the French order. Several congregations of Augustinian nuns and of other Roman Catholic orders are called Sisters of Charity and Sisters of Mercy, and have branches in the U. S. The Sisters of Charity have many claims to the gratitude of mankind, and, besides the direct good accomplished by them, their example has led many who do not profess celibacy, and who do not belong to their Church, to engage in acts and lives of benevolence.

**Charlemagne** [Lat. *Carolus Magnus*], king of the Franks and Roman emperor, born April 2, 742, probably at Aix-la-Chapelle, was a son of Pepin le Bref. After his father's death, in 768, he reigned over the Franks, jointly with his brother Carloman, until the death of the latter in 772. From that time sole ruler, during a reign of forty-three years he carried on incessant wars on all his borders, extending his domains, and at the same time spreading Christianity, subduing rebellions, and building up the vast dominion over which he was crowned as a successor of the Roman cæsars by Pope Leo III. in 800. In 772 he began a thirty years' war against the determined Saxons, after the successful opening of which Charlemagne was called to the assistance of Pope Hadrian I. against Desiderius, king of the Lombards, who had demanded the banning of Charlemagne and the coronation of the sons of Carloman, because the former had put away the daughter of Desiderius on account of sterility, and taken the Swabian princess Hildegard to his bed. Charlemagne marched two armies over the Alps and conquered Lombardy in 774; returned and beat the Saxons again, and hastened into Spain in 778 to help the Arabian rulers of that country against the Osman caliph of Cordova. It was in this war that the hero of romance, Roland or Orlando, fell in the pass of Roncesvalles. The extensive domain of Charlemagne was only rendered secure by ceaseless vigilance and warfare. In 799 the Romans revolted against Pope Leo III., and were again brought into subjection by Charlemagne, who in return, while he was praying on the steps of St. Peter's church, was crowned by Leo with the iron crown of the Western empire, unexpectedly to him, as he pretended, on Christmas Day, 800. Charlemagne laid the foundations of his empire securely. He was sagacious, energetic, and vigilant, as a ruler and commander alike. He watched over and fostered agriculture, trade, art, and letters with untiring zeal, clearing away forests, draining swamps,

founding monasteries and schools, building up cities, constructing splendid palaces, as at Aix, Worms, and Ingelheim, and drawing to his court scholars and poets from all nations, as Aleuin, Paulus Diaconus, and Turpin. He was himself proficient in science as well as all hardy accomplishments, speaking Latin and knowing Greek. Indeed, the two institutions of his which are still alive—or, at least, recognizable—in the history of Europe are his margraviates and his schools. By the former he put an end to the migration of nations, and by the latter he planted the germ of the European universities. All along the frontiers of his empire he established a kind of military fiefs for the purpose of securing peace and quiet within the empire, and those fiefs—generally called margraviates—became the nuclei of kingdoms and principalities. Of his schools, that established in his own palace is the most celebrated; it afterward grew into the University of Paris. He was tall and stately, measuring seven of his own foot-lengths, simple in his life, “excelling all men of the time, to all alike dread and beloved, by all alike admired,” as he was described by the historian Nithard. His fame spread through all lands. He was about to become united by marriage with the Byzantine empress Irene, but after her fall was not on friendly terms with her successor, Nicephorus. The caliph Haroun-al-Rashid sent an embassy to the court of Charlemagne, with gifts in token of good-will. He had three sons, Pepin, Charles, and Louis, among whom he intended to divide his empire, but Pepin and Charles died before their father. In 813 he associated his son, Louis le Débonnaire, with himself in the empire. He died at Aix-la-Chapelle Jan. 28, 814, and was succeeded by his son Louis. His descendants were called Carlovingians. All sources of his life, of which his biography by Eginhard, his son-in-law, is the most important, are found in PERTZ, “*Monumenta Historica Germanie*.” His *opera omnia* are found in MIGNE, “*Patrologia Latina*” (87, 88). (See JAMES, “*Life of Charlemagne*,” 1832; WAITZ, “*Deutsche Verfassungsgeschichte*,” 1869; BASS MULLINGER, “*The Schools of Charles the Great*,” 1877; “*Charlemagne*,” par ALPHONSE VÉTAULT, 1877.)

**Charleroi**, a strongly fortified town of Belgium, in Hainaut, is on the river Sambre and on the railway between Brussels and Namur, 33 miles S. of Brussels. This place was fortified by Vauban, and was held alternately by the French and Spaniards. It has important manufactures of cutlery, glass, nails, etc. In this vicinity are extensive coal-mines, and smelting furnaces which produce cast iron. Railways extending in various directions connect it with Paris and other towns. Pop. 13,294.

**Charles I.**, emperor. See CHARLEMAGNE.

**Charles II.**, emperor. See CHARLES THE BALD (of France).

**Charles III.**, surnamed THE FAT [Fr. *Charles le Gros*], emperor of the Franks, born in 822 A. D., was a younger son of Louis II., who at his death, in 876, divided the empire between his three sons, Carloman, Louis, and Charles. After the death of his brothers, which occurred before 884, Charles inherited their dominions, and was the nominal ruler of a large empire, but he was imbecile and had little real power. He was deposed by his nephew Arnulph in 888, and died in the same year.

**Charles IV.**, emperor of Germany, born in 1316, was a son of John de Luxembourg, king of Bohemia. He was elected emperor in 1346 as the successor of Louis V., whom the pope had deposed. He issued in 1356 the Golden Bull, which for more than four centuries was the fundamental law to regulate the election of German emperors. He died in 1378, and was succeeded by his son Wenceslaus.

**Charles V.**, DON CARLOS I. of Spain, afterwards emperor of Germany, was the eldest son of the archduke Philip of Austria, and a grandson of the emperor Maximilian I. His mother was Joanna, the daughter and sole heiress of Ferdinand of Aragon and Isabella of Castile. He was born at Ghent Feb. 24, 1500, and educated in Flanders, having as his preceptor Adrian of Utrecht. On the death of his father in 1506, Charles inherited the Low Countries and Franche-Comté, and in 1516 he succeeded Ferdinand as king of Spain, to which he removed his court in 1517. In 1519 he was elected emperor of Germany, defeating Francis I. of France, who was also a competitor for that dignity. He was crowned as emperor at Aix-la-Chapelle Oct. 22, 1520. Charles V. and Francis I. of France were then the most powerful sovereigns on the continent of Europe, and were rivals. Their ambitious designs against Italy led to hostilities, which commenced in 1522. In this war Henry VIII. of England was the ally of Charles V., whose army defeated Francis at the battle of Pavia (1525), and took him prisoner. The war was suspended by the treaty of Madrid in 1526. Charles married in that year Isabella, a daughter of Immanuel, king of Portugal. The war was

renewed in 1527 by Francis I. and Pope Clement VII., who had formed an alliance against the emperor. Under the constable of Bourbon the army of Charles assaulted Rome and took the pope prisoner in 1527. Peace was restored by the treaty of Cambrai in 1529. Charles employed his power to check the progress of the Protestant Reformation, for which purpose he assembled the Diet of Augsburg in 1530. This Diet ordained that severe penalties should be inflicted on the Protestants. In 1531 the German Protestant princes formed, for mutual defence, the League of Schmalkalden, and extorted some concessions from Charles, who, being then engaged in a war against the Turks, thought it expedient to temporize. In 1535 he conducted in person an expedition against Barbarossa, whom he defeated at Tunis. In 1536 his army invaded the south of France, but was not successful, and was soon forced to retreat. A truce of ten years was concluded between Charles and Francis I. in 1538, but it was broken in 1542. The French gained a victory at Ceresole, in Italy, in 1544, soon after which the war was ended by a treaty of peace. Resolving to extirpate heresy among his subjects, he published in 1546 the ban of the empire against the elector of Saxony and the landgrave of Hesse, who were chiefs of the Protestant party. They took arms in self-defence, but were defeated at Mühlberg in April, 1547. Their cause, however, found an able defender in Maurice of Saxony, who, as the head of a league, took arms against Charles early in 1552. Charles, surprised by his rapid and skilful movements, was compelled to flee, and hostilities were ended by the important treaty of Passau, Aug. 22, 1552, which secured religious liberty to the German Protestants. In the autumn of 1555 he formally resigned to his son Philip the sovereignty of the Low Countries, Spain, and his other hereditary dominions. He also abdicated the imperial crown, and was succeeded as emperor by his brother Ferdinand. His motive for abdicating appears to have been partly ill-health. He retired to the monastery of Yuste, near Plasencia, in Spain, where he died Sept. 21, 1558. (See ROBERTSON, “*History of the Reign of Charles V.*,” PRESCOTT, “*History of Philip II. of Spain*,” vol. i.; LUIGI DOLCE, “*Vita di Carlo V.*,” 1561; A. PICIOR, “*Charles Quint*,” 1854; STIRLING, “*The Cloister Life of the Emperor Charles V.*,” 1852; SANDOVAL, “*Historia de la Vida de Carlos V.*,” 1606; KERVYN DE LETTENHOVE, “*Commentaires de Charles V.*,” Brussels, 1862.)

**Charles VI.**, emperor of Germany, the second son of the emperor Leopold I., was born Oct. 1, 1685. He claimed the throne of Spain as a relative of Charles II., who died without issue in 1700, and who appointed Philip of Anjou as his heir. In the war of the Spanish succession, which ensued, the cause of Charles was supported by Austria, England, and a portion of the Spaniards. These allies were defeated at Almanza in 1707 by the army of Philip, who finally obtained the throne by the aid of Louis XIV. of France. On the death of his brother, Joseph I., in 1711, Charles was chosen emperor of Germany. Having no son, he wished to secure for his daughter, Maria Theresa, the succession to his hereditary dominions, and appointed her his heir by a Pragmatic sanction (1724). Died Oct. 20, 1740. (See SCHIRACH, “*Biographie Kaiser Karl's VI.*,” 1778.)

**Charles VII.** (CHARLES ALBERT), emperor of Germany, a son of Maximilian Emmanuel, elector of Bavaria, was born at Brussels in 1697. He married a daughter of the emperor Joseph I. in 1722, and became elector of Bavaria on the death of his father in 1726. When Charles VI. died, in 1740, this elector claimed part of the Austrian dominions. To obtain these he and his allies, France and Prussia, waged war against Maria Theresa. He was elected emperor in 1742, but his army was defeated by that of Maria Theresa. Died Jan. 20, 1745.

**Charles I.** (CHARLES STUART), king of Great Britain, born at Dunfermline, Scotland, Nov. 19, 1600, was the third son of James I. and Anne of Denmark. He became heir-apparent to the throne on the death of his brother Henry in 1612. He inherited extreme notions in relation to royal prerogatives from his father, whom he succeeded in Mar., 1625. He married Henrietta Maria, a daughter of Henry IV. of France, in the same year, and in disregard of public opinion chose for his prime minister and adviser the unpopular duke of Buckingham, who had been his father's favorite. The Parliament, animated by a growing spirit of liberty, was sparing in its grants of supplies, and was soon involved in a contest with the court. Charles dissolved several Parliaments in the first five years of his reign, and had recourse to arbitrary methods of raising money. He governed for eleven years without a Parliament, and after the death of Buckingham employed Laud and the earl of Strafford as his chief ministers. During this period the Puritans were severely persecuted, and the pa-



triot Hampden was prosecuted because he refused to pay the illegal tax called ship-money. In 1638 the Scottish people, on whom he attempted to impose the Liturgy, rose in arms to assert their liberty, and subscribed the National Covenant. Charles, who had not power to enforce his policy in Scotland, summoned a Parliament, which met in April, 1640, but, as it was not subservient, it was dissolved in the next month. The Scottish insurgents invaded England in August, and defeated the royal army at Newburn-on-Tyne. This disaster and the want of money induced the king to call a new Parliament, which met in Nov., 1640, and was the famous Long Parliament. Both Houses were resolute in resistance to despotic power. They impeached the earl of Strafford, who was executed in 1641, and they imprisoned Laud. In Jan., 1642, the king made a rash and abortive attempt to arrest Pym, Hampden, and three other members of the House of Commons. Provoked by this outrage, the Parliament appealed to arms. The royalists at first gained several victories, but they were defeated at Marston Moor in 1644, and again in June, 1645, at the battle of Naseby, where Charles commanded in person and Cromwell led the right wing of the Roundhead army. He was here so completely beaten that he soon gave himself up to the Scottish army, which transferred him in 1647 to the custody of the English Parliament. Having been tried and convicted in a high court appointed for the occasion, he was beheaded Jan. 30, 1649. He was distinguished for his literary culture and good taste in the fine arts. He was regarded as a martyr by a large portion of his subjects. (See HUME, "History of England;" WILLIAM HARRIS, "Life of Charles I.," 1758; DISRAELI, "Life and Character of Charles I.," 1828.)

**Charles II.**, king of Great Britain, son of Charles I., was born May 29, 1630. He went into exile in 1645, and joined his mother in Paris. In 1649 he assumed the title of king, and he was proclaimed king by the Scottish Parliament "on condition of his good behavior." He landed in Scotland in June, 1650, and was crowned at Scone early in 1651. The austere Covenanters required him to sign "articles of repentance," and subjected him to restraints which were very irksome to a man who was naturally fond of ease and pleasure. A Scottish army fighting for the king was defeated by Cromwell at Dunbar in Sept., 1650. Charles, having recruited his army, led it into England, hoping that many English royalists would rally to his support. He was pursued by Cromwell, who gained a decisive victory over the royal army at Worcester, Sept. 3, 1651. Charles then became a fugitive, and after several narrow escapes took refuge in France.

After the death of Cromwell, the royalist party, which was always the most numerous, and was now favored by the law of reaction, easily regained the ascendancy. Charles was restored in 1660 to almost unlimited power. He appointed Lord Clarendon prime minister, and married in 1662 Catherine, a daughter of the king of Portugal. In 1665, without good reason, he declared war against the Dutch—a war which was contrary alike to the feelings and commercial interests of the English people. The Dutch admiral De Ruyter, by entering the Medway and burning some ships of war at Chatham, induced him to make peace in 1667. Lord Clarendon was removed from power in 1667, and was succeeded by a corrupt ministry called the CABAL (which see). These ministers abused their power to promote popery and absolute monarchy, and in their foreign policy were subservient to Louis XIV. Charles accepted a pension from the French court, that he might be enabled to reign without the aid or control of parliaments. He also became an ally of France in another war against the Dutch in 1672, but this war, which was unpopular, was ended in 1674. The king showed partiality to the Roman Catholic Church, of which he had secretly become a member. A rumor of a popish plot caused a violent excitement among the people in 1678. Charles dissolved Parliament in that year, and called another, which in 1679 passed the Habeas Corpus act in opposition to the will of the court. The prevalence of corruption and profligacy in politics and morals, together with the despotic policy of the court, rendered this reign one of the most disgraceful in English history. In 1683 the patriots Algernon Sidney and Lord Russell were put to death for their complicity in the Rye-House Plot. Charles died without lawful issue Feb. 6, 1685, and was succeeded by his brother, James II. Charles II. was indolent, unambitious, and depraved in morals. (See HUME, "History of England;" MACAULAY, "History of England," vol. i.; WILLIAM HARRIS, "Life of Charles II.," 1765; LORD HALIFAX, "Character of Charles II.," 1750.)

**Charles I.** of France. See CHARLEMAGNE.

**Charles**, surnamed **THE BALD** [Fr. *Le Chauve*], or **Charles II.**, king of France, the fourth son of Louis le

Débonnaire, was born at Frankfort on the Main in 823 A. D. On the death of his father (840) he inherited all of France which is W. of the Rhone. He was unable to resist the Normans, who invaded France, and was compelled to pay them tribute in 845 and again in 861. Having invaded Italy with success, he was crowned as emperor by the pope in 875 A. D. He is styled Charles II. among the German emperors, as well as Charles II., king of France. He died in 877, and was succeeded by his son, Louis le Bègue.

**Charles III.** of France, called **THE SIMPLE**, a son of Louis le Bègue, was born in 879 A. D. Eudes, count of Paris, was elected king by the barons in 883. Charles assumed the title of king in 893, and after the death of Eudes, in 898, he reigned alone. He was a feeble prince, and failed to defend his kingdom from the Normans. In 923 the nobles elected Raoul (or Rodolph) of Burgundy to the throne. Charles died in 929, leaving a son, Louis Outremer.

**Charles IV.** of France, surnamed **THE HANDSOME** [Fr. *Le Bel*], the third son of Philippe le Bel, was born in 1294. He began to reign in 1322. He aided his sister Isabella to dethrone her husband, Edward II. of England. He died without male issue in 1328, and was succeeded by Philip of Valois.

**Charles V.**, called **THE WISE** [Fr. *Le Sage*], king of France, born Jan. 21, 1337, was a son of John II. He acted as regent during the captivity of John, who was taken prisoner by the English in 1356. He became king on the death of his father, in 1364, at a time when France was invaded by English armies. He acted on the defensive and avoided a general battle. The French general Du Guesclin expelled the English from Poitou, Saintonge, etc. Charles founded the Royal Library of Paris. He died Sept. 16, 1380, leaving the throne to his son, Charles VI. (See MICHELET, "Histoire de France;" BARTHÉLÉMY DE BEAUREGARD, "Histoire de Charles V.," 1843.)

**Charles VI.**, called **THE BELOVED** [Fr. *Le Bien-Aimé*], a son of Charles V., was born in Paris Dec. 3, 1368. He was the first prince who received the title of dauphin. He became insane in 1392, after which the kingdom was distracted by the rivalry between the dukes of Burgundy and Orleans. In 1407 a civil war broke out between the Burgundians and the Armagnacs. France was also invaded by Henry V. of England, who gained a great victory at Agincourt Oct. 21, 1415. Charles died Oct. 22, 1422.

**Charles VII.**, surnamed **THE VICTORIOUS**, king of France, born Feb. 22, 1403, was a son of Charles VI., whom he succeeded in 1422. At that time Henry VI. of England was recognized as king of France by a faction which had possession of Paris, and France was partially occupied by the English, who besieged Orleans in 1428. From the ruinous state to which the country was reduced by intestine discord and foreign invasion, it was restored by the heroism of Joan of Arc and the prudent policy of Charles, who became master of Paris in 1436. He waged war with success against the English, and recovered Normandy in 1450. He died July 22, 1461, and was succeeded by his son, Louis XI. (See VALLET DE VIRVILLE, "Histoire de Charles VII.," 3 vols., 1862-65.)

**Charles VIII.**, surnamed **THE AFFABLE**, king of France, born at Amboise July 30, 1470, was a son of Louis XI., whom he succeeded in 1483. He married, in 1491, Anne, duchess of Brittany. He led an army into Italy in 1494, and conquered Naples early in 1495. Alarmed by his victorious progress, the king of Spain, the German emperor, and other powers formed a league against him. As Charles was marching homeward he encountered and repulsed the army of the allies at Fornovo, and then returned to France. He died without issue April 7, 1498, and was succeeded by Louis XII. (See PHILIPPE DE SÉGUR, "Histoire de Charles VIII.," 1835.)

**Charles IX.**, king of France, the second son of Henry II. and Catherine de Médicis, was born at St. Germain-en-Laye June 27, 1550. He succeeded his brother, Francis II., in 1560. During his minority his mother had the chief control of the government. His reign was disturbed by civil or religious wars, which began in 1562, between the Catholics and Huguenots. The court generally co-operated with the Catholic party, but Catherine was jealous of the duke of Guise, the leader of the Catholics, and sometimes opposed him by her intrigues. The civil war was several times suspended by treaties, and renewed in consequence of the perfidy of the court. Charles married, in 1570, Elizabeth, a daughter of the emperor Maximilian II. He made overtures of peace to the Huguenots, and negotiated a marriage between his sister Margaret and Henry of Navarre. On the occasion of this wedding he invited Coligni and other Protestant leaders to court, and treated them with a simulated favor which lulled their suspicions. It appears that he and his mother were responsible for the massacre of the Protestants which commenced

Aug. 24, 1572 (St. Bartholomew's Day). Charles admitted that he had consented to this crime. He died without issue May 30, 1574. (See VARILLAS, "Histoire de Charles IX.," 1633; SIMONDI, "History of France.")

**Charles X.**, king of France, born at Versailles Oct. 9, 1757, was a younger brother of Louis XVI. He was originally styled the count of Artois. In 1773 he married Maria Theresa. He emigrated in 1789, and instigated the French royalists to revolt in 1795. He remained in exile until 1814. He began to reign on the death of Louis XVIII. in Sept., 1824. His policy was reactionary, and his advisers were a conclave of fanatical priests. In Aug., 1829, he formed an ultra-royalist ministry, which became obnoxious to the people, and on July 25, 1830, the Parisians appealed to arms, barricaded the streets, and after a contest of three days were completely victorious. Charles abdicated in favor of his grandson, the duke of Bordeaux, and escaped to England. He died Nov. 6, 1836. (See LORIEUX, "Histoire du Règne de Charles X.," 1834; LAMARTINE, "History of the Restoration.")

**Charles I.** of Anjou, king of Naples, count of Anjou and Provence, born about 1220, was the youngest son of Louis VIII. of France, and a brother of St. Louis. He married Beatrice, a daughter of Raimond Berenger, count of Provence, and became his heir. At the instigation of the pope he attacked and defeated Manfred, king of Naples, in 1266, and usurped his throne. Provoked by his tyranny, the Sicilians revolted and massacred a multitude of Frenchmen on the 30th of Mar., 1282. This event was called "The Sicilian Vespers." Died Jan. 7, 1285.

**Charles I.** of Spain. See CHARLES V. (emperor).

**Charles (or Carlos) II.**, king of Spain, born Nov. 6, 1661, was the son of Philip IV., who died in 1665. Anne of Austria became regent during the minority of Charles, who was her son. He married, in 1678, Louise, a niece of Louis XIV. of France. In 1689 he became an ally of England and other powers in a war against Louis XIV. He was an incapable ruler and a man of morbid condition of mind and body. As he was childless, he became in the latter part of his life anxious and irresolute about the choice of his successor. By his last will he appointed Philip, duke of Anjou, as his heir. Died Nov. 1, 1700.

**Charles III.**, king of Spain, a son of Philip V., was born Jan. 20, 1716. He ascended the throne on the death of his brother, Ferdinand VI., in 1759, and was an ally of France in the war against England which began in 1762. He promoted education and reform, and expelled the Jesuits from Spain in 1767. In 1779, as an ally of France, he declared war against England. These allies besieged Gibraltar without success. He died Dec. 14, 1788, and was succeeded by his son, Charles IV.

**Charles IV.** of Spain, a son of Charles III., was born at Naples Nov. 12, 1748. He became king in 1788, before which he had married Maria Louisa Theresa of Parma. In 1792, through the evil influence of the queen, her depraved favorite Godoy was appointed prime minister. In 1793 war was declared by the French against the Spaniards, who were defeated in many battles. Charles sued for peace, and the war ended in July, 1795. As an ally of France he declared war against England in 1796. Charles abdicated in favor of his son Ferdinand in Mar., 1808, but Napoleon in the same year deposed him, and placed his own brother Joseph on the throne. Died Jan. 19, 1819.

**Charles X. (or Charles Gustavus)**, king of Sweden, born at Nyköping Nov. 8, 1622, was a son of the prince of Deux-Ponts. His mother was a sister of King Gustavus Adolphus. He was the heir-apparent in the reign of Christina, and became king when she abdicated in June, 1654. He was an able and a warlike ruler. In 1655 he invaded Poland because the Polish king had not renounced his claim to the throne of Sweden. He took Warsaw, and speedily drove the king out of Poland. During his absence the Danes declared war against him. He defeated them and compelled them to cede Scania to Sweden (1658). He died Feb. 13, 1660, and left the throne to his son Charles. (See LUNDBLAD, "Konung Carl X. Gustaf's Historia," 2 vols., 1823-29.)

**Charles XI.**, king of Sweden, the son of Charles X., was born Dec. 25, 1655. By a treaty with Poland in 1660, Esthonia and other provinces which Charles X. had conquered were ceded to Sweden. Charles XI. assumed the royal functions in 1672, and formed an alliance with Louis XIV. of France. He defeated the Danes, who invaded Sweden in 1677, but in 1679 he signed a treaty of peace and married a sister of the king of Denmark. His reign henceforth was pacific and prosperous. In 1682 he was invested by the states with absolute power, of which he made a good use. He died April 15, 1697, and was succeeded by his son, Charles XII.

**Charles XII.** of Sweden, born at Stockholm June 27, 1682, was the eldest son of Charles XI. and Ulrica Eleonora of Denmark. He learned Latin, French, and German, and formed in his youth simple and frugal habits of living. He began to reign in April, 1697, and chose Count Piper as his chief minister and adviser. In 1700 a league was formed against Sweden by Peter I. of Russia and the kings of Denmark and Poland, who designed to aggrandize their dominions at his expense. At the head of a well-disciplined army Charles assumed the offensive in May, 1700. He marched first against Copenhagen, and compelled the Danish king to sue for peace, which was concluded in Aug., 1700. With prompt and rapid movement he then led about 8000 men against Peter the Great, who was besieging Narva with nearly 70,000 men. Charles gained a decisive victory at Narva in Nov., 1700, soon after which he invaded Poland. He defeated the Poles in several battles, and deposed Augustus, king of Poland, in 1704. Provoked by recent acts of hostility on the part of the czar Peter, he advanced towards Moscow in Sept., 1707, with an army of 43,000 men. The Russian army was not able to resist his impetuous progress, and he crossed the Beresina in June, 1708. Having arrived at Smolensko, he was induced by Mazeppa, hetman of the Cossacks, to march southward into the Ukraine. Here many of his men perished from cold and want of provisions, and his army remained inactive during the severe winter of 1708-09. At the beginning of the next campaign he had only 18,000 Swedes in his army. He besieged Poltava, to relieve which Peter advanced with an army of 70,000 men. The decisive battle of Poltava, July 8, 1709, resulted in the defeat of Charles, who lost about 9000 men killed and 6000 prisoners. He retreated into Turkey, and was kindly received by the sultan, who gave him a residence at Bender. He induced the sultan to declare war against Russia, but this war was soon ended by a treaty. Charles remained in Turkey several years, and at length was involved in a quarrel with the Turkish rulers, who treated him as a prisoner. He escaped in 1714, and travelling *incognito* through Hungary and Germany, reached Stralsund in November of that year. The Russians, Danes, and Prussians continued to wage war against the king of Sweden, and they took Stralsund in Dec., 1715, after a long siege. The energy and audacity of Charles remained unabated, notwithstanding his reverses, and while the allies threatened to invade Sweden, he invaded Norway. He was killed at the siege of Fredrikshall Nov. 30, 1718, and left a great reputation as a military genius. He was never married, and his sister Ulrica Eleonora inherited the throne. (See VOLTAIRE, "Life of Charles XII.," NORDBERG, "Karls XII. Historia," 1740; LUNDBLAD, "Konung Carl XII. Historia," 2 vols., 1830; POSSELT, "Geschichte Carl's XII.," 1804.)

**Charles XIII.**, king of Sweden, born 7th Oct., 1748, was a son of King Adolphus Frederick and a nephew of Frederick the Great. He was before his accession an admiral of the Swedish navy, and gained a naval victory over the Russians in 1788. In 1792 he became regent during the minority of his nephew, Gustavus IV., and retained that office until 1796. The States-General deposed Gustavus in 1809, and elected Charles as his successor. Having no son, Charles, with the consent of the Swedish Diet, adopted Gen. Bernadotte as his son and heir in 1810. Died Feb. 5, 1818.

**Charles XIV.** of Sweden. See BERNADOTTE.

**Charles (or Carl) XV.** (LOUIS EUGÈNE), king of Sweden and Norway, was born May 3, 1826. He succeeded his father, Oscar I., July 8, 1859. He married in 1850 a Dutch princess of Orange. Died Sept. 18, 1872, leaving a daughter, Louisa, crown-princess of Denmark. The crown descended to his brother, Oscar II., Frederick, duke of Ostrogothia.

**Charles I.** (KARL EITEL FRIEDRICH ZEPHYRIN LUDWIG of Hohenzollern Sigmaringen), king of Roumania, which until 1861 was the United Danubian Principalities of Moldavia and Wallachia. He was born in Germany April 20, 1839, and is the second son of the late prince Karl of Hohenzollern. He entered the Prussian army at an early age, and was a lieutenant in the second regiment of Prussian dragoons when, on the 10th of May, 1866, he was elected *domnu*, or prince, of Roumania, at the instance of the Prussian ambassador. He arrived in Bucharest May 2, and was recognized by the people May 22, and received formal investiture from the sultan, who was his suzerain, July 11, 1866. His administration has been successful as a whole. He has recently declared Roumania independent, and was proclaimed king Mar. 27, 1881.

**Charles**, archduke of Austria, an eminent general, born at Florence 5th Sept., 1771, was a son of the German emperor Leopold II. Having served several campaigns against the French, he obtained in 1796 the chief command

of the Austrian army of the Rhine, and defeated the French general Jourdan at Wurtzburg in September of that year. He also compelled Moreau to retire across the Rhine. He retired from active service on account of ill-health in 1800. In 1805 he commanded in Italy, and defeated Massena at Caldiero. He became general-in-chief of the Austrian armies in 1806. He could not prevent Napoleon from entering Vienna, but he encountered him with success at the great battle of Aspern in May, 1809. The archduke and Napoleon commanded the armies at Wagram July, 1809, where the French claimed the victory. He resigned the command soon after this event. He wrote an able work called "Principles of Strategy" (1814). He died 30th April, 1847, leaving a son, Albert.

**Charles Albert**, king of Sardinia, was born Oct. 2, 1798. He was a son of Prince Charles Emmanuel of Savoy-Carignan. He became king on the death of Charles Felix in 1831, and adopted a liberal policy. Co-operating with the movements of the popular party in the cause of the unity and liberation of Italy, he declared war against Austria in the spring of 1848. Having been defeated at Novara in Mar., 1849, he abdicated in favor of his son, Victor Emmanuel. Died July 28, 1849.

**Charles** (surnamed) **the Bold**, sometimes called **Charles the Rash** [Fr. *Charles le Téméraire*], duke of Burgundy, born at Dijon Nov. 10, 1435, was a son of Philip the Good. He was styled count de Charolais until he became duke in 1467. He married Margaret, a sister of Edward IV. of England, in 1468, and became one of the most powerful sovereigns of his time. His dominions included the Netherlands. He waged war against Louis XI. of France and other princes. In 1476 he was defeated by the Swiss at Morat. He afterwards invaded Lorraine, and was defeated and killed at Nancy Jan. 5, 1477. He was succeeded by his daughter Mary, who was married to the emperor Maximilian I. (See KIRK, "History of Charles the Bold," 1868; COMINES, "Mémoires.")

**Charles City**, R. R. junction, capital of Floyd co., Ia. (see map of Iowa, ref. 2-H, for location of county), is on Cedar River, 139 miles W. N. W. of Dubuque. It has a furniture factory and various other industries. Pop. in 1870, 2166; in 1880, 2421.

**Charles City Court-house**, capital of Charles City co., Va. (see map of Virginia, ref. 6-H, for location of county), is about one mile N. of the James River and 28 miles S. S. E. of Richmond. Pop. not in census of 1880.

**Charles Edward**, "the Young Pretender," or more fully **Charles Edward Louis Philip Casimir Stuart**, son of James Stuart, the first "Pretender," and of the Polish princess Clementina Sobieski, was born at Rome Dec. 31, 1720. Unlike his father and his grandfather James II., he had much native talent and firmness of purpose. He was well educated, and skilled in athletic exercises, as well as in music and the fine arts. In early youth he served with much honor in the Spanish army against Austria. War having broken out between France and England, and his father having abdicated his claim to the British throne, he in 1744 embarked with a powerful fleet and army for England, Marshal Saxe being in command; but the expedition was broken up by a great storm, which destroyed a large part of the fleet. In the following year (July 25) he landed with a few attendants at Moidart. He soon had a large following, mostly of Highlanders. With these he entered Edinburgh Sept. 17, destroyed Sir John Cope's army at Preston Pans Sept. 21, entered England, and could easily have taken London, but for the insubordination of the Highland chiefs, who compelled him to retreat to Scotland, repulsing the royal troops at Clifton. On Jan. 17, 1746, he defeated Hawley at Falkirk. The character of his forces soon compelled his retreat to the Highlands, whither he was followed by the duke of Cumberland. He fought the latter at Culloden Muir (April 16), and was there utterly overthrown; but though his army was inferior in numbers and worn out by exposure and hunger, he would doubtless have won a complete victory but for the jealousy of the clan MacDonald. As it was, the battle was totally lost, and with it the last reasonable hope of the Stuart line. After many months of suffering he escaped from the Western Islands by the aid of the famous Flora MacDonald. He lived upon various parts of the Continent under the title of count of Albany. His ill-fortune and the unfaithfulness of the countess (who was the mistress of Alfieri) led him to grossly intemperate habits. He died at Rome Jan. 30, 1788.

**Charles** (ELIZABETH RUNDLE), an English authoress, born about 1826. She was married to Andrew P. Charles, Esq., of London. Among her works, which are very popular, are "Chronicles of the Schönberg-Cotta Family" (1863) and "Diary of Mrs. Kitty Trevelyon" (1864).

**Charles Emmanuel I.**, duke of Savoy, surnamed **THE GREAT**, was born Jan. 12, 1562. He succeeded his father, Philibert Emmanuel, Aug. 31, 1580, and married Catherine, a daughter of Philip II. of Spain. He was an ambitious prince, and waged war against Henry IV. of France and other powers. Died July 26, 1630.

**Charles Friederich August Wilhelm**, duke of Brunswick, born Oct. 30, 1804, son of Friedrich Wilhelm, who perished at the battle of Quatre-Bras, had for his guardian George IV. of England. Assuming the reins of government in 1823, he ruled so capriciously and arbitrarily that he was deposed by the German Diet. He lived afterwards in Paris and London, and died in Aug., 1873, bequeathing his immense fortune to the city of Geneva.

**Charles** (JACQUES ALEXANDER CÉSAR), a French savant and aéronaut, born at Beaugency Nov. 12, 1746. He was a popular lecturer on physical science in Paris, and gained distinction by his experiments in electricity. He also made an improvement in the art of ballooning by substituting hydrogen gas for heated air. He and M. Robert were the first persons who ever ascended in a balloon. They ascended in 1783 to the height of 7000 feet. Died April 7, 1823.

**Charles Martel**, king of the Franks, born about 690 A. D., was an illegitimate son of Pepin d'Héristal, duke of Austrasia. He succeeded his father as mayor of the palace in 714, and obtained royal power, while Chilperic was the nominal king. He gained near Poitiers in 732 a most important victory over a large army of Saracens who had invaded the kingdom. This is known as the battle of Tours, and is regarded as one of the decisive battles of the world's history. For this victory he was surnamed **MARTEL** (i. e. the "Hammer.") He died Oct. 22, 741 A. D., and was succeeded by his sons, Carloman and Pepin le Bref.

**Charles River**, Mass., rises in Worcester co., and pursues a very tortuous course through Norfolk and Middlesex counties. It meets the tide-water at Boston, forming part of Boston harbor, and separating that city from Cambridge. Total length, about 75 miles.

**Charleston**, city and R. R. junction, capital of Coles co., Ill. (see map of Illinois, ref. 7-F, for location of county), 45 miles W. of Terre Haute. It is the seat of a medical college and an infirmary. Pop. in 1870, 2849; in 1880, 2867.

**Charleston**, capital of Tallahatchee co., Miss. (see map of Mississippi, ref. 5-F, for location of county). Pop. in 1880, 368.

**Charleston**, R. R. junction, capital of Mississippi co., Mo. (see map of Missouri, ref. 7-K, for location of county), 12 miles from Cairo. It has an academy. Pop. in 1870, 635; in 1880, 1028.

**Charleston**, capital of Swain co., N. C. (see map of North Carolina, ref. 3-B, for location of county), is about 50 miles S. S. E. of Knoxville, Tenn. Pop. of tp. in 1880, 1352.

**Charleston**, an important R. R. and commercial centre, the chief city of South Carolina and capital of Charleston county (see map of South Carolina, ref. 7-F, for location of county), is situated in lat. 32° 46' N., lon. 79° 57' W., about 7 miles from the Atlantic Ocean and 130 miles from Columbia, the capital of the State. The city stands upon a tongue of land between the Ashley and the Cooper rivers. Northward stretches an extended plain occupied by fruit, floral, and vegetable farms; southward the two rivers unite, forming a spacious and beautiful harbor, one of the safest and most commodious on the Atlantic coast. The depth within the harbor is from 40 to 50 feet, but only 18 feet at the entrance; however, the work of deepening the latter is now progressing. The city covers 5½ square miles, is triangular in form, has 53½ miles of streets, and 9½ miles of water-front. The population in 1850 was 42,985; in 1860, 48,409; in 1870, 48,956; in 1880, 49,984. The proportion of the white to the colored population in 1880 was 22 to 27. The city is the seat of a large wholesale trade carried on with the interior, and is the port through which the large interior cities of the neighboring States draw their supplies of merchandise from the great commercial centres. There is also a growing trade in flour, bacon, grain, etc., carried on overland with St. Louis, Chicago, and the cities of the West and the Northwest. Charleston is the first rice and third cotton port in the U. S. The principal exports are in cotton, rice, naval stores, lumber, and phosphate rock (a fertilizing substance of great value). The exports in 1883 were—

	Total.	Foreign.	Constantine.
Cotton, bales.....	547,736	364,503	183,283
Rice, tierces.....	42,425		
Naval stores, barrels.....	331,760		
Lumber, feet.....	40,000,000		
Phosphates, tons.....	313,000		

The exports of each article were larger than those of the year before, particularly the foreign exports of cotton and naval stores. A large quantity of vegetables grown upon the suburban farms is annually exported to New York and other Northern cities. In the spring of 1883, 51,460 barrels of Irish potatoes, 708,476 quarts of strawberries, 72,365 melons, and 81,332 packages of other vegetables were shipped northward. The value of foreign exports for the year ending Sept. 1, 1883, was \$22,570,167. The bulk of coastwise imports cannot be ascertained, but it is very large; the foreign imports are small, but growing; their value for the year ending Sept. 1, 1883, was \$506,565. The vessels owned in Charleston in 1883 were 9 ocean sailing-vessels, aggregating 46,250 tons; river sailing-vessels 160, tons 3945; ocean steamers 6, tons 1031; river steamers 9, tons 1593.

*Manufactures* are carried on in cotton, iron, wood, and phosphate rock. The census of 1880 sets down the manufactures of all kinds at 194, employing \$1,718,300 capital, 2146 hands, paying annually \$639,030 in wages, consuming \$1,468,375 in materials, and producing \$2,732,590 in manufactured articles. The total annual value of the manufactures in 1883 was \$9,341,400; the number of manufactures, 371; number of hands employed, 6558; capital invested, \$6,121,570; of this, \$2,490,500 is invested in the manufacture of fertilizers. The manufacture of locomotives was begun in the South Carolina R.R. machine-shops in 1873.

The U. S. census of 1880 fixed the valuation of all property in the county at \$27,994,055, of which \$16,946,917 was real estate and \$11,047,138 was personal property. There is one local fire insurance company, capital \$50,000. There are one daily, four weekly, one semi-monthly, and one monthly publication. A city court, sitting once a fortnight, and presided over by a judge elected for life by the legislature, and the mayor's court, constitute the municipal tribunals. There is a county jail, and a house of correction which is in the suburbs. The inmates are made to cultivate a farm, which produces nearly enough to pay for supporting that institution and an adjoining asylum for the aged and infirm. Pauperism and crime characterized respectively one-third and one-fifth of 1 per cent. of the population.

The principal educational institutions are—Charleston College, founded in 1785, endowment over \$200,000, income without tuition \$14,000, faculty 6, students 34, alumni since 1866, 50; the Medical College of South Carolina, no endowment, faculty 12, students 60, cost of course \$60, and the State Military Academy, having 182 students and 7 professors. The former has an excellent museum of natural history, and the Medical College one of the best pathological and anatomical museums in the U. S. There is one high school for boys, with 7 teachers and 100 pupils; annual donation from city \$2000. Number of public schools 6, teachers 120, pupils 5900. One of these schools is a normal school for girls; it has two departments. In the higher girls are prepared to become teachers. The other schools are divided into primary, intermediate, and grammar departments, each of the last two being the field of promotion for the one below. Each school has a principal, and a sub-principal for each department. All of the schools are under the direction of a superintendent, who is subject to the control of a board of commissioners composed of one citizen from each ward, chosen every two years by the people. The Charleston Library is the principal institution of that kind. Established in 1748, it formerly contained 24,000 volumes, but lost about 8000 by the war. Many of its books are of great value. The society owns a building on Broad street. It has no endowment. Its income is about \$2000. The Apprentices' and Minors' Library Society has a building on Meeting street and 10,000 volumes, which were destroyed by fire in 1861. It was reorganized in 1873.

The churches number 44; Episcopal 11, Presbyterian 8, Catholic 6, Methodist 7, Baptist 4, Lutheran 3, Unitarian 1, Independent 1, orphans' chapel 1; also two Jewish synagogues; average sittings 500 each. St. Michael's and St. Philip's Episcopal, and the Central Presbyterian, are the finest church edifices. The benevolent institutions are the city orphan house, endowment \$190,000, annual cost \$21,377; inmates 303, city donation \$20,000 a year; the Catholic orphan asylum, inmates 109, annual city donation \$6000; almshouse, inmates 75, besides outside pensioners, cost to the city \$10,000 a year; asylum for aged and infirm, inmates 58, annual cost \$3515; city hospitals, patients treated 1223, annual expenses \$20,977, cost to the city \$7287. There is an asylum for colored orphans, supported by the State, cost \$5000 a year. The Confederate Widows' Home, St. Philip's Church Home, Sailors' Home, Ladies' Mutual Aid Association, and Ladies' Fuel Society are among the private benevolences.

The most noted public buildings are the Arsenal and the Citadel, occupied by U. S. troops, the market, city hall, court-house, city orphan-house, Charleston Hotel, Mills House, Academy of Music, new custom-house, and the post-office. The Battery, a small park on the S. front of the city, is the chief public resort.

The city railroads are the City Railway, for passengers only, capital \$200,000, miles of track 8, passengers carried annually 1,000,000; Enterprise Railroad, for freight and passengers, capital \$250,000, miles of track 3. Three steam railroads centre in the city, the principal of which is the South Carolina. There is a steam ferry to Sullivan's Island, a summer resort, carrying 200,000 passengers annually. The city is lighted by a private gas company. The paved streets are  $9\frac{1}{4}$  miles, plankd  $5\frac{1}{2}$ , shelled  $1\frac{1}{2}$ . The tidal sewerage is in vogue: miles of sewers  $5\frac{1}{2}$ , besides inclined drains.

Charleston was founded in 1680 by an English colony. During the first half century its growth was slow, but it attained commercial importance before the end of the second. It was taken by the British in 1780, after a gallant defence, and evacuated by them in 1782. It was the State capital until 1790, when the seat of government was removed to Columbia. It was the seat of the great Democratic convention of 1860, and later in the same year of the convention which passed the famous Ordinance of Secession. The reduction of Fort Sumter, its principal harbor defence, was the first conflict of the great civil war and the first triumph of the Confederate arms. In Dec., 1861, nearly half of the city was destroyed by fire. During the last two years of the war it sustained a protracted siege and bombardment, and was finally evacuated by the Confederates Feb. 19, 1865.

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**Charleston, or Kanawha Court-house**, capital of Kanawha co. and former cap. of W. Va. (see map of West Virginia, ref. 5-C, for location of county), at the mouth of the Elk River, on the Kanawha River, 65 miles from its mouth and 150 miles S. S. W. of Wheeling. The Chesapeake and Ohio R. R. passes the city on the opposite side of the Kanawha. Steamboats navigate the Kanawha River up to this point. The city has two iron-foundries and several large manufactories. A considerable trade in lumber, salt, and coal is carried on. There are ten salt furnaces, one of which makes 2000 bushels of salt per day. The seat of the State government was removed to Charleston in 1869, and to Wheeling in 1875. In May, 1885, Charleston became the permanent capital of the State. A new capitol building has been erected. Pop. in 1870, 3162; in 1880, 4192.

**Charleston, College of.** In June, 1770, a meeting of the citizens of Charleston, S. C., was held to petition the general assembly for the establishment of a college. In Oct., 1775, an act was passed providing for three colleges, one of which was to be located in Charleston. In March, 1789, the Rev. Dr. Robert Smith was elected president. In Oct., 1794, the first commencement was celebrated. In 1805 Dr. George Buist was elected president, and served three years. Upon his death Mr. Mitchell King was elected to supply his place.

After a suspension of some years, in 1826 the Rev. Jasper Adams of Brown University was elected president, and in 1830 the new building (subsequently enlarged by the addition of wings) was erected. From 1826 to 1838 the chair was filled by Dr. Adams, with the exception of one or two intervals, in which Mr. King and the Rt. Rev. Dr. Bowen officiated temporarily. In 1838, Rev. Dr. Brantley was elected, and was succeeded in 1844 by W. P. Finley, LL.D., who served until 1857, when N. Russell Middleton, LL.D., was elected president. In 1882 Prof. Henry E. Shepherd, LL.D., succeeded Dr. Middleton as president.

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**Charlestown**, a former city and seaport of Middlesex co., Mass., but now a part of Boston (see map of Massachusetts, ref. 2-I, for location of county), is situated on a peninsula nearly enclosed by the Mystic and Charles rivers, and is connected with the old part of Boston and with Chelsea by five bridges. The ground is uneven, and rises into two eminences, Breed's and Bunker Hills, which afford delightful situations for dwellings. The city is handsome and well built, with pleasantly shaded rather irregular streets. Three avenues, Main, Bunker Hill, and Medford streets, traverse the peninsula, and, converging at its neck, make the fine broad avenue Broadway, passing through Somerville and over Winter Hill. The city has public parks, horse-railways, a public library, and numerous charities. There is an extensive U. S. navy-yard, occupying seventy to eighty acres, extending from the Charles to the Mystic rivers, in which are three large ship-houses, a ropewalk, the largest in the U. S., and machine-shops for the manufacture of copper-work, machinery, and ordnance,

capable of employing 2000 men. A dry-dock connected with the navy-yard is built of granite and cost \$670,000. Charlestown has manufactures of steam-engines, boilers, and machinery, chemicals, stone-ware, brass-ware, brushes, sugar, soap, leather, mechanics' tools, gas fixtures, whips, drain-pipes, New England rum, tobacco, oils, etc. To commemorate the battle of BUNKER HILL (which see) a granite shaft 221 feet high, 31 feet square at the base, and 15 at the top, was commenced in 1825 and finished in 1843. It is called the Bunker Hill Monument, and from its summit is afforded a magnificent view of the surrounding country. The corner-stone of this tower was laid by La Fayette, and at the celebration of its completion, June 17, 1843, the anniversary of the battle, was present a vast gathering of people, including the President and his Cabinet. Charlestown is supplied with water from Mystic Lake, 5 miles distant. The water-works were finished in 1864, at a cost of \$1,461,259. The water flows from the lake one mile by gravitation, is then pumped by three engines to a reservoir on Tuft's Hill, from which it flows four miles, and supplies Charlestown and the neighboring towns. Charlestown is memorable from its associations with the Revolution. It was burned by the British on the day of the battle of Bunker Hill. The city charter dates from 1847. The city of Charlestown, also the towns of West Roxbury and Brighton, were annexed to Boston Oct. 13, 1873, to become a part of that municipality Jan. 5, 1874. Pop. in 1870, 28,323; in 1880, included in Third, Fourth, and Fifth Wards of Boston, 33,731.

**Charlestown**, Sullivan co., N. H. (see map of New Hampshire, ref. 8-D, for location of county), on R. R. and the Connecticut River, 50 miles W. of Concord. It has manufactures of lumber, boots and shoes, etc. Pop. of Charlestown township in 1870, 1741; in 1880, 1587.

**Charlestown**, R. R. junction, capital of Jefferson co., West Va. (see map of West Virginia, ref. 3-G, for location of county). It has a fine court-house and a jail. In this place John Brown was tried and executed Dec. 2, 1859. On the 18th Oct., 1863, a Confederate force of 1200 or 1400 men, under Gen. Imboden, surrounded the place at daylight, and attacked the Union troops stationed there. Being surprised, they were panic-stricken, and, flying in confusion, were nearly all captured. The place was recaptured within an hour by a force of U. S. troops under Col. Geo. D. Wells, and the Confederates driven from the town. Pop. in 1870, 1593; in 1880, 2016.

**Charleville**, a town of France, in the department of Ardennes, on the river Meuse, which separates it from Mézières. It is well built and handsome, and has a college and a large public library; also manufactures of hardware, nails, copper, leather, etc. A suspension bridge crosses the river here. This place was formerly fortified. Pop. in 1881, 16,185.

**Charlevoix**, capital of Charlevoix co., Mich. (see map of Michigan, ref. 4-L, for location of county). Pop. in 1880, 512.

**Charlevoix, de** (PIERRE FRANÇOIS XAVIER), a French Jesuit and historian, born at Saint-Quentin Oct. 29, 1682. He went as a missionary to Canada in 1720, and descended the Mississippi to its mouth. He wrote, besides other works, a "History of Canada" (3 vols., 1744). Died Feb. 1, 1761.

**Charlotte**, a city and R. R. junction, capital of Eaton co., Mich. (see map of Michigan, ref. 7-I, for location of county), 19 miles S. W. of Lansing. It has lumber and other manufactures. Pop. in 1880, 2910; in 1884, 3598.

**Charlotte**, a city and R. R. centre, capital of Mecklenburg co., N. C. (see map of North Carolina, ref. 3-E, for location of county). It has three academies and various manufactures. Gold-mines have been opened in the vicinity. There is a branch of the U. S. Mint in this city. Pop. in 1870, 4473; in 1880, 7094.

**Charlotte**, capital of Dickson co., Tenn. (see map of Tennessee, ref. 6-E, for location of county), 38 miles W. of Nashville. Pop. not in census of 1880.

**Charlotte Amalie**, a town of the West Indies, capital of the island of St. Thomas. It stretches a mile along the shore, with white-walled, red-roofed houses, contrasting with the palms on the neighboring hills. It has a good harbor and an extensive trade, and is a station for the mail-packets which ply between Southampton and the West Indies and for the steamers from New York to Brazil. Pop. 12,560.

**Charlotte Harbor**, an inlet on the W. coast of Florida, in Manatee county, is nearly 24 miles long, and is sheltered from the sea by several islands. It is shallow, its greatest depth being nearly ten feet. Good oysters and fish abound here. Cattle are exported to Key West.

**Charlot'tenburg**, a town of Prussia, in the province

of Brandenburg, on the river Spree, 3 miles W. of Berlin, at the end of the Thiergarten park. It has a palace with a fine park and a famous palmery, and a mausoleum in which are statues of Frederick William III. and Queen Louisa, by Rauch. Here are manufactures of cotton and hosiery. Pop. in 1880, 30,446.

**Char'lottesvile**, R. R. junction, capital of Albemarle co., Va. (see map of Virginia, ref. 5-G, for location of county), is on the Rivanna River, 97 miles by railroad W. N. W. of Richmond and 61 miles by railroad N. N. E. of Lynchburg. One mile W. of this town is the University of Virginia, founded in 1819 by Thomas Jefferson, and endowed by the State. Here are cloth, agricultural implement, tobacco, and other factories. The city has an academy and several other schools. Monticello, the residence of Jefferson, is three miles distant. Pop. in 1870, 2838; in 1880, 2676.

**Char'lottetown**, the capital of Prince Edward Island and of Queen's county, is situated on the N. bank of East River, near the S. coast. It has an excellent harbor and a large export trade. The town is well laid out, and has a fine colonial building, post-office, and atheneum, a normal school and lunatic asylum, and is the seat of Prince of Wales, St. Dunstan's (Roman Catholic), and a Methodist college. It has excellent public schools, and is the see of a Roman Catholic bishop. Pop. in 1881, 11,485.

**Charlton** (ROBERT M.), an American lawyer and author, born at Savannah, Ga., Jan. 19, 1807. He published a volume of poems in 1838, and became U. S. Senator in 1852. Died Jan. 18, 1854.

**Char'mides** [Χαρμίδης], an Athenian philosopher, born about 450 B. C., was an uncle of Plato and a pupil of Socrates. He was one of the tyrants who obtained power by the aid of Lysander the Spartan, and was killed in battle by the army of Thrasybulus about 404 B. C.

**Cha'ron** [Gr. Χάρων], in classic mythology, the ferryman who transported the souls of the dead across the rivers of the infernal regions. The poets feigned that he was the son of Erebus and Nox.

**Charon'das** [Χαρωνδας], an eminent Greek legislator, born at Catana, in Sicily, flourished about 650 B. C. He composed laws in verse, which were adopted by the Athenians and other nations.

**Cha'ron of Lamp'sacus**, son of Pythocles, one of the early writers of history preceding Herodotus, who are known under the name of "logographi." Little more is to be gathered of his life than the brief summary given by Suidas, who places him in the time of the Persian wars, O. 75 (i. e. B. C. 480). Plutarch refers to him as writing still after the death of Xerxes, which occurred B. C. 465. He composed a number of works on historical subjects, particularly an account of the Persians (Περσικά), and another of the Greeks (Ελληνικά). Suidas gives the titles of several other histories of separate countries, some of which, Creuzer and Müller think, may be but different names of the same work; some probably belong to other writers of this name. Suidas speaks of two others—one of Carthage, who wrote accounts of the tyrants of Europe and Asia; the other of Naucratis, who wrote the lives of Alexandrian and Egyptian priests, a history of kings, and an account of Naucratis. (The fragments of the works of Charon of Lamp'sacus are collected in CREUZER'S "Histor. Græc. Antiq. Frag.," and in MÜLLER'S "Histor. Græc. Frag.," vol. i., pp. 32-35.) HENRY DRISLER.

**Charr** (*Salvelinus umbla*), a beautiful European fish of the salmon family. It is not a game-fish, though it will occasionally rise at the fly or take a minnow. It lives in the clear water of lakes and streams. It seldom weighs much more than a pound, and is quite variable in color and marks. Allied to this are a number of species in Europe and America, and among them is the common brook-trout of North America, the *S. fontinalis*.

**Charrières, de** (MADAME SAINT HYACINTHE), a French authoress, born in Holland in 1740, wrote several romances: "Lettres Neuchâtelaises" (1784) and "Oaliste" (1786). She was intimate with Benjamin Constant, and their correspondence has been published. Died Dec. 20, 1805.

**Chart** [from the Fr. *carte*; Lat. *charta*, "paper"], a hydrographic map for the use of navigators, is the projection of some portion of the sea or coast on a plane surface. Charts are generally constructed on the principle of Mercator's projection. In the English and U. S. services, after coasts have been surveyed by the government, charts are engraved and sold at prices below their cost, in order to encourage their general use. The navigating charts, showing the dangers of the coasts with sufficient clearness to enable mariners to avoid them, are usually on a uniform scale, and the U. S. charts are generally on the polyconic



projection. The preparation of charts is a part of the duty of the hydrographical department at the admiralty in England, and in the U. S. of the coast survey department.

**Char'ta Epispas'tica** [Lat. for "drawing" (or blistering) "paper"], the pharmaceutical name for blistering paper. It is prepared by applying to one surface of smooth bibulous paper a mixture of oil, wax, spermaceti, resin, Canada balsam, water, and powdered cantharides. When applied to the skin it adheres, and after a time raises a blister as perfectly as the blistering cerate does, while it is much cleaner and more easily applied.

Various *charte emplastique*, or adherent medicated papers (*papiers emplastiques*), are employed by many French physicians instead of the less neat and convenient plasters of ordinary pharmacy.

**Charte** [Fr.], the name applied in France (1) to the "Grand Charter" of John II., prepared by the States-General and agreed to by the king: this was the basis upon which the States-General asserted their liberties at the commencement of the Revolution; (2) that by which Louis XVIII. in 1814 acknowledged the rights of the people; (3) that of 1830, which was sworn to by Louis Philippe, recognizing the popular sovereignty.

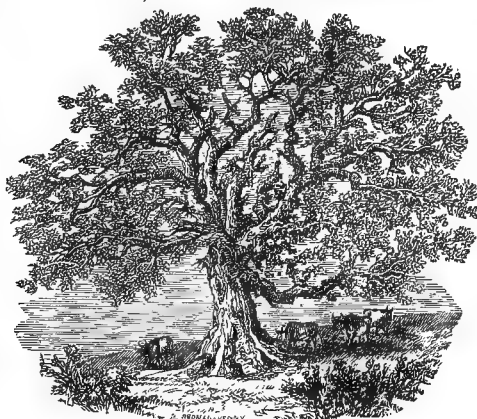
**Char'ter** [Fr. *chartre* or *charte*, from the Lat. *charta*, "paper"], a formally written instrument given as evidence of a grant, contract, or other transaction between man and man; an instrument executed with form and solemnity bestowing rights and privileges. In public law the term is applied to those formal deeds or instruments by which sovereigns guarantee the rights and privileges of their subjects, or by which a sovereign state guarantees those of a colony. The founders of several of the British colonies, now States of the Union, obtained charters from the king of England for the same. In municipal law the word is principally used to designate a grant obtained from the king of franchises, privileges, or estates by letters patent under the great seal. A leading instance is found in the creation of corporations. In early times corporations were created principally in this manner. It has been doubted whether municipal corporations could at first be created in any other way than by royal charter. The better opinion is that there could be valid charters other than royal. It is now quite frequent to originate them by act of Parliament. The act of incorporation in that case has the force of a statute. There are certain special rules appertaining to royal charters, as distinguished from corporations created by act of Parliament. Thus, the king cannot limit the perpetuity of a corporation, while Parliament may. Accordingly, when the Bank of England was established by way of experiment, the aid of Parliament was called in to limit its duration. A general statute now confers that power upon the king to limit the time of corporate existence. So the Crown cannot force a new charter upon an already existing corporation. The king cannot derogate from his own grant. Parliament may abolish the institution or modify it at pleasure. Nor can the king remove corporators at discretion, as each corporator is supposed to have a freehold estate. So a charter cannot create exclusive right or prohibit trade, or in any way change the established law of the land. These propositions are of but little practical use in the U. S., as, since the Revolution, corporations are created by act of the legislature. There is a number of municipal and other charters in existence which were granted by the king prior to the Revolution, and which remain in force, notwithstanding the change in government. (As to general rules of law in which the rules concerning strict charters agree with corporations created by the legislature, see CORPORATION.)

T. W. DWIGHT.

**Char'ter-House** [a corruption of *Chartreuse* (see CARTUSIANS)], a hospital and school in London, founded in 1611 by Sir Thomas Sutton, who endowed it with the revenues of more than twenty manors, lordships, and other estates. It was originally a Carthusian monastery, founded in 1371. It is an asylum for poor brethren, the number of whom is limited to eighty, and they must be bachelors, members of the Church of England, and fifty years old. Each brother receives, besides food and lodging, an allowance of £26 a year for his clothing, etc. The school is for the benefit of "the sons of poor gentlemen to whom the charge of education is too onerous." The number of scholars is limited to forty-four, but there are large numbers of day and boarding pupils who are not charity scholars. Among the eminent men educated here were Addison, John Wesley, George Grote, Bishop Thirlwall, and Thackeray. The reputation of the school is high. In 1873 the school was removed to Godalming.

**Char'ter Oak**, a tree famous in colonial history, once

stood in Hartford, Conn. When Sir Edmund Andros came



Charter Oak.

to Hartford in 1687, by command of King James II., to resume the charter of the colony, the charter was concealed by Capt. James Wadsworth in a hollow of this oak. This historic tree was blown down by a gale Aug. 21, 1856, but a sketch had been made of it in 1848.

**Chart'er-Par'ty** [Fr. *chartre-partie*, so called from such documents being at one time divided (in Fr. *parti*), and one-half given to each party concerned], the title given to a contract in which the owner or master of a ship, with consent of the owner, lets the vessel or a portion of her to a second party for the conveyance of goods from one port to another port; hence the vessel is said to be "chartered." It must specify the voyage to be performed, and the terms on which the cargo is to be carried. On the part of the ship it is covenanted that she shall be seaworthy, well found in rigging, furniture, and provisions, and that the crew be suitable in number and competency; that she shall be ready to receive the cargo on a given day, wait its complete delivery for a certain period, and sail for the stipulated port when laden if the weather for the time permits. The freighter's portion of the contract obliges him to load and unload at suitable periods under specified penalties, and to pay the freight as agreed on. The master must not take on board any contraband goods, or otherwise render the vessel liable to seizure. The owner is not responsible for losses caused by war, fire, or shipwreck, unless arising from negligence of the master or crew. A charter-party sometimes assumes another character, and is a mere lease of a ship, which is manned by the charterer, who then has the usual rights and incurs the liabilities growing out of possession.

**Chartier** (ALAIN), the most celebrated name in the French literature of the fifteenth century, born at Bayeux in Normandy between 1380 and 1390, died at Avignon in 1449. He studied in the University of Paris, entered the service of Charles VI., and was clerk, notary, and financial secretary to Charles VII. His principal works are "Breviaire des Nobles," "Le Livre des Quatre Dames," and "Le Quadrilogue-Invectif." They are now forgotten, but enjoyed, at the time they were written and for a century after, the greatest fame. The pages and the young gentlemen learned passages of his poems by heart every day, and Lydgate, the English poet, studied him with ardor. Popular, however, in the great sense of the word—that is, something for the people—they never became.

**Chart'ism** [so called from "the people's charter," noticed below], a political movement in Great Britain between 1835 and 1850, in which attempts were made to secure universal male suffrage, equal representation, the vote by ballot, annual parliaments, the abolition of property qualification for office-holders, and the payment of salaries to members of Parliament. These changes were demanded in "the people's charter" of 1838. The movement was primarily caused by the sufferings of the working-classes; and as a whole, the demands of the Chartists were reasonable, moderate, and just; but they excited the greatest alarm in England, and the movement was opposed by force, some of their meetings being fired upon by the troops, prominent Chartists being imprisoned, and Parliament refusing to entertain their petitions. But various parliamentary reforms and the repeal of the corn laws in 1846 having in a measure relieved the distress of the working-classes, Chartism gradually declined.

**Chartres** (anc. *Autricum*), a city of France, capital of the department of Eure-et-Loir, is on the river Eure, and on

the railway which connects Paris with Le Mans, 49 miles S. W. of Paris. It is built at the base and on the declivity of a steep hill. The streets are narrow and crooked. Here is a Gothic cathedral of the eleventh century, said to be the most perfect in France; it is surmounted by two towers, one of them 382 feet high, with rich ornamentation, and the other exceedingly massive. Chartres has two other remarkable churches, an episcopal palace, and a public library of about 30,700 volumes; also manufactures of hosiery, hats, leather, etc. Here is a large weekly market for grain and flour. During the Middle Ages, Chartres was the capital of the district of *Chartrain*, made by Francis I. a duchy, and given as an appanage to the dukes of Orleans. Hence the title duke of Chartres was given to the eldest son of the duke of Orleans. More recently the same title was given to Prince Robert of Orleans, grandson of King Louis Philippe, and second son of Duke Ferdinand of Orleans. Pop. in 1881, 21,080.

**Chartres** (ROBERT D'ORLEANS). See APPENDIX.

**Chartreuse, La Grande**, a large and famous monastery in the French Alps, 12 miles N. N. E. of Grenoble, in the midst of wild and impressive scenery, 3281 feet above the sea. The convent was founded by Saint Bruno in 1084, somewhat higher up the mountain than the present buildings. The name of the order, Carthusians, comes from this convent, and the English Charter-house is a corruption of its name. The buildings are extensive, but rudely built, and date from 1689. The monastery had been repeatedly burned before the present structure was built. The monks were stripped of their possessions in the French Revolution, and abandoned the convent until 1826. They have never recovered their former wealth and dignity.

**Chartulary** [Late Lat. *chartularia*] is, as its name implies, a collection of charters. So soon as any body, ecclesiastical or secular, came to be possessed of a considerable number of charters, considerations of convenience and safety would suggest having them classified and copied into a book or roll. Such book or roll has received the name of a chartulary. Mabillon traces chartularies in France as far back as the tenth century, but it was not until the twelfth or thirteenth century that they became common. They were kept not only by all kinds of religious and civil corporations, but even by private families. Many of them have been printed, and they are often of great value in historical, archæological, and genealogical inquiries.

**Charyb'dis** [Gr. *Χάρυβδις*], now called **Galafaro**, is an incessant undulation, rather than a whirlpool, on the Sicilian side of the Strait of Messina, opposite the rock of Scylla. It is caused by the meeting of currents, and is seldom dangerous. It was anciently much dreaded by mariners. (See REAR-ADMIRAL WILLIAM HENRY SMYTH's monograph on the Mediterranean, p. 519, 8vo, 1854.)

In Greek mythology, Charybdis was a daughter of Poseidon, and was killed by Zeus with a thunderbolt and hurled into the sea, where she henceforth drew the approaching ships into the deep.

**Chase** [Fr. *chasse*], a pursuit, a hunting; the sport of hunting or pursuing game. In nautical language, chase is the pursuit of a hostile vessel and also the vessel pursued. The chase of a gun is the name of the greater portion of the length between the muzzle and the trunnions. In forestry, chase is a row or rank of trees or plants, especially hedge-plants.

**Chase** [Fr. *châssis*], in printing, an iron frame in which the pages of type are wedged up to secure the letters from separating or dropping out in the process of printing. Chases are of different dimensions, according to the number of pages in a sheet and the size of the paper.

**Chase** (CARLTON), D. D., born at Hopkinton, N. H., Feb. 20, 1794, graduated at Dartmouth in 1817, was ordained deacon in 1818, and priest in 1820, and in 1844 was consecrated Protestant Episcopal bishop of New Hampshire. Died at Claremont, N. H., Jan. 18, 1870.

**Chase** (DUDLEY), born in Cornish, N. H., Dec. 30, 1771, an uncle of S. P. Chase, graduated at Dartmouth in 1794, was chief-justice of Vermont (1817-21), and U. S. Senator from 1813 to 1817, and again from 1825 to 1831. Died Feb. 23, 1846.

**Chase** (GEORGE), LL.B., born in Portland, Me., Dec. 29, 1849; graduated at Yale College, Conn., 1870, and at Columbia College Law School, New York City, 1873. In 1875 was appointed assistant prof. of municipal law in the last-named institution, and in 1878 prof. of criminal law, torts, and procedure; published an edition of Blackstone's Commentaries, known as the "American Students' Blackstone" (1877), and edited "Johnson's Ready Legal Adviser" (1880); contributed many legal articles to "JOHNSON'S UNIVERSAL CYCLOPEDIA."

**Chase** (IRAH), D. D., born at Stratton, Vt., Oct. 5, 1793, graduated at Middlebury College in 1814, studied at Andover Theological Seminary, and was ordained to the Baptist ministry in 1817. He labored as missionary in West Virginia, and was in 1818 appointed professor in the theological school at Philadelphia. From 1825 to 1845 professor at successive periods of biblical theology and ecclesiastical history in the Theological Institution (which he was largely instrumental in founding) at Newton Centre, Mass. He published several works, mainly controversial. Died at Newton Centre, Mass., Nov. 1, 1864.

**Chase** (PHILANDER), D. D., an American Episcopal bishop, born in Cornish, N. H., Dec. 14, 1775, and graduated at Dartmouth in 1796. He went in 1817 as a missionary to Ohio, where he planted the Episcopal Church. He became bishop of Ohio in 1819, and bishop of Illinois in 1835. He founded Kenyon College, O., and Jubilee College, Ill. Published "Reminiscences" (2 vols. 8vo). Died Sept. 20, 1852.

**Chase** (PLINY EARLE) was born at Worcester, Mass., Aug. 18, 1820, and graduated at Harvard College in 1839. While engaged for many years as a teacher in Philadelphia, and afterwards in mercantile life, he employed his leisure in metaphysical, philological, and physical studies, producing many able and learned papers, published in the "Proceedings of the American Philosophical Society," and in various scientific journals, several of which were copied in the London, Dublin, and Edinburgh "Philosophical Magazines" and other foreign journals. These articles have procured him wide distinction as a man of science. In 1871 he was appointed professor of physics in Haverford College. The Magellanic gold medal of the American Philosophical Society was awarded to him in 1864 for the "Numerical Relations of Gravity and Magnetism." Among his works is "Elements of Meteorology" (1884).

**Chase** (SALMON PORTLAND), an American statesman and jurist, son of Ithamar Chase, a farmer of New Hampshire, and nephew of Dudley and Philander Chase, above noticed, was born at Cornish, N. H., Jan. 13, 1808. He was sixth in descent from Aquila Chase, who emigrated from England to Massachusetts in 1630. His mother was of Scotch descent. The stock to which he belonged was prolific in eminent men. His grandfather, Samuel Chase, had seven sons, five of whom received an education at Dartmouth College. During the war of 1812 Ithamar Chase engaged in the glass manufacture at Keene, N. H., but this business resulted unfortunately on the reintroduction of foreign manufactures. He died in 1817, leaving his family in straitened circumstances. Salmon's education, however, was not neglected. He was first sent to a school at Windsor, Vt., and when twelve years of age went to Ohio to live with his uncle, the bishop, who resided near Columbus. Here he divided his time between hard work on the bishop's farm and hard study in the bishop's academy, which was afterwards removed to Cincinnati. In 1823 he returned to New Hampshire, and the next year entered Dartmouth College, from which he graduated in 1826. He then repaired to Washington, and supported himself by teaching a school whilst studying law under the direction of William Wirt. Here he obtained his license to practise law in 1829, and in the spring of 1830 went to Cincinnati to pursue his profession. For a few years, like most young men without influential business connections, he had to struggle hard to maintain a professional existence, and his first efforts in court, as often happens to men of great talent, were failures. But all these difficulties were finally overcome. During the weary hours of waiting for business he occupied himself in preparing an edition of the "Statutes of Ohio," with notes and an historical introduction. This brought him into notice, and in 1834 he was appointed solicitor for the U. S. Bank in Cincinnati. From this period he never wanted employment.

He early engaged in the controversy respecting slavery and the slave-power in the U. S., and took the then unpopular anti-slavery side. He held slavery to be against natural law and right, and was for confining it within its narrowest limits of power and territory. In 1837 he appeared as counsel for Matilda, a colored woman claimed as a fugitive slave, and took the ground that Congress had no right to impose on State officers the duty of assisting to render up fugitive slaves, nor to legislate on the subject at all—that the States were, by the Constitution, solely responsible for the performance of that duty, and had a right to prescribe such proceedings as they saw fit to prevent unjust arrests and detentions. These views were enforced with great eloquence and power, though unsuccessful at that time. In a subsequent case he took the broad ground that slavery was a local institution, dependent upon State laws for its existence and continuance. His great maxim was, "Slavery is sectional, freedom is national." In 1842

he was employed to defend Van Zandt, the original of Van Tromp in "Uncle Tom's Cabin," who had been a Kentucky farmer, but from a conviction of the wrong of slavery had liberated his slaves and removed to Ohio, near Cincinnati. Here he was indicted, under the Fugitive Slave law of 1793, for harboring fugitive slaves and aiding them to escape. The cause was carried to the Supreme Court of the U. S., where it was ably argued by Mr. Chase and Hon. W. H. Seward in 1846, and became one of the *causes célèbres* of the country.

The subject had now become fully introduced into the politics of the country, and Mr. Chase was virtually the founder and leader of the Liberty party, which resulted in the formation of the Free-Soil party, and ultimately of the great Republican party, which became the means of prostrating the slave power and abolishing slavery in the U. S. A convention of this party, under the guidance of Mr. Chase, was held at Columbus, O., in Dec., 1841, after it became apparent that no hope was to be expected from President Tyler or the old Whig party in the direction of anti-slavery. Other conventions were held at Buffalo, Cincinnati, and Columbus in 1843, 1845, 1847, and 1848, resulting in the latter year in the nomination of Mr. Van Buren and Charles Francis Adams as the candidates of the Free-Soil party for President and Vice-President. Mr. Chase was the moving spirit in these conventions. He presided over the last, and drew up the platform of principles and policy which it adopted. Most absorbing and prominent among these, at this time, was that of preventing the extension of slavery into the new Territories.

Mr. Chase was originally a Whig, but in the pursuit of his great object of crushing slavery and the political forces which supported it, he allied himself to any party that, for the time being, would further his aims. On the 22d of Feb., 1849, he was elected to the Senate of the U. S. by the Democrats, including the Free-Soil section of the party. During his senatorial term, from 1849 to Mar., 1855, occurred those great debates in Congress upon the question of extending slavery into the new Territories, California, New Mexico, Kansas, and Nebraska, which resulted in the Compromise acts of 1850 and the repeal of the Missouri Compromise. These acts produced a state of feeling in the Northern States which resulted in the formation of the Republican party. It is needless to say that Mr. Chase took a leading part in the debates referred to, and he was always noted for the frankness with which he declared his sentiments on the questions at issue. They were the same which he had always maintained—that slavery was local and exceptional, sustained only by local laws, and that all new territory was free territory by the laws of nature and the principles of American government, and could only be made slave territory by usurpation and wrong; and that only the original States, who had entered into the constitutional compact, were bound to render up fugitive slaves, and then only after such proceedings had as they might deem just and reasonable for preventing illegal seizures and detentions. He failed to carry his measures in Congress, but the result in after years showed the sagacity with which he comprehended the entire situation. He lived to see the fulfilment of his predictions and the consummation of his most cherished hopes.

In Oct., 1855, he was elected governor of Ohio, and re-elected in 1857. In 1860 he was a prominent candidate for the presidency before the Republican convention which nominated Mr. Lincoln. In the following session of the Ohio legislature he was again chosen Senator of the U. S., but had scarcely taken his seat in Mar., 1861, when he was nominated by President Lincoln as secretary of the treasury, upon the duties of which position he immediately entered.

The period of civil war that ensued rendered his duties as financial minister of the government most important and arduous; and it is almost universally conceded that he discharged them with pre-eminent ability and success. He found the treasury empty and the government credit below par. But he inaugurated measures which met the pressing demands of a gigantic war, amounting to six or seven hundred millions per annum, and stimulated the industrial energies of the country. These measures cannot be examined in detail. They belong to the history of that struggle. A cardinal principle kept in view was, to issue a sufficient amount of such securities and notes as would furnish a currency that would enable the people to meet their engagements and avoid bankruptcy. This kept them in heart, and kept every branch of industry in constant activity. It obviated those commercial crises which are the usual consequences of such wars. This financial policy was largely due to the recommendations of Secretary Chase, although able financiers in Congress and out gave him wise and energetic co-operation.

One of the measures resorted to, which should be noticed

as exciting a difference of opinion in the constitutional power of Congress, was the issue by the government, in Feb., 1862, of currency notes which were made a legal tender in the payment of debts. It is due to Secretary Chase to say that whilst he recommended the issue of the notes, the making them a tender originated in Congress, though acquiesced in by him. Another measure of permanent importance to the country was the establishment, in Feb., 1863, of a national banking system, by which all notes issued were to be based on funded bonds of the government of equal or greater amount. This system was entirely originated by Secretary Chase, and will probably be regarded as one of his greatest achievements for the benefit of his country. He hoped that it would effectually abolish a resort to State bank issues of paper currency, which, it is known, he latterly regarded as bills of credit within the meaning and prohibition of the Constitution.

Mr. Chase resigned the secretaryship of the Treasury in the last of June, 1864, and on the 6th of Dec. following he was appointed chief-justice of the Supreme Court of the U. S., in place of Chief-Justice Taney. The duties of his new office were no less important to the country than those which he resigned. Many of the momentous questions which arose out of the issues of the war had to be ultimately adjudicated by the high tribunal over which he was called to preside—questions affecting vast private interests and the future stability of the government. It was the singular fortune of Chief-Justice Chase that he bore a conspicuous and leading part not only in the great political movement which brought on the American civil war and abolished slavery, but in the successful conduct of that war, and in the final settlement of the constitutional issues and changes to which it gave rise. The status and reconstruction of the Southern States; the rights of their citizens, personal and political; the constitutionality of acts of Congress and of the executive in various matters during the impulses and excitements of the war; the construction of those important amendments to the Constitution which were necessitated by the event of the contest,—these were among the subjects upon which the Supreme Court was called to decide. As presiding officer of the court and as a constitutional judge, the chief-justice fully met the duties, responsibilities, and the dignity of his high position. But his long service in political life and absence from the bar induced him to lean largely upon the experience of the other members of the bench in matters of technical law. In every case of public consequence depending upon constitutional or fundamental principles he exhibited the same largeness of mind which characterized his entire career. His opinions on some questions have been criticised as exhibiting a leaning against the Federal government and its authority, in which as an executive officer he had taken so large a part. For example, on the question of the constitutionality of the legal-tender notes he changed his opinion, and held them unconstitutional. But it is fairly due to him to accept his own explanation, that he assented to the law as a pressing necessity when passed, but subsequent reflection convinced him that he was mistaken. His opinions are characterized by great clearness and chasteness of style, and may be cited as models of juridical composition. They ever betrayed the fine scholar and the practised writer.

In 1868 he was called upon, as chief-justice, to preside over the Senate pending the impeachment and trial of President Johnson—the only instance of such a trial in the history of the Federal government.

In June, 1870, he had a stroke of paralysis, from the effects of which he labored more or less till his death. He attended the regular terms of court commencing in Dec., 1871, and Dec., 1872, and whilst his mind still remained clear and his logical powers unimpaired, his powerful frame was much enfeebled, and his general appearance indicated that his tenure of life was by a slender thread. He died in the city of New York May 7, 1873, in the sixty-sixth year of his age.

JOSEPH P. BRADLEY, *U. S. Supreme Court.*

**Chase (SAMUEL)**, an American judge, born in Somerset co., Md., April 17, 1741. He was a delegate in Congress from 1774 to 1778, and signed the Declaration of Independence. In 1796 he became an associate justice of the Supreme Court of the U. S. He was impeached in 1804 for misdemeanor in the conduct of several political trials, but was acquitted by the Senate. John Randolph was one of the instigators and managers of this impeachment. Judge Chase died June 19, 1811.

**Chase (THOMAS), LL.D.**, a brother of Pliny Earle Chase, noticed above, was born at Worcester June 16, 1827. He graduated at Harvard with high honors in 1848. He was tutor and Latin professor at Harvard for three years. He visited Europe in 1853-55, and studied at the University of Berlin. On his return he was appointed (in 1855) pro-



fessor of philology and of classic literature at Haverford College. He has published excellent editions of Virgil, Horace, and Livy, and a volume entitled "Hellas," a description of his personal observations in Greece in 1862, etc. Pres. of Haverford College.

**Chase** (WILLIAM H.). See APPENDIX.

**Chas'idim** (Heb. for "saints"), a name applied among the ancient Jews to a sect of pietists who originally aimed at strict ceremonial purity under the Mosaic law, warmly espousing the cause of the Maccabees, and opposing the Hellenizing tendencies of some of their fellow-Israelites. Some writers believe that the Essenes, Pharisees, and other strict followers of the Law all sprang from the Chasidim, but that the name was finally taken by a moderate party, who received the traditions as of equal authority with the Law. In recent times the name is applied to a sect of Jews who sprang up in Poland in the eighteenth century, and who aim at a restoration of the ancient piety of their nation. Their ceremonial is extremely formal. Their peculiar mystical and cabalistic doctrines and customs are repudiated by the orthodox Jews. They are now chiefly found in Eastern Europe. (See JEWISH SECTS, by PROF. F. ADLER.)

**Cha'sing**, or **Encha'sing**, the art of working raised figures in metal; the art of embossing or making metallic bas-reliefs. Much chasing is done by filling the vessel to be chased with a composition of pitch, and then hammering with a point and chisel on the outside. Closely connected with chasing is the art of stamping with a punch from the inside, a very ancient art. Phidias and other ancient Greek artists practised the art of chasing on statues which were formed of ivory and gold. Cellini's chasing ranks with the best ever made. As an art it is chiefly practised in Europe and the East.

**Chas'ka**, R. R. junction, capital of Carver co., Minn. (see map of Minnesota, ref. 9-E, for location of county), in a township of its own name, is on the left bank of the Minnesota River, 32 miles W. S. W. of St. Paul. The Chicago St. Paul Minneapolis and Omaha R. R. passes on the opposite side of the river. Pop. in 1880, 1068.

**Charles** (MICHEL), a French geometer, born at Epemnon Nov. 13, 1793. In a "Memoir on Two General Principles of the Sciences, Duality and Homography," he established the basis of a new theory of conic sections. He became in 1846 professor of the higher geometry in the Faculty of Sciences, Paris. He extended and simplified several important theories of pure geometry. Among his works are "History of Arithmetic," a "Treatise on Higher Geometry," and "Treatise on Conic Sections." D. Dec. 18, 1880.

**Charles** (VICTOR EUPHÉMIEN PHILARÈTE), a French journalist and author, and professor of foreign literature at the College of France, born Oct. 8, 1799, was apprenticed to a printer by his father, a prominent democratic journalist of the Revolution. He went to England, where he assisted Valpy in his editions of the classics, and afterwards studied in Germany. He has contributed to the "Journal des Débats," the "Revue des Deux Mondes," and many other journals, and made admirable translations for the "Revue Britannique." Died Aug. 3, 1873.

**Chasseloup-Laubat**, a French statesman, born May 18, 1805, at Alessandria, in Italy, was maître de requêtes during the reign of Charles X., member of the Chamber of Deputies, and councillor of state under Louis Philippe. He became in 1849 member of the legislature, in 1851 minister of the navy, in 1859 minister of the colonies, in 1862 senator, and in 1869 president of the ministry which was to carry out the liberal promises of the imperial message of July 12, 1869. Died Mar. 29, 1873.

**Chassepot**, a breech-loading rifle musket, which takes its name from its inventor, Antoine Alphonse Chassepot, a French officer and inspector of arms, whose first model was brought out in 1863. It has been since repeatedly improved. This musket has attracted much attention in consequence of its use by the French in the recent war with Germany. The chassepot belongs to the same class with the German needle-gun, having in its cartridge a mass of fulminating material, which is exploded by means of a needle thrust into it along the axis of the bore. Military critics have objected to the chassepot that it is too light and fragile, too expensive, too easily fouled by the powder and the fulminate, and that it is difficult to clean it properly. The more recent forms of it are free from some of these objections.

**Chasseur**, a French word signifying a "hunter," a "sportsman," the name of certain light troops in the French

army who are distinguished as good marksmen. There are chasseurs both among the infantry and cavalry. In the Austrian army are similar troops called *Jägers*. The light troops which fought under Garibaldi in 1859 and 1860 were called *Cacciatori dei Alpi*—i. e. "hunters of the Alps."

**Chasseurs de Vincennes** is one of the names given to a famous corps in the French army. About the year 1835, when certain improvements had been made in the French rifle, the duke of Orleans ordered the formation of a company of riflemen armed with the new rifle; they were garrisoned at Vincennes. They proved so efficient that in 1838 a whole battalion was organized, which was called indifferently the *tirailleurs* (sharpshooters) or *chasseurs de Vincennes*.

**Chastellux, de** (FRANÇOIS JEAN), MARQUIS, a French general and writer, born in Paris in 1734. He wrote an "Essay on Public Happiness" (1772), which was highly commended by Voltaire, and became in 1775 a member of the French Academy. As major-general under Rochambeau he fought for the U. S. (1780-82). He was a friend of Washington and Jefferson. Among his works is "Travels in North America" (2 vols., 1786). Died Oct. 28, 1788.

**Chas'uble** [Lat. *casubula* or *casula*], the uppermost garment worn by priests in the Roman Catholic Church when robed for the mass. It was called also "the vestment," and under that name seems occasionally to have been used in the English Church after the Reformation. Originally it covered the priest from head to foot, like a little house, whence some writers think it had its name of *casula*, and in this shape it is still worn in the Greek Church. It is made of velvet, is of an elliptical shape, with a hole in the middle for the head; it has no sleeves. It has two parts, one hanging down before; another, on which a cross is embroidered, hanging down behind.

**Chat** (*Saxicola*), a genus of small birds of the very numerous family Sylviidae, distinguished by a bill slightly depressed and widened at the base. They have rather longer legs than most of the family. They are lively birds, flitting about with incessant and rapid motion in pursuit of the insects on which they chiefly feed. They are found



Whinchat.

in Europe, Asia, Africa, and Australia. Three species are British—the stonechat, whinchat, and wheatear. The yellow-breasted chat of the U. S. (*Icteria polyglotta*) is a larger bird, and belongs to the family Turdidae.

**Chateaubriand, de** (FRANÇOIS AUGUSTE), VISCOUNT, a celebrated French author and diplomatist, the most brilliant representative of the reaction against the ideas of the French Revolution, and a most characteristic and instructive transition from the old classical to the new romantic school in French literature, born of a noble family at Saint-Malo Sept. 14, 1769, died in Paris July 4, 1848. He studied the ancient languages at Dol and Rennes, and was destined for the Church, but he preferred other pursuits, and a commission in the army was procured for him in 1788. Impelled by a love of adventure, he visited the U. S. in 1791. The purpose with which he set out was to find the Northwest Passage to India, but, having arrived in America, he completely forgot his aim, traversed the primeval forests of the South, studied the nature and life of the aborigines, and found there the material for a new and romantic literature. He returned in 1792 to France, where he married Mademoiselle de Lavigne. The same year he joined the royalist emigrants who had taken arms to fight against the dominant party; he was wounded at Thionville, and became an exile in England. He passed

nearly eight years in England in extreme poverty, and during this period wrote several works. In 1800 he returned to France, and began to write for the "Mercure de France." He published in 1801 "Atala," a romance, the scene of which is laid among the American aborigines. It excited much admiration on account of its marvellous delineations of natural scenery and its great literary finish. It at once established his literary fame, and gave him the most prominent place in the literature of the First Empire. His "Genius of Christianity" followed in 1802, and actually promoted the revival of a religious spirit in French society, then recoiling from the skeptical theories of the Revolution. It appeared just as Napoleon was negotiating the concordat with the pope and laboring for the re-establishment of the Roman Catholic Church in France. The emperor showed the poet his gratitude by appointing him ambassador to Rome, afterward to the Swiss republic. But immediately after the assassination of the prince of Enghien, Chateaubriand resigned office, by no means concealing his indignation. In 1806 and 1807 he travelled in Greece, Asia Minor, and Palestine. He published in 1809 a prose epic entitled "The Martyrs, or the Triumph of the Christian Religion," and in 1811 his "Itinerary from Paris to Jerusalem." He was admitted into the French Academy in 1811. In 1814 he expressed his implacable enmity to Napoleon in an eloquent pamphlet entitled "Bonaparte and the Bourbons." After the restoration of 1815 he acted with the royalists, became a peer of France, and was sent as ambassador to Berlin in 1820. In 1822 he was transferred to the court of St. James. He was appointed minister of foreign affairs in 1823, but was removed by the intrigues of Villèle in June, 1824. He afterward acted with the liberal opposition, and wrote articles against the Villèle ministry, which were inserted in the "Journal des Débats." In 1828 he was sent as ambassador to Rome by Martignac, but he resigned when Polignac became prime minister in 1829. His sympathy for the Bourbons was so strong that he refused to swear allegiance to Louis Philippe in 1830. In the latter part of his life he lived in retirement, consoled by Madame Récamier so far as so vain and egotistic a nature could be consoled. After his death appeared his autobiography, "Mémoires d'Outre-Tombe" (1849-50, 12 vols.), which by its many singular revelations again brought him conspicuously before the public. (See VILLEMAIN, "Chateaubriand, sa Vie, ses Ecrits et son Influence," 1858; COURCELLE, "Chateaubriand et son Temps," 1859; SCIPION MARIN, "Histoire de la Vie et des Ouvrages de Chateaubriand," 1833; SAINT-BEUVE, "Chateaubriand et sa Groupe Littéraire," Paris, 1872.)

**Châteaudun**, a handsome town of France, department of Eure-et-Loir, is on the river Loir, 28 miles S. S. W. of Chartres. It has an old castle of the tenth century, a communal college, a public library, and manufactures of blankets. Oct. 18, 1870, the town was stormed and almost entirely destroyed by the Germans. Pop. in 1881, 7036.

**Chateaugay**, Franklin co., N. Y. (see map of New York, ref. 1-I, for location of county), on R. R. and the Chateaugay River, 73 miles E. by N. from Ogdensburg, has manufactures of lumber, starch, butter, cheese, etc. Pop. in 1880, 680.

**Château-Gontier**, a town of France, department of Mayenne, on the river Mayenne, here crossed by a stone bridge, 18 miles S. of Laval. It has manufactures of linen and woollen fabrics. Pop. in 1881, 7107.

**Château-Renard**, a town of France, department of Bouches-du-Rhône, near the Durance, 17 miles N. E. of Arles. Pop. in 1881, 5801.

**Châteauroux**, a town of France, capital of the department of Indre, is in an extensive plain on the river Indre, 62 miles S. E. of Tours. It has a castle built in the tenth century, a chamber of commerce, and a society of arts; also manufactures of wool, cotton, cutlery, paper, hats, and hosiery. Nearly 2000 persons are employed here in the manufacture of strong woollen fabrics. Good iron is found in the vicinity. Pop. in 1881, 21,179.

**Chateauroux** (MARIE ANNE), DUCHESSE DE, succeeded her three sisters as the mistress of Louis XV. She was grasping and arrogant, and made herself many enemies at the court. In May, 1744, she accompanied the king on his tour of inspection along the frontier. At Metz he fell ill; his life was even in danger, and on the instance of the bishop of Soissons the duchess of Châteauroux was sent away. In order to escape ill-treatment and violence by the rural population, she was at last compelled to travel in disguise. But the king recovered, and on his return to Paris the duchess regained her whole power over him and prepared for revenge, when she suddenly died, Dec. 8, 1744, probably poisoned.

**Château-Thierry**, a town of France, department of Aisne, on the river Marne, here crossed by a bridge, about 60 miles by railway E. N. E. of Paris. It is on the slope of a hill crowned by the ruins of a vast castle built by Charles Martel for Thierry IV. It was the native place of the great poet Lafontaine, to whom a marble monument has been here erected. Pop. in 1881, 7015.

**Chatel** (FERDINAND FRANÇOIS), a French priest, was born in 1795 at Gannat, became a priest in 1818, renounced the communion of Rome in 1830, and founded in 1831 the "French Unitarian Church," the fundamental principle of which was to recognize nothing but the law of nature. The church of Chatel in Paris was closed by the police in 1842, revived in 1848, and again closed in 1852. Died in 1857.

**Châtelet** (GABRIELLE EMILIE), MARQUISE DU, born at Paris Dec. 17, 1706, died at Luneville Aug. 10, 1749. She was a daughter of Baron de Breteuil, and received a most careful education. She understood Latin, English, and Italian, and began to translate Virgil when sixteen years old. She studied mathematics and physics and philosophy, and was one of the first in France who read and understood Newton. She published several dissertations on philosophy and physics, and was considered one of the great minds of the age. In 1726 she married Marquis du Châtelet, to whom she bore a son. Nevertheless, in 1733 she settled in the château of Cirey with Voltaire, as whose mistress she lived, the world and her husband saying nothing, and in 1747 she further became the mistress of Saint Lambert, by whom she had a child, her husband and Voltaire saying nothing.

**Châtelleraut**, a town of France, department of Vienne, on the river Vienne, 18 miles N. N. E. of Poitiers. It is near the railway from Tours to Bordeaux. It has a handsome stone bridge, an old castle, a theatre, an exchange, and hospital; also important manufactures of cutlery, and a large trade in millstones, wines, etc. Here is a national manufactory of swords and bayonets. The Scottish dukes of Hamilton derive from this place the title of duke of Châtelleraut, which was given by King Henry II. to James Hamilton in 1549. Pop. 18,280.

**Chatfield**, Minn. See APPENDIX.

**Chat'ham**, a fortified town, river-port, and naval arsenal of England, in the county of Kent, on the right bank of the Medway, and 30 miles E. S. E. of London. The river here begins to expand into an estuary. Chatham is defended by several forts or castles crowning the adjacent heights, by which it is flanked on the S. and E. It derives its importance from its naval and military establishments, which are separated from the town and the country by a line of fortifications which are considered the best in England, except those of Portsmouth. Here are a military hospital, barracks for infantry, marines, artillery, and engineers, and magazines, storehouses, and dépôts on a large scale. Chatham has also one of the largest royal shipbuilding establishments in the kingdom. The dockyard is nearly a mile long, and contains several building slips and wet-docks, sufficiently capacious for the largest ships. Connected with it are extensive saw-mills, forges, and a metal-mill which produces copper sheets, copper bolts, etc. Numerous brickyards, limekilns, and flour-mills are found in the surrounding district, and the town carries on a large retail trade, partly on account of the presence of the garrison. In 1667 the Dutch admiral De Ruyter sailed up the Medway and burned some shipping at Chatham. Pop. in 1881, 46,788.

**Chatham**, a port of entry of Northumberland co., New Brunswick, on the right bank of the Miramichi, 6 miles below Newcastle, has a heavy trade in lumber and salmon, several steam-mills and foundries, is lighted with gas, and is the seat of a Roman Catholic bishop. Pop. of census sub-district in 1881, 5762.

**Chatham**, a post-town of Ontario (Dominion of Canada), capital of Kent co., on the river Thames, and on the Great Western R. R., 45 miles E. of Detroit, Mich., and 11 miles N. of Lake Erie. It has a court-house, an extensive trade in lumber, wood, potash, tobacco, soap, and pork, and has large manufactures of iron castings, machinery, and woollen goods. Pop. in 1881, 5907.

**Chatham**, Barnstable co., Mass. (see map of Massachusetts, ref. 5-K, for location of county), on the ocean, at the S. E. extremity of Cape Cod, about 80 miles S. E. of Boston. It has a fair harbor, and is resorted to as a summer residence. There are good public schools. It has two lighthouses, lat. 41° 40' 15" N., lon. 69° 56' 30" W. Pop. in 1880, 1378.

**Chatham**, a township of Pittsylvania co., Va. (see map of Virginia, ref. 7-F, for location of county). Pop. in 1880, 543.

**Chatham** (**WILLIAM PITT**), EARL OF, one of the most distinguished of English statesmen, born Nov. 15, 1708, and educated at Eton and Oxford, was the son of Robert Pitt, a country gentleman, and grandson of a colonial governor. After travelling on the Continent he entered the army as a cornet in the Blues, and soon after, in 1735, was returned to Parliament from Old Sarum, a family borough. He had shown remarkable promise in his studies, and in the House of Commons he soon became prominent, engaging in the fierce opposition to the Walpole government headed by the prince of Wales, and embittered by a quarrel between the prince and the king. Upon the fall of the Walpole administration, the king, notwithstanding a strong personal dislike, saw best to give Pitt an office, and in 1746 he was made treasurer of Ireland, and then paymaster-general, and in 1755, upon the breaking out of the Seven Years' war, after the resignation of Fox, he became the head of the government, with the nominal title of secretary of state. His measures for the reorganization of the army and navy were opposed by the king, but upon his resignation he was recalled, and pursued his plans against the French vigorously, aiding Frederick the Great, capturing Canada through Wolfe, and improving the navy to such an extent that the French were driven from the seas. After the accession of George III. in 1761, Pitt's energetic military measures were opposed by the growing influence of the Tories, and a peace was negotiated unwillingly by Pitt, whose ministry soon afterwards went out. Pitt remained in the opposition until 1766. His health was become feeble; he nevertheless combated zealously the more obnoxious acts of Bute's government, and upon its defeat in 1766 was desired to form a cabinet, in which he chose for himself the unimportant office of privy seal, with a seat in the House of Lords. The new ministry was weak and inefficient, and after it went out in 1768, Lord Chatham never again held office. When the war for American independence began, he, though sinking under the infirmities of age, called back all his great powers of eloquence to oppose the cruel and oppressive measures which were put in practice against the colonies; but when, in 1778, the timid policy of the duke of Richmond was gaining ground in the legislature, which favored peace with France and a recognition of the American States, Pitt, feeble, pale, and dying, arose in the House of Lords and summoned his fleeting powers to denounce this course of weakness and shame so eloquently that the measure was defeated. He sank back in a swoon at the close of his appeal, and four days afterwards, April 11, 1778, he died.

Lord Chatham's character was above reproach, and throughout his life his actions were impelled by deep patriotic feelings. The effects of his extraordinary eloquence were enhanced by his tall and stately form and dignified bearing. His speeches, which were composed in a vigorous, eloquent, idiomatic English style, have only been partially preserved in the "Chatham Papers," 4 vols., 1838-40. (See F. THACKERAY, "Life of Chatham," 2 vols., 1827.)

J. THOMAS.

**Chatham Four-Corners.** See CHATHAM VILLAGE.

**Chatham Islands,** a group in the South Pacific Ocean, discovered by Broughton in 1791, about 400 miles E. of the Middle Island of New Zealand. They are about lat. 44° S., and between lon. 177° and 179° W. Chatham Island, the largest of the group, is nearly 90 miles in circumference, and contains a large lake. Area, 425 square miles. The others are for the greater part mere rocks. The soil and climate are good; besides the natives there are a few British colonists. Pop. 600.

**Chatham Village, or Chatham Four-Corners,** R. R. junction, Columbia co., N. Y. (see map of New York, ref. 6-K, for location of county), 22 miles S. E. of Albany. It has a blast-furnace, academy, foundry, machine-shops, cotton-mill, and paper-mills. Pop. in 1870, 1387; in 1880, 1765.

**Chatillon-sur-Seine,** a town of France, in the department of Côte d'Or, on the Upper Seine, about 40 miles S. W. of Troyes. It stands on both sides of the river, and consisted originally of two distinct portions—Chaumont and Bourg—each with its own fortifications. It has a church, dedicated to St. Vorle and dating from the twelfth century, and a fine château, built by Marshal Marmont, who was born there in 1775. Pop. 5265.

Chatillon was in olden times often the residence of the dukes of Burgundy, but in modern times it owes its name in history chiefly to the congress which was held there in 1814, from Feb. 5 to Mar. 19, for the purpose of bringing about a peace between Napoleon and the allies. At times it looked as if the negotiations should succeed; but, as Napoleon could not be brought to accept the first proposition of the allies—that the frontiers of France should be made equal to those it had before the Revolution—the con-

gress was finally broken up without having arrived at any result. On Mar. 25 the allies marched their troops directly against Paris, and issued from Vitry a proclamation in justification of their proceedings.

**Chatoyant** [from the Fr. *chat*, a "cat"], a French word used in mineralogy to denote the changeable or floating internal light which is reflected by certain minerals, and resembles the light reflected from the eye of a cat. Among the minerals which are chatoyant are *adularia* and *Car's Eye* (which see).

**Châtre, La,** a fine old town of France, department of Indre, on the river Indre, 22 miles S. E. of Châteauroux. It has a fine church, a ruined castle, a considerable chestnut market, and manufactures of woollen and leather. P. 5234.

**Chats'worth,** the mansion of the duke of Devonshire, one of the most splendid private residences in England, is situated in Derbyshire, on the river Derwent, 3 miles N. E. of Bakewell. It is surrounded by a beautiful park about ten miles in circumference. This domain was given by William the Conqueror to his natural son, William Peveril. It was purchased by Sir William Cavendish, who built here in 1570 a mansion in which Mary queen of Scots was confined for thirteen years. The present mansion was built in 1706 by the first duke of Devonshire. It is nearly a quadrangle with an interior court, and is ornamented with balustrades and Ionic pillars. The façade is 720 feet long. Chatsworth contains rich collections of paintings, statuary, bas-reliefs, and books. Here is a conservatory which covers nearly an acre, is 65 feet high, and has 70,000 square feet of glass.

**Chatsworth,** R. R. junction, Livingston co., Ill. (see map of Illinois, ref. 4-F, for location of county), 70 miles E. of Peoria. Pop. in 1870, 999; in 1880, 1054.

**Chattahoo'chee,** a river of Georgia, rises in the Blue Ridge in the N. E. part of the State. It flows south-westward, through the gold-region of Georgia, to West Point, below which it flows southward and forms the boundary between Georgia and Alabama. At the S. W. extremity of Georgia it unites with the Flint River to form the Apalachicola. Its length is estimated at 550 miles. Small steamboats can ascend it to Columbus, which is about 325 miles from the Gulf of Mexico.

**Chattanooga,** a city and important R. R. centre, capital of Hamilton co., Tenn. (see map of Tennessee, ref. 7-H, for location of county), is pleasantly situated on the left bank of the Tennessee River, about 200 miles by water below Knoxville, and 150 miles by R. R. S. E. of Nashville. The river is navigable for steamboats above and below this point. This is the largest town which is situated in East Tennessee. It has two rolling-mills, a furnace, machine-shops and foundries, a cotton-factory, waterworks, a street railroad, and fine academies and schools. Coal and iron are found in the adjacent hills. After the retreat of Rosecrans to Chattanooga from the battle-field of Chickamauga, Sept., 1863, the Confederates under Bragg at once seized the passes which covered his line of supplies from Bridgeport, and sending a cavalry force across the Tennessee above Chattanooga, struck various points on the railroad, making the supplying of the army difficult and hazardous. Gen. Grant relieved Gen. Rosecrans in October, and assumed general command of the departments of the Tennessee, Cumberland, and Ohio. Gen. Thomas was placed in immediate command of the department of the Cumberland, and Gen. Sherman, who had been telegraphed to bring his corps up at once from Mississippi, was assigned to the department of the Tennessee. The supply of the army at Chattanooga being of the first importance, Gen. Grant ordered Hooker with the Eleventh and Twelfth corps, which had been sent from the Army of the Potomac, to cross at Bridgeport and menace Bragg with a flank attack, while a force under W. F. Smith was to be thrown across the river at Brown's Ferry, a few miles below Chattanooga, and secure the points of Lookout Mountain commanding the river. These operations were successfully carried out on the 27th, 28th, and 29th of October, and communication restored with the dépôt of supplies. The loss in these operations for reopening communication on the S. side of the Tennessee, on the side of the U. S., had been about 450, while the Confederate loss is estimated as high as 1500.

Gen. Sherman's army was now coming up, and on the 23d of November the movement against the Confederates was commenced. Gen. Thomas's troops attacked the Confederate left at 2 P. M., and carried the first line of rifle-pits, which was held during the night. The battle was renewed on the 24th along the whole line. Sherman carried the end of Missionary Ridge nearly up to the railroad tunnel; Thomas had strengthened himself in his advanced position, and repelled every attempt on the part of the

Confederates to recover their lost position at the centre; while Hooker had been fighting desperately, and had partially carried Lookout Mountain, and intrenched himself in a strong position, the Confederates abandoning the mountain entirely during the night. Fighting was resumed at early dawn of the 25th, continuing until dark. Missionary Ridge, Lookout Mountain top, and all the rifle-pits in Chattanooga valley were now in possession of the U. S. troops, having been carried after a most desperate struggle. The Confederate army was routed, and pursued by Sherman and Hooker back to Georgia. A severe fight occurred at Taylor's Ridge, near Ringgold, Ga., Nov. 27, resulting in dislodging the Confederates, after which their retreat continued. Forty cannon and thousands of small-arms were captured. The loss on the part of the U. S. forces amounted to between 6000 and 7000 in killed, wounded, and missing. The Confederate loss in killed and wounded is estimated at 2500; in prisoners, 6000. The result of this battle cut off Bragg from communication with Longstreet, and forced the latter to abandon the siege of Knoxville and retreat to Virginia.

This battle must be regarded as one of the most remarkable of the war, owing to the apparently impregnable position held by the Confederate army upon lofty mountains. Pop. in 1870, 6093; in 1880, 12,892.

**Chat'tel** [remotely from *Lat. capitalis*, a man's "capital" or property], in law. This is a word of comprehensive meaning, and, with certain exceptions, includes all property of a personal or movable nature. The common law distinguishes between hereditaments on the one hand and chattels on the other. Though this distinction is in the main founded on a difference in the nature of things, the one being in general immovable and the other movable, yet it is in part arbitrary, since there are some things which are in their nature chattels, and yet in law, in a particular case or for some special purposes, within the rules governing interests in land. No one could deny that pigeons are in general movables or chattels, yet they might become so connected with the land by their abode in a pigeon-house as to descend as land to an heir. The same remark might be made of a key of a house, which, though in its owner's pocket, might be regarded in law as part of the house or land. Mr. Austin expresses the same idea in the following words: "Things which are physically movable may be immovable by institution." So in some cases an owner's intention may impress upon a movable thing the legal qualities of an immovable, as where money is directed by a testator to be laid out in land, it is for legal purposes deemed to be land. These same doctrines may be regarded from an opposite point of view, and that which is really land may become in contemplation of law a chattel, as where land is directed by a testator to be sold and converted into money. Certain temporary interests in land are in law treated as chattels of a peculiar nature (chattels real), such as leases for a definite number of years. There is here no completeness of classification, and much time must be spent by a legal practitioner in acquiring arbitrary distinctions, and particularly in determining when chattels attached to the land are to be deemed a part of it. The addition of machinery, buildings, trees, and shrubs to land, either by the owner or some stranger, has given rise to an important class of questions usually treated under the term "fixtures."

Chattels personal are usually sub-divided by text-writers into two principal classes: such as are in possession and in action. The first term needs no special explanation. It would include the common case of a movable thing, like a watch or a domestic animal, in the possession or under the control of its owner. A so-called thing in action, or chose in action, is intangible. It is a mere right, and can only be made available or reduced into possession by a legal proceeding. An instance is a note or bond, or, according to some authorities, a right to recover damages for a wrong committed. This classification is imperfect, as it is plain that there are some rights which cannot be brought within it; such as patents or copyrights, which, though derived from the state and in the nature of monopolies, are considered as chattels. Some writers would discard this common-law distinction, and divide property of a movable nature into corporeal and incorporeal. This is not satisfactory, for, though such a distinction is prevalent in the law of real estate, it is well shown by Mr. Austin to be unphilosophical. He advocates a classification which philosophically seems to be correct between those rights which can be affirmed against all persons, and those which can only be asserted against particular persons and those who represent them. The former case is equivalent to complete ownership, such as that of a field or watch; the latter is illustrated by the rights growing out of a contract, or even a wrong, as no one could claim these except a party to the contract or one injured by the wrong. While the com-

prehension of these distinctions is of service to the student in tending to give him clear conceptions of his subject, the old classification cannot be disregarded by the practising lawyer, who is so bound by precedent that he cannot ask a court to dismiss from its view elementary propositions concerning things in possession and things in action. We would adopt the words of Mr. Maine, who says: "The lawyers of all systems have spared no pains in striving to refer these classifications to some intelligible principle, but the reasons of the severance must ever be vainly sought for in the philosophy of law. They belong not to its philosophy, but to its history." They must be accepted as historical facts. They can only be reduced to symmetry, if at all, by legislation. (See, for further distinctions, *PROPERTY, OWNERSHIP, and TITLE.*) (Consult AUSTIN, "On Jurisprudence," 3d ed.; WILLIAMS, "On Personal Property;" SCHOULER on the same; KENT's "Commentaries.")

T. W. DWIGHT.

**Chat'terer**, a significant popular name often given to birds of the family *Ampelizæ*, which belongs to the order *Insessores* and tribe *Dentirostres*. The chatters are depressed bills like those of flycatchers, but rather shorter and broader in proportion. They feed chiefly on insects and their larvæ. Many of them have richly-colored plumage, and some of them have excellent powers of song.

**Chat'terton** (THOMAS), an English poet, born at Bristol Nov. 20, 1752. He was a precocious youth, but received only a very meagre education in Colson's charity in his native city. He was fond of solitude and reverie, devoured books, especially on antiquities, began to write verses at the age of twelve, and was apprenticed to an attorney of Bristol in 1767. Soon after this date he exhibited to his friends manuscript copies of poems which he said were composed by Rowley, a monk of the fifteenth century, and found by him in the archives of St. Mary Redcliffe, where his father had been sexton; even Horace Walpole was for a moment taken in. Disgusted with the drudgery of legal studies and business, he removed to London in April, 1770, and adopted the profession of author. He produced with great rapidity songs, satiric poems, letters in the style of Junius, and other works, some of which were inserted in the public journals, but brought him little remuneration. He was reduced to extreme destitution, and was found dead in his lodging-room Aug. 24, 1770; at that time, however, his death attracted very little attention. Among his poems are "The Tragedy of Ella," "The Battle of Hastings," and the "Tournament." (See JOHN DIX, "Life of T. Chatterton," 1837; "Edinburgh Review" for April, 1804 (by SIR WALTER SCOTT); T. CAMPBELL, "Specimens of the British Poets.") Real literary merit those poems have not, and psychologically their writer seems to have been a curiosity rather than a man of talent.

**Chau'cer** (GEOFFREY) was born in 1328 and died Oct. 25, 1400. He was a son of John Chaucer, vintner of London. Of the year and place of his birth nothing is known, though much has been surmised or asserted. He died in Oct., 1386, that he was of the "age of forty and upwards," and had been armed twenty-seven years. A Geoffrey Chaucer was in the service of Lionel, third son of Edward III., in 1357, not improbably in the condition of page. The poet himself has told us that he was in the army which invaded France in the autumn of 1359, and that this was his first military service. It appears from public records that he was a valet of the king's chamber—a place always filled by gentlemen—in 1367, and that in June of the same year the king granted him a salary for life, or till he was otherwise provided for, in consideration of services past and to be rendered. Before this time he had married Philippa, possibly a daughter of Sir Payne Rouet and sister of the third wife of John of Gaunt, certainly a lady in the household of the queen. At various times from 1370 to 1380 Chaucer was employed on royal missions in Italy, France, and Flanders, and for somewhat more than ten years from 1374 he held offices in the customs. He was elected to Parliament for Kent in the year 1386, but towards the end of that year was dismissed, for reasons unknown, from his place in the customs; and although he received other public appointments in 1389, he lost them again, and remained in comparative poverty until the accession of Henry IV., whose favor he immediately received, but lived only a year to enjoy.

Chaucer left behind him neither property nor descendants. His wife died in 1387, and a son, Lewis, to whom he dedicated a treatise on the astrolabe in 1391, is not heard of after that. Thomas Chaucer, a person of great wealth and consideration, has generally been assumed to be a son of the poet, but upon insufficient evidence.

The chief work of Chaucer, and one which has secured him an immortal and still brightening fame, is "The Canterbury Tales," a series of about twenty stories narrated by pilgrims to the shrine of Saint Thomas. The persons and

characters of the pilgrims are sketched with marvellous spirit in an introductory Prologue, and both here and in the tales there is displayed a dramatic power of the comic sort second only, and scarcely second, to Shakespeare's. "Troilus and Cressida," "The House of Fame," and "The Legend of Good Women" are also admirable poems. "The Canterbury Tales" were excellently edited by Thomas Tyrwhitt in 1773, and his edition has not been superseded. The best edition of the other poems is by Robert Bell. A society was formed in 1868 for the purpose of printing a selection of the best texts of Chaucer's poems, and has accomplished the larger part of its work. F. J. CHILDS.

**Chaudes-Aignes**, an old town of Upper Auvergne, in France, in the department of Cantal, celebrated for its hot mineral springs, which were well known to the Romans and are mentioned by Sidonius Apollinaris. The water, whose temperature varies from 135° to 177° F., is slightly alkaline, and is used not only for medical purposes, but also furnishes a cheap means of heating the houses of the town. Pop. 1133.

**Chaudet** (ANTOINE DENIS), an eminent French sculptor and painter, born in Paris in 1763. He studied in Rome, worked in Paris, and was chosen a member of the Institute about 1805. Among his best works are "Paul and Virginia," "Cincinnatus," and a bas-relief of "Joseph Sold by his Brethren." Died in 1810.

**Chaudière**, a river of the Dominion of Canada, rises in the S. part of the province of Quebec, flows northward, and enters the St. Lawrence about 7 miles above Quebec. Length, 120 miles. Two and a half miles from its mouth is a remarkable cataract, called the Falls of the Chaudière, which is about 100 feet high.

**Chaudière**, a lake of Canada, about 15 miles W. of the city of Ottawa, is an expansion of the Ottawa River.

**Chaudordy, de** (EMILE), COMTE, a French statesman, was after 1855 employed in the French ministry of foreign affairs. He retained his position under Jules Favre, and went as the representative of Favre with the delegation of the provisional government in Sept., 1870, to Tours, and in Jan., 1871, to Bordeaux.

**Chaud'war'**, an ancient and ruined city of Hindostan, in Orissa, near Cuttack. The ruins extend many miles, and include the remains of several temples and reservoirs. Scarcely any parts of the temples are visible except the foundations.

**Chaumonot** (PIERRE MARIE JOSEPH), a French Jesuit and missionary to the North American Indians. He was born in France in 1611, went to Canada in 1639, and after many labors and hardships died near Quebec in 1693. He wrote a grammar of the Huron language, which was published in 1835.

**Chaumont**, a fortified town of France, capital of the department of Haute-Marne, is on an eminence near the river Marne, about 141 miles E. S. E. of Paris. It is connected by railways with Paris, Troyes, and Vesoul. It has a triumphal arch commenced by Napoleon, and a public library of 35,000 volumes; also manufactures of druggery, hosiery, cotton yarn, and gloves. On Mar. 1, 1814, the allied powers here concluded a treaty against Napoleon. Pop. in 1881, 12,160.

**Chauncey** (CHARLES), B. D., second president of Harvard University, was born in England in 1592, and educated at Cambridge, where he was a professor of Greek and Hebrew. He came to New England in 1638, became president of Harvard in 1654, and died Feb. 19, 1672.

**Chauncey** (CHARLES), LL.D., an American lawyer, born at New Haven, Conn., Aug. 17, 1777, graduated at Yale in 1792. He removed to Philadelphia about 1798, and practised there with much distinction. Died Aug. 30, 1849.—His father, CHARLES CHAUNCEY, LL.D. (1747-1823), was an eminent jurist of Connecticut.

**Chauncey** (ISAAC), a commodore in the U. S. navy, born at Black Rock, Fairfield co., Conn., Feb. 20, 1772. At an early age he manifested a love for the sea, and entered the merchant service about 1785, displaying such energy and ability that he obtained command of a ship when he was only nineteen years old. During one of his voyages between Charleston and New York the entire crew and all the officers were stricken down with yellow fever, and Chauncey, alone and unaided, brought the vessel safely to New York. On the organization of the navy in 1798, Chauncey was appointed a lieutenant, was promoted to be commandant in 1802, and captain in 1806. He served with distinction in the war with Tripoli, and for his services there received the thanks of Congress, which body also voted him a sword, but the resolution was never carried into effect. He was in command of the navy-yard at

Brooklyn, N. Y., from 1808 till the outbreak of the war with Great Britain, when he was placed in the command of the lakes. He reached Sackett's Harbor Oct., 1812, and at once entered upon the important and arduous duties on shore of supervising the construction of a fleet, while at the same time he was obliged to maintain a sharp lookout for the enemy on the lakes, naval superiority on those waters being of the greatest importance to both nations. Chauncey retained this important command till the close of the war, and won for himself the highest honors for gallantry and skill as a naval commander. He subsequently commanded the Mediterranean squadron (1816-18), was in command of the navy-yard at Brooklyn, and was president of the navy commission at the time of his death, which occurred in Washington Jan. 27, 1840. No officer of the navy ever served his country more faithfully, or better acquitted himself of the high trusts reposed in him.

**Chauncey** (JOHN S.). See APPENDIX.

**Chauny**, a town of France, department of Aisne, at the commencement of the canal of St. Quentin, and on a railway, 18 miles W. of Laon. It is partly built on an island in the Oise, here navigable. It has an active trade and manufactures of hosiery, chemicals, etc. Pop. in 1881, 8852.

**Chautauqua**, a noted summer resort, on Chautauqua Lake, Chautauqua co., W. N. Y. (see map of New York, ref. 6-B, for location of county). Its former name was Fair Point; the grove covering the point was occupied early as a camp-meeting ground. It was bought in 1874 by the Chautauqua Sunday-school Assembly, and is devoted to religious and educational meetings. It has cottages, hotels, an amphitheatre, and other public buildings. Pop. not in census of 1880.

**Chautauqua Lake**, in Chautauqua co., N. Y., is a beautiful sheet of water about 18 miles long and from 1 to 3 miles wide. It is 726 feet higher than Lake Erie, and is said to be the highest navigable water in the U. S. The surplus water flows through an outlet into Conewango Creek. Steamboats ply between the outlet and Mayville, which is at the N. W. end of the lake. Near the S. E. end is the large village of Jamestown.

**Chauvenet** (WILLIAM), LL.D., a mathematician, born in Pennsylvania in 1820, graduated at Yale in 1840. He was professor of mathematics and astronomy at the U. S. Naval Academy at Annapolis, Md. (1845-59), and the author of several works on those sciences. Died in 1870.

**Chauve-Souris**. See BAT.

**Chauvin** (ÉTIENNE), born at Nîmes Apr. 18, 1640, died in Berlin Apr. 6, 1725. He was a pastor of the Reformed Church in France, but after the revocation of the Edict of Nantes he fled to Rotterdam, where for several years he officiated in the Walloon Church. In 1695 he was called to Berlin as professor of philosophy. He enjoyed great reputation there as a representative of Cartesianism, and he studied physics with great zeal in order to fill up the gaps which the Cartesian system presents in that department. His principal work is his "Lexicon rationale sive thesaurus philosophicus," which may be considered as a dictionary of Cartesian philosophy. This is a very comprehensive work, but fatiguing on account of the aridity of its style.

**Chauvinisme**, a French term derived from Chauvin, a character in a popular comedy which was performed at the time of the restoration of the Bourbons, 1815. Chauvin was a bragging veteran of Napoleon's army, who talked much of Austerlitz and Jena, and vowed to take revenge for the battle of Waterloo. A Chauviniste may be defined as one who has exaggerated and ridiculous sentiments of patriotism, and is excessively warlike or quarrelsome.

**Chaux-de-Fonds**, a town of Switzerland, in the canton of Neuchâtel, is situated in a narrow gorge of the Jura Mountains, 9 miles N. W. of Neuchâtel. It is 3070 feet above the level of the sea. It has extensive manufactures of clocks and watches. Above 160,000 watches are manufactured annually. Nearly every house of this town is surrounded by a garden. Pop. in 1880, 22,456.

**Chaves** (anc. *Aque Flavie*), a town of Portugal, province of Villa Real, on the river Tamega, 52 miles W. of Braganza. It was once fortified, and has a Roman bridge of eighteen arches over the river. Here are hot saline springs, and baths which are well frequented. Pop. 5539.

**Chay-Root, Choya, or Indian Madder** (*Oldenlandia umbellata*), an herb of the order Rubiaceæ, a native both of India and of Mexico, cultivated in India for its roots, the bark of which affords a beautiful red dye. The quality is improved by keeping. The coloring-matter is used to paint the red figures on chintz. Several plants of this genus abound in the U. S.

**Chazy Limestone**, a member of the lower Silurian



formation, derives its name from Chazy in Clinton co., N. Y. According to Dana, the Trenton period of geology is divided into two epochs; one is called the Chazy epoch.

**Cheadle**, a neat town of England, in the county of Stafford, in a pleasant valley, 180½ miles by rail N. W. of London. It has a fine Gothic fifteenth-century church, and manufactures of cotton tape; also copper- and brass-works. Pop. in 1881, 4724.

**Cheape** (Sir John). See APPENDIX.

**Cheat**, in law. This topic may be considered under two principal divisions: 1, at common law; 2, by statute, then termed "false pretences."

1. The common law regarded a "cheat" as a crime when one person defrauded another not by mere words, but by some outward and visible means, such as a false token or sign. A mere lie was not in this sense a cheat, though in a civil sense and as a basis for a civil action it may amount to a fraud. Thus, the act of marking false brands upon articles sold, calculated to deceive and defraud persons in general, would come within the scope of the criminal offence. This view led to fine-spun and artificial distinctions. For example, if a man in purchasing goods gave his own check on a bank in which he knew that he had no funds, it would be a mere lie reduced to writing, and thus not a cheat; while if he gave another man's check under the same circumstances, the act would be cheating, as the paper was then a token or symbol. Under these rules false personation may be a common-law cheat, particularly where the personator by dress or tokens represents himself to be another person, and thus causes injury to others. Some have even maintained that the defrauder might himself be a symbol or token, as where, knowing that he held a relation (such as apprenticeship) which prevented him from entering into a public engagement (enlisting as a soldier), he professed to be able to, and did in fact, enter into it.

The crime of forgery, though usually, from its magnitude as an offence, discussed separately from the various classes of cheats, is, in reality, comprised within the same category. The "false token or sign" necessary to constitute cheating at common law must be of such a nature that its tendency in general would be to deceive, though in fact it may be used only to injure particular individuals; as, e. g., the use of false dice in games of chance. Moreover, it is essential that any injury sustained be properly attributable to some confidence or belief which the use of the token, etc. inspired. If other considerations than the device influence a person's action, there is merely an attempt to cheat. This is, however, also indictable. Cheating belongs to the lower grade of criminal offences, termed "misdemeanors."

2. *False Pretences* constitute a very reprehensible mode of fraudulent deception. The failure of the common law to provide a remedy where no symbol was employed made statutory provisions necessary for wrongs thus occasioned. Reference can here be made only to such regulations as the various States have generally agreed in establishing. False pretences may be defined as false representations, with intent to defraud, by words or acts concerning past or present facts and events. Statements of a promissory nature in regard to any future transaction, and perhaps all representations as to the future, are insufficient to afford a ground for prosecution. The false representation may be made by acts without words, as if one purports by his peculiar dress to belong to a particular institution of learning, such as Cambridge University. A false sample may also be referred to. Mere expressions of opinion, however, or mere exaggerations of language, by which no reasonable man would be influenced, cannot be considered false pretences within the statutes. It is a further rule that the deception practised must be the efficient operative cause of the injury sustained. The criterion always is, Whether, if there had been no such deceit practised, the transaction between the parties would have been consummated? There has been much discussion upon the point whether the representation must be calculated to deceive a person of ordinary prudence, or whether it will be sufficient, though the party was weak, that he was actually defrauded. The question is still open. The false pretence may be made by an agent in such a way as to make his principal criminally liable.

Property acquired under false pretences is held by the wrongful possessor under a voidable title as regards the true owner, but if transferred to an honest purchaser, who acts in good faith, without knowledge of the fraud, the latter's claim is indefeasible. On the other hand, when goods are stolen the thief can, with but few exceptions, give no better title than he himself possesses. The reason for the difference is, that in the one case the wrong-doer acts with the owner's consent, even though it be procured fraudulently, while in the other his will is in no way ex-

erted. According to general principles, this offence would be a misdemeanor, though the statutes of some of the States make it a felony. T. W. DWIGHT.

**Cheatham** (B. F.), a general in the Confederate army, born in Tennessee, served during the war with Mexico as captain of Tennessee volunteers and as colonel Third Tennessee Voltigeurs to July, 1848. During the recent civil war he espoused the Confederate cause, was appointed major-general, and bore a conspicuous part at Chickamauga, Missionary Ridge, Franklin, Nashville, etc.

**Cheat River**, of West Virginia, is formed by the junction of several branches which rise among the Alleghenies in Randolph county, and unite in Tucker county. It flows nearly northward, and enters the Monongahela in Fayette co., Pa. Its length without the branches is about 75 miles. It takes its name from the extremely variable volume of its waters; for while it is sometimes a large stream, it often becomes in a few hours quite insignificant.

**Chebanse**, on R. R., Iroquois and Kankakee cos., Ill. (see map of Illinois, ref. 4-G, for location of county), 65 miles S. S. W. of Chicago. It has a very extensive trade in grain. Pop. in 1880, 728.

**Cheboygan**, on R. R. and Lake Huron, capital of Cheboygan co., Mich. (see map of Michigan, ref. 3-I, for location of county). Pop. in 1880, 2269.

**Checceozzi** (GIOVANNI), born at Vicenza June 21, 1691, died there Feb. 13, 1756. He studied theology, entered the service of the Church, and was appointed professor of ecclesiastical history in the University of Padua in 1726. But the obscure and eccentric manner in which he expressed himself made him suspected of heresy. He lost his position, and was even for a short time kept in prison. His principal work is his "De historia ecclesiastica" (Venice, 1727). During the latter part of his life he lived in retirement, mostly occupied with antiquarian studies, and wrote some minor treatises.

**Check** [Fr. *écheq* and *cheque*], a hindrance or obstruction, a curb or restraint; a repulse; a mark put against names in going over a list; a token which is given to a passenger on a railroad or steamboat, and is a duplicate of a token fastened on his baggage in order to identify it. Also a term used in the game of CHESS (which see).

CHECK is also the name of a variegated cloth, the pattern of which consists of quadrangles or rectangular spaces like a chessboard. It is made of cotton, linen, or wool.

**Check**, or **Cheque**, a bill of exchange drawn upon a bank or banker, or person holding a position similar to that of a banker. It has some peculiarities which distinguish it from an ordinary bill of exchange, particularly when it is payable without any specific mention of time. It is then, in point of law, payable on demand and without days of grace. If payable a fixed number of days after date, it varies but slightly from a bill of exchange, and will follow the ordinary rules as to days of grace. It is usually said in the law-books that a check is not accepted as a bill is. Acceptance, however, as will be seen hereafter, has recently become quite common, and is perfectly lawful. A check may be considered under the following heads: 1, Its form and requisites; 2, The duty of the holder as to demand of payment (a) towards the drawer, (b) towards the endorser, and herein of crossed checks; 3, The effect of the check upon the banker, and, under this, of acceptance; 4, A check considered as payment of a debt or as cash; 5, The civil and criminal liability of drawers having no funds.

1. A check in its ordinary form is simply an order addressed to the banker to pay a person named or his order or bearer, or the equivalent of a bearer (such as a mere numeral), a sum of money. A check may preserve this form and be post-dated. This class of checks is not used in England, owing to the provisions of the stamp acts. It is quite common at the present time to make a check payable to order, as the endorsement of the name of the payee operates as a receipt. In some instances a note may amount to a check. Thus, if a customer makes a note payable at his bank, he implicitly requests its payment in the same general manner as if he had drawn his check. In filling up a check care should be taken to so draw it that additional words, which might increase its amount, cannot be inserted in blank spaces. Thus, if the drawer had written the words "fifty dollars," and had left sufficient space between the word "fifty" and that which preceded it to insert "one hundred and," and such words had been fraudulently inserted, and the bank had paid the check in good faith, supposing it to be drawn for one hundred and fifty dollars, the drawer would be the loser. When, on the other hand, due caution has been exercised, the loss from forgeries will fall on the bank, rather than on the drawer, though the former may in some instances

recover from the holder. The drawer may simply sign his name to a blank printed form of check, or even to a blank sheet of paper, at the same time authorizing it to be subsequently filled up by some person acting in his behalf. If so filled he will be bound. Even should the agent acting fraudulently fill it up for a larger sum than was directed, the drawer would still be bound to a person who took the check in good faith. This would not be strictly a case of forgery, but that of an agent defrauding his principal, and yet acting within his apparent authority.

2. *The Duty of the Holder as to Demand and Notice: (a) As to the Drawer.*—The drawer has a right to expect that the holder will demand payment with promptitude, as, if the banker fails to pay, recourse may be had to him. Presentment should be made, in general, as early as the next day, and if payment is not made, due notice given. However, a failure to present is not necessarily fatal to the holder's claim. Whether it is or not depends on the fact whether an injury is caused to the drawer. If, for example, he had no funds in the bank, want of presentment is unimportant, as it is plain that he sustains no harm; so, if after giving the check, he withdraws his funds. If, however, the banker should become insolvent with sufficient funds of the drawer in his possession, want of presentment would be a sufficient defence. (b) *Demand as to Endorsers.*—Endorsements upon checks are common. An endorsement is necessary when the instrument is payable to order; it is admissible when payable to bearer. The legal effect of endorsement, as in the case of a bill of exchange, is to make the endorser liable, provided that the steps necessary to charge him are taken. These are substantially the same as in bills of exchange. There are cases in which no presentment is necessary to bind the endorser, as where he endorses and puts in circulation a void or forged check, even though he does this innocently. In some cases custom enlarges the time for presentment. Thus, if there be a custom to pay checks through the "clearing-house" (see CLEARING-HOUSE), the time required for them to pass through the system of exchanges there adopted will be allowed. In England a practice of *crossing* checks is resorted to. A check is said to be "crossed" when it is marked by the drawer in such a way that, instead of being presented through an ordinary holder, it must come to the paying bank through a banker. This practice has given rise to a number of perplexing questions recently settled by statute (21 and 22 Vict. ch. 79). The additional time necessary to present the check in this manner must of course be allowed there to the holder. It is believed that crossing checks is not practised in this country. A practice has grown up in some of our large cities to pay drafts drawn on bankers by checks drawn by such bankers, in turn, upon some regularly organized bank, instead of cash. This practice has an important effect upon the subject of demand. Though the check is not payment of the draft, yet it must be presented on the same day that it is received, or the drawers of the draft may be discharged. The holder of the draft might have insisted on the money instead of taking the check, and if not paid might have protested the draft.

3. *Effect of the Check on the Banker on whom it is Drawn, and herein of Acceptance.*—According to the better opinion, a check gives no right of action to the holder against the banker. Of course the latter should, in general, pay it, but the holder has no means of enforcing this obligation if the banker refuses to perform it. This rule grows out of the nature of a deposit in a bank, in respect to which there is much popular misconception. This fact is perhaps partly due to the ambiguity lurking in the word "deposit." This is sometimes and properly used to mean the act of entrusting a specific chattel to a person, who is bound to return the identical thing delivered to him. That, however, is not the nature of an ordinary bank account against which checks are drawn. The banker is not bound to render the specific money delivered, but only engages to pay an equivalent amount. The relation of *debtor and creditor* is created by the transaction. Although the banker is bound to pay checks when he is in funds, it is a duty between him and the depositor or creditor. It cannot be enforced by the payee of the check, who is no party to the contract. Nor can the check be treated as an assignment by the depositor of so much money as it represents. These rules have led to a very important practice of certifying checks. An officer of a bank—e. g. a teller or cashier—has by custom acquired an authority to mark such checks as are presented to him as good. This act is treated in law as an acceptance, and the bank becomes liable. The practice is attended with danger, as it practically gives to a teller power to establish without limit fictitious claims against the bank, as he may certify checks for persons who have overdrawn their accounts, or even who have closed their accounts, or have had no dealings with the bank, which will still be binding upon it on general principles of law. (See AGENT,

ESTOPPEL, and BILL OF EXCHANGE.) A cashier or teller, however, cannot, where he has no funds, validly certify his own check. On the other hand, certification of a check is attended with some hazard to the holder, as he may thereby release the drawer should the bank fail even on the same day and between the time of certification and of presentment for payment. (*National Bank of Jersey City agt. Leach*, N. Y. Court of Appeals, 1873.) In the financial crisis of 1873 in New York certified bank-checks by general consent played an important part in monetary transactions, and became for a considerable time, through the association of a number of national banks, a substitute for currency. It may be added that banks sometimes pay checks for customers who have no balance due them. These are called "overdrafts." The bank in such a case has a claim upon the dealer for the sum overdrawn.

4. *A Check Considered as Payment or as Cash.*—The general presumption of law is that a check is issued by a drawer to a payee in payment of debt, and not as a means of making a loan. The intention, however, may be shown by affirmative proof. Considered as payment, it is not in general absolute. It is rather a means of obtaining payment, whether it be the debtor's own check or that of a third person. Accordingly, if the check is not paid, the creditor may resort to his original claim, though if there be an agreement to receive the check as full payment, it must be followed. In other words, a check is not money, but a means of obtaining money, and debts cannot be paid in anything but money, unless there be an agreement for some substitute. The gift of one's own check, unless it be certified, is a mere naked promise, and may be countermanded at any time before payment. The death of a drawer in such a case before payment would be a revocation of the authority. It is common for a bank to receive on deposit not only cash, but checks drawn either on itself or on some other bank, payable to the depositor. Such a deposit is not to be treated as cash in case the check is drawn on another bank. It is rather received conditionally, in case it turns out to be good, and the depositor will be liable on his endorsement, which is usually required. Where, however, the check is given by another dealer, the receiving bank is absolutely bound by the credit which it gives the depositor as if it had paid the check.

5. *Civil and Criminal Liability of Drawers of Checks having no Funds with the Bank: (a) Civil Liability.*—It is a general rule that a man who draws a check with knowledge that he has no funds commits a fraud towards the payee. If he should purchase goods under such circumstances, the seller could rescind the sale as fraudulent. It will not be enough to sustain the sale that he has reasonable grounds to expect funds, but they must be *actually on hand* to pay the check. This view proceeds upon the theory that a check is in the nature of a representation that the money is immediately available; and where a drawer has notice to the contrary he makes a representation known to be false which avoids the contract as between him and the seller, though it would be otherwise should the rights of innocent purchasers intervene. (See SALES.) (*Loughran agt. Barry*, 6 Irish Com. Pleas, 457, A. D. 1872.) (b) *Criminal Liability.*—It was not a crime at common law to give one's own check for goods bought with knowledge that it was worthless, since this was only an affirmation or a base lie reduced to writing, and there was no token or symbol of falsehood on which the common law lays stress. It might accordingly be a criminal cheat (see CHEAT) knowingly to pass off the worthless check of another. Under the statutory offence of false pretences it is criminal to give one's own check on such a sale, knowing that the drawer had no funds nor any reasonable grounds of expecting them. There might be cases, such as that of *Loughran against Barry*, above cited, where the contract would be rescinded on account of a representation known to be false, and yet the drawer would not be guilty of crime, by reason of the absence of a true criminal intent. (See farther SHAW "On the Law of Bankers' Checks," London, 1871; also PARSONS "On Bills and Notes;" and other text-writers on same subject, as CHITTY, BYLES, STORY, etc.)

T. W. DWIGHT.

**Checkers.** See DRAUGHTS.

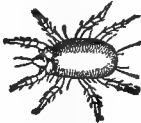
**Chedu'ba**, an East Indian island, in the Bay of Bengal, about 10 miles from Aracan, to which province it belongs, has an area of about 250 square miles. It is about lat. 18° 50' N. and lon. 93° 40' E. Nearly all of the island has a rich and productive soil, and the interior is much more free from jungle than that of any other island on this coast. The staple productions are cotton, sugar, rice, indigo, and petroleum, which is extensively used in the composition of paint, as it is found to protect the wood against the ravages of insects. This island was captured from the Burmese by the British in 1824, and actually ceded to



them in 1826. It afterward proved a valuable possession. Pop. about 10,000.

**Cheese.** See article by PROF. C. F. CHANDLER, LL.D., on this subject in the APPENDIX.

**Cheese-maggot**, the larva of *Piophilæ casei*, a black dipterous fly of the family Muscidae, to which the house-fly belongs. The perfect insect is three-twentieths of an inch long. It is a pest of dairies, laying its eggs in cracks of cheese, the destined food of its larvæ. To preserve cheeses from this pest it is of advantage to brush or rub them frequently, and to remove all injured cheeses, besides keeping them dry and in a well-aired place. The same rules are applicable to their preservation from the other insects by which they are sometimes infested. Among these may be mentioned the cheese-mite, *Tyroglyphus stiro*, of the family Acaridæ. Those cheeses of the Netherlands which are prepared with hydrochloric acid, instead of rennet, are reported to be uninjured by insects, but are rather hard.



Cheese-mite.

**Chee'tah, or Hunting Leopard**, the *Gueparda jubata* or *Cynailurus jubatus*, a carnivorous mammal of the cat family, having longer legs than any of the true cats, and approaching the Canidæ in its almost non-retractile claws, its manner of hunting, as well as in temper and disposition when tamed. It is found throughout Africa, and in Asia nearly as far N. as Siberia. It is generally spotted like the leopard, but, like that animal, is sometimes entirely black. Its intelligence, docility, and fidelity are so great that in India and Persia it is trained for the chase of antelopes and deer. The cheetah is kept leashed and hooded until the game is found near, when it is let loose, and, drawing stealthily near its victim, it rushes suddenly upon it, and can with difficulty be made to let go its hold. This animal is readily domesticated. Little is known of its habits while in a state of nature. In Ceylon the true leopard is called *cheetah*.

**Cheetham** (HENRY), D. D., born April 27, 1827, at Nottingham, England; educated at Christ's College, Cambridge, and was ordained in 1856 to the curacy of Saffron Walden, Essex; held the vicarage of Quarndon, Derbyshire, from 1858 to Sept., 1870. He was then nominated to the bishopric of Sierra Leone, and was consecrated Nov. 30, 1870, in St. Paul's Cathedral. He is the author of "Ministerial Fruit proportionate to Ministerial Faith," "Sermons," etc.

**Chee'ver** (EZEKIEL), a celebrated New England school-teacher, born in London, England, Jan. 25, 1615. He received an excellent classical education, and emigrated to America in June, 1637, to enjoy Christian worship in its purity. He was one of the founders of the colony of New Haven, where he taught school for twelve years; was chosen deacon soon after the organization of a church there, and occasionally served as a preacher. He represented the town in the General Assembly in 1646; was afterwards master of the grammar-school at Ipswich, Mass., for eleven years, and subsequently taught school in Charlestown, Mass., nine years; removed to Boston Jan. 6, 1671, and had charge of the Boston Latin School for thirty-eight years, until his death. During the time he was teaching at New Haven he prepared the "Accidence, a Short Introduction to the Latin Tongue," of which in 1785 twenty editions had been published, and it was in use for over a hundred years by the Latin scholars of New England. He also wrote "Scripture Prophecies Explained, in Three Short Essays." Died at Boston, Mass., Aug. 21, 1708.

**Cheever** (GEORGE BARRELL), D. D., an American divine, born at Hallowell, Me., April 17, 1807, graduated at Bowdoin College in 1825, and at Andover Theological Seminary in 1830. In 1833 he became minister of a Congregational church in Salem, Mass. He published, in 1835, a satirical allegory called "Deacon Giles's Distillery," for which he was prosecuted by a certain distiller, and was condemned to imprisonment for thirty days. He was distinguished as a zealous advocate of temperance and as an opponent of slavery. He resigned his pastorate, went to Europe, and contributed letters to the New York "Observer," and in 1839, on his return, took charge of the Allen Street Presbyterian church, New York City; he was corresponding editor of the New York "Evangelist" in 1844 while in Europe, and was its principal editor for a year after his return in 1845. His contributions to the New York "Independent" and the "Bibliotheca Sacra" have been numerous and extensive. From 1846 to 1867 he was pastor of the Church of the Puritans in New York City. Among his works are "Studies in Poetry" (1830), "Lectures on Pilgrim's Progress" (1843), "Wanderings of a Pilgrim in

the Shadow of Mont Blanc" (1846), "Journal of the Pilgrims at Plymouth in 1620" (1848), and "God against Slavery" (1857).

**Cheever** (REV. HENRY THEODORE), a younger brother of the above, author of "Island World of the Pacific" (1851), "The Pulpit and the Pew" (1858), and other works, was born at Hallowell, Me., in 1814, and graduated at Bowdoin in 1834.

**Cheever** (SAMUEL), the first minister of Marblehead, Mass., was born in New Haven, Conn., Sept. 22, 1639; was the son of Ezekiel Cheever, noticed above, and graduated at Harvard College in 1659. He first visited the town of Marblehead in Nov., 1668, and preached there sixteen years before his ordination, which took place Aug. 13, 1684. He was noted for his thorough knowledge of the Scriptures, for the earnestness, plainness, and simplicity of his preaching, and for his peaceable and philanthropic spirit. He published the election sermon 1712. Died at Marblehead May 29, 1724.

**Cheffontaines, de** (CHRISTOPHE), a French theologian, born about 1532 in Brittany, became archbishop of Cæsarea about 1586, and exercised his episcopal functions in the diocese of Sens in the absence of Cardinal Pellevé, who was nominally in charge of it. Cheffontaines wrote, among other works, a "Defence of the Faith of our Ancestors" (1570) and a "Treatise against Certain Dogmas of Scholastic Theology" (1586). Died May 26, 1595.

**Chehab-Eddin** (ABDEL RAHMAN), born at Damascus in 1200, died there in 1267. He wrote "Ahzar-al-rondhain," or "The Flowers of the Two Terraces," which means the history of Nureddin and Saladin, two sketches of the chronicle of Damascus, and the history of the Obaïdites.

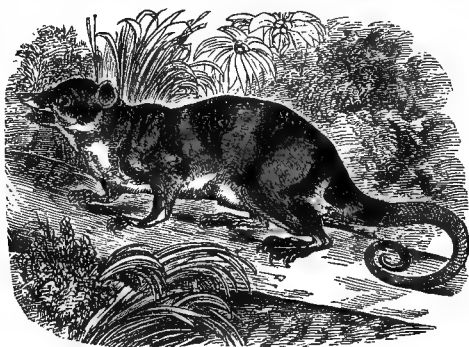
**Chehal'is**, a river of Washington Territory, rises in Lewis co., on the E. side of the Coast Range, flows in a W. N. W. direction through Chehalis co., enters Gray's Harbor, and is about a quarter of a mile wide at its mouth. It is navigable for steamboats, and its valley is extensive and fertile, producing oats, wheat, and potatoes. The enclosing hills are covered with dense forests of fir, cedar, spruce, maple, and ash. Total length, about 125 miles.

**Chehalis**, W. T. See APPENDIX.

**Cheirolo'epis** [from the Gr. *χείρ*, a "hand," and *λεπίς*, a "scale"], a genus of fossil lepto-ganoid fishes peculiar to the Devonian measures. Eight species have been found. They had large heads, the spine rudimentary, and the body covered with small lozenge-shaped ganoid scales. The first ray of each fin was converted into a strong spine. The pectorals and ventrals were largely developed, the dorsal small and farther back than the anal fin. The generic name was given in allusion to the scaly pectoral fins.

**Cheiron.** See APPENDIX.

**Cheironectes** [from the Gr. *χείρ*, the "hand," and *νίχω*, to "swim"], a genus of marsupial quadrupeds, differing from the opossums in having webbed feet and



Cheironectes.

aquatic habits. The only species, *Cheironectes palmatus*, or the yapock, is common in Brazil and Guiana. It has a soft woolly fur; the color of the upper parts of the body is gray, with large patches of black and a dorsal black line; the breast and belly are white; the tail is long, thick at the base, tapering, and covered with scales. The cheek-pouches are very large. Fishes, insects, and crustaceans are the chief food of this animal, which is a marsupial representative of the otter. (See also CHIRONECTES.)

**Cheke** (SIR JOHN), an English scholar and Hellenist, born at Cambridge June 14, 1514. He became in 1540 first professor of Greek in the university of that place, and distinguished himself as a reviver of classical learning. In 1544 he was appointed Latin tutor to Prince Edward. He

was secretary of state in 1553, but on the accession of Queen Mary he was deprived of his office because he was a Protestant, and he went into exile. He was seized in Flanders in 1556 by the agents of Philip II. of Spain, and taken to England. Compelled to choose between death by fire and a profession of the Catholic religion, he accepted the latter. Died Sept. 13, 1557. Of his numerous writings, "The Hurt of Sedition" (1549) and the translation of the Gospel of Matthew are especially noteworthy. (See STRYPE, "Life of Cheke," 1705.)

**Che-Kiang**, a maritime province of China; area 44,470 square miles, with 8,100,000 inhabitants. The south-western part of the province is hilly, and produces great quantities of excellent tea; the northern and eastern parts belong to the great delta-plain, and produce silks. The principal towns are the capital, Han-Chow-foo, and the treaty-port of Ning-po. In 1874 Ning-po exported goods, chiefly tea and silks, to the value of £2,337,948, imported goods, chiefly opium (£1,129,668) and cotton fabrics (£430,692), to the value of £2,565,179. To the province belong the Chusan Islands, lying opposite Ning-po at a distance of about 50 miles.

**Chelidonium.** See SCHWALBER.

**Chelms'ford**, a town of England, capital of the county of Essex, at the confluence of the Chelmer and Cann rivers, on the Eastern Union Railway, 29 miles N. E. of London. Two fine bridges cross the river here. The town is well built, has an old church, a handsome county hall, a theatre, and assembly-rooms. Pop. 9885.

**Chelmsford** (Sir FREDERICK THESIGER), LORD, an English lawyer and judge, born in London in 1794. He became solicitor-general in 1844 and attorney-general in 1845, but he resigned in 1846. He was reappointed in 1852. On the formation of a conservative ministry in 1858, he was appointed lord chancellor and received the title of Lord Chelmsford. He resigned with his colleagues in June, 1859, and was again lord chancellor from July, 1866, to Feb., 1868. D. Oct. 5, 1878.

**Chelonia** [from the Gr. *χελών*, a "tortoise"], or **Testudina'ta**, one of the three great orders of true reptiles, characterized by the possession of a carapace or horny dorsal shell composed of several united pieces; a ventral shell, plastron, or sternum; a horny, bill-like mouth, without teeth; eyes with three lids; and external ear-openings. The carapace represents the blended ribs and vertebrae, the plastron the sternum of other animals, these elements being intimately blended with the proper dermal elements. The spinal column is entirely immovable, for the vertebrae are thoroughly ankylized with the shell and with each other. The genus *Emys* forms a transition from this order to the saurians through the alligators and crocodiles, having its carapace much contracted, while the neck, tail, and limbs are greatly elongated. The lung-sacs of the Chelonia have their cavities subdivided by imperfect partitions. They are very capacious, and the large quantity of air they contain materially aids in buoying up the heavy body as the animal swims in the water. Since the ribs and sides are fixed, the chelonians breathe by gulping down air through the nostrils, thus filling the lung-cavities for a time, the air being occasionally renewed. The order is divided into two sub-orders—the Chelonii, true or sea-turtles, which have the fore feet, or more frequently both fore and hind feet, transformed into paddles; and the Amydæ, or land-tortoises. The sea-turtles comprise the largest living species, one of which, the *Sphargis coriacea* of the Atlantic and Mediterranean, has been found to weigh nearly 2000 pounds; but the fossil shell of *Colosuchelys atlas*, a land-tortoise of East Indian deposits, is sometimes twenty feet long, and it must have weighed much more than the *Sphargis*. The sea-turtles are of two families—*Sphargidae* and *Chelonoidæ*, or loggerheads. The land-tortoises are much more numerous in genera and species, and are divided into seven or more families. They are peculiarly abundant in North and South America, but are found in nearly all warm and temperate regions.

There are several edible species both of land and sea chelonians. The flesh of some others is disagreeable or even injurious. The best known is the green turtle (*Chelonia midas*), found throughout a large part of the Atlantic, but having its head-quarters about the Bahamas, and notably at Ascension Island in the South Atlantic. Another famous edible species is the great *Testudo Indica*, a land-tortoise of the coasts of the Pacific and Indian oceans, of which the head-quarters are at the Galapagos Islands. Some species are valuable for their oil; others for that of their eggs; and one at least, the *Eretmochelys imbricata* of tropical seas, the inedible hawksbill turtle, affords the valuable tortoise-shell of commerce.

Tracks ascribed to chelonians have been found in triassic rocks, but their remains are first observed in the

upper oolite. In the more recent formations their remains are abundant in both hemispheres.

**CHELONIA** is also the name of a genus of sea-turtles, to which the green turtle belongs.

**Chel'sea**, a populous south-western suburb of London, in Middlesex, on the left (N.) bank of the Thames, 4½ miles W. S. W. of St. Paul's. The river is here crossed by a fine iron bridge. Many of the nobility and gentry formerly resided at Chelsea. The principal public edifice is the noble hospital for superannuated soldiers. (See CHELSEA HOSPITAL.) Chelsea has waterworks for the supply of London, a chain pier, and manufactures of floor cloth; also a training college for male teachers, and one for female teachers. Here is a place of public amusement called Cremorne House Gardens. The original name was not Chelsea, but Cealseythe or—as it appears in "Doomsday-Book"—"Chelched"; the form "Chelsey" does not occur until the sixteenth century. The manor was by Henry VIII. presented to Catherine Parr; afterward it passed into the possession of the duke of Northumberland. Chelsea was the first place in England in which the Italian style of gardening was introduced by Sir John Danvers. During the eighteenth century many of the most famous men of the time resided in the village; as, for instance, Atterbury, Swift, Arbuthnot, Gay, Smollet, Steele, and others. From 1742 till 1803 the house and grounds of the earl of Ranelagh were a favorite resort. Pop. in 1881, 88,101.

**Chelsea**, a city of Suffolk co., Mass. (see map of Massachusetts, ref. 2-I, for location of county), is a north-eastern suburb of Boston, and is 3 or 4 miles N. E. of Boston Common. It is separated from Charlestown by the Mystic River, which is here crossed by the Chelsea Bridge. It is bounded on the S. and S. E. by an inlet of the sea called Chelsea Creek, which separates it from East Boston. Chelsea has a U. S. marine hospital and a U. S. naval powder-magazine, an academy, and a large elastic rubber factory; also manufactures of sewing-machines, brass-ware, linseed oil, iron safes, woollens, brushes, machinery, tools, etc. The U. S. census of 1880 shows 155 manufactures; capital, \$1,822,250; value of products, \$3,846,250. Chelsea is connected with Boston by the Eastern R. R. and by a ferry 1½ miles across. Pop. in 1870, 18,547; in 1880, 21,782.

**Chelsea**, Mich. See APPENDIX.

**Chelsea**, capital of Orange co., Vt. (see map of Vermont, ref. 5-C, for location of county), 22 miles S. by E. from Montpelier. It has an academy, and manufactures of leather, lumber, and woollen goods. Pop. in 1880, 415.

**Chelsea Hospital**, at Chelsea, England, is an asylum for disabled or superannuated soldiers. Founded as a college in 1610, it was made a hospital in 1682. It has accommodations for about 660 persons, and is governed by a board of commissioners, comprising, *ex-officio*, the lord president of the council and the first lord of the treasury. It supports about 500 in-pensioners and nearly 70,000 out-pensioners. The former receive, besides board, lodging, and clothing, a small sum of money, varying from eight pence a week for a private soldier to three shillings six pence for a color-sergeant. The out-pensioners receive daily a sum of money varying from four pence to two shillings six pence for life.

**Cheltenham**, chelt'nam, a town and fashionable watering-place of England, in the county of Gloucester, and on the Bristol and Birmingham Railway, 96 miles by the road or 121 by railway W. N. W. of London. It is pleasantly situated in a picturesque valley on the Chelt, a small tributary of the Severn, and is sheltered on the E. and S. E. by a semicircle of the Cotswold Hills. It derives its prosperity and importance from its mineral springs, which contain sulphates of soda and magnesia, with iodine, iron, and carbonic acid. It has elegant squares, terraces, and crescents, and numerous villas, interspersed with gardens and shrubberies. The public promenades are among the finest in England. It has ten or more churches, besides chapels of dissenters, a general hospital, a theatre, a zoological garden, and a well-endowed grammar-school founded in 1574. Cheltenham is famous for its colleges and schools, among which is the proprietary college for the sons of gentlemen. Pop. in 1881, 43,972.

**Chemical Affinity.** See AFFINITY.

**Chemical Analysis** is the identification and separation of the elements of chemical compounds or mixtures of any sort. When conducted simply with reference to determining what elements exist in any substance it is termed *qualitative analysis*. When the absolute or relative quantities of the elements are ascertained it is *quantitative analysis*. The theory of qualitative chemical analysis is to put the substance to be analyzed under such conditions and associations as shall cause all its various elements, one after another, to present certain characteristic phenomena or to

enter into certain recognizable combinations, and is based on the grand truth that each chemical element has constant and absolute peculiarities which it carries into its compounds. Thus, the fact that silver and mercury are the only elements whose compounds with chlorine are insoluble in dilute nitric acid, is taken advantage of to separate these two metals from all others. Any nitric solution of metals which is not made milky or turbid on the addition of hydrochloric acid does not, and cannot, contain silver or sub-salts of mercury. Again, any nitric solution wherein hydrochloric acid produces a white milkiness or a white curdy separation, or a fine dazzling white powder, which neither dilute hydrochloric acid, dilute nitric acid, nor hot water will clear up, must contain either silver or mercury, or both. In case such a white separation—or “precipitate,” as the chemist technically terms it—is formed by hydrochloric acid in a solution of metals, the liquid, together with the suspended precipitate, is poured upon a filter (a conical cup folded from a circle of paper specially prepared for the purpose) sustained in a glass funnel. The liquid, which retains all the other elements in solution, passes the pores of the paper, but the precipitate of silver chloride and mercurous chloride remains upon it. The filter is next repeatedly filled with water until the acid liquid has been washed out from the precipitate and the pores of the paper, and we have then all the silver and all the mercury that existed in the form of sub-salts in the filter, and all the other elements in the “filtrate,” as the liquid which has passed through is designated.

The substances which are employed to bring about those chemical changes which serve the purposes of chemical analysis are called *reagents*, and the chemical processes themselves are termed *reactions*, for the reason that at least two substances must always be involved in chemical transformations, and that both act and are reacted upon. Thus the hydrochloric acid employed in our separation of silver and mercury from all other metals is a reagent, and the precipitation is the evidence of a reaction.

Chemical reactions have been known and employed to identify certain bodies from the earliest times. Pliny described the use of paper dyed in nutgalls for detecting iron sulphate when mixed with verdigris as an adulteration. The reaction is a blackening of the paper (formation of ink). In many cases it is easy to recognize a substance by simply applying in this manner a single reagent, which is then called a test. Thus, copper in its solutions is tested by a bit of clean iron wire, which precipitates it as a red powder. A clean piece of copper is a test for mercury in solution, the latter metal forming a silvery coating on the former. Lime-water is a test for carbonic acid gas, making with it a white precipitate of carbonate of lime. Hydrochloric acid is a test for ammonia, as the vapors of the two, when brought together, produce a white cloud. But there are circumstances under which such simple tests fail to give unequivocal answers to the chemical inquirer, and it is needful to frame a system of operations which takes account of all possible contingencies, and which enables the analyst not only to prove with certainty that such and such elements exist in any substance he analyzes, but also gives him equal assurance that nothing else is present in it—a system, in short, which can lead him to a complete knowledge of the composition of any body. Such systems of procedure, more or less satisfactory, have been devised out of the collective experience of chemists, and their details are found in our treatises on qualitative chemical analysis. In respect to the elements and compounds of mineral or inorganic chemistry a very perfect plan has been elaborated, which has received in all essential points the sanction of universal usage.

This system of analysis applies to all the metals and their oxides, and to all their compounds with mineral elements or acids. It supposes that the elements, etc. are in a state of solution either in water or an appropriate acid, and gives directions for obtaining such solutions. The substance is first subjected to a “preliminary examination,” which often leads to the detection of some of its ingredients, or demonstrates the absence of certain elements, and furnishes useful hints as to the mode of solution and subsequent procedure. The actual examination begins with the application of four “general reagents,” which serve to dissect the substance into six “groups” as regards its bases or metallic oxides.

The solution being in nitric acid, the first reagent is hydrochloric acid, which precipitates the first group—viz., silver and mercury (the latter from mercurous salts). The acid filtrate from these chlorides is submitted to a stream of sulphuretted hydrogen gas, which precipitates the second and third groups, consisting of twelve metals together, as sulphides. These are collected and washed upon a filter, and upon them is poured sulphide of ammonium. This dissolves and carries through the filter the sulphides of the

second group—viz., arsenic, antimony, tin, gold, platinum, molybdenum, and tungsten, while the sulphides of mercury (from mercuric salts), lead, bismuth, copper, and cadmium, constituting the third group, remain undissolved.

The filtrate from the precipitate by sulphuretted hydrogen is next taken in hand, made alkaline by ammonia, and sulphide of ammonium is added to it. This throws down, as hydroxides or phosphates, aluminium, chromium, glucinum, and the cerium metals; as phosphates, calcium, barium, strontium, and magnesium; and as sulphides, nickel, cobalt, manganese, zinc, iron, uranium, thallium, and indium—making a fourth group.

To the ammoniacal liquid, separated by a filter from the last precipitate, is added carbonate of ammonium, whereby the fifth group—viz., barium, calcium, and strontium—are precipitated as carbonates.

Lastly, the liquid filtered from the above carbonates may contain the alkalis and magnesium.

The resolution of these groups is accomplished by further application of appropriate reagents. Each group is treated after a certain order which experience has taught. To illustrate: the white precipitate obtained by hydrochloric acid, already described, may contain silver chloride or mercurous chloride, or both. To complete its examination we employ the deportment of these chlorides towards ammonia-water, which easily dissolves silver chloride to a clear liquid, but converts white mercurous chloride into a black substance that remains undissolved. It is only needful then to pour dilute ammonia upon the white content of the filter; and if it blacken, the presence of mercury is demonstrated. The ammonia-water that passes the filter is dropped into excess of dilute nitric acid; the separation of a white curdy substance is evidence of silver.

After thus isolating the two metals we may apply further confirmatory tests. Thus, the black mercury compound remaining in the filter may be mixed with carbonate of sodium, dried, introduced into a small glass flask, and heated to redness, when metallic mercury will distil off and gather on the cold part of the vessel in brilliant globules. So, too, the white curds of silver chloride separated by nitric acid from the ammoniacal solution may be gathered and washed on a filter, the latter burned, the precipitate and ashes mixed with moist carbonate of sodium into a pellet, and heated strongly on charcoal by aid of a jeweller's blowpipe. The silver is thus reduced to the metallic state, and may be found, even when present in extremely minute quantity, by cutting out the charcoal to a little depth around the spot where the pellet was placed, grinding it in a smooth mortar of porcelain or agate, and carefully washing away the coal-powder by a gentle flow of water. The flattened silver particles will reveal themselves by their lustre.

The detection of acids is accomplished in another portion of the substance by the use of other reagents, after the same general plan.

In quantitative chemical analysis it is needful to convert each element of a substance into some form or compound which will admit of complete separation from all the others, and also of accurate weighing or measuring. In many cases an element must be separated in one form, and converted into another for weighing. Silver may be both separated and weighed as chloride or as metal, whilst zinc must be separated as carbonate or sulphide, but can only be weighed accurately as oxide. Many of the reactions employed in qualitative analysis also serve in quantitative estimations; the latter branch of analysis has, however, a multitude of processes peculiar to itself.

In most cases the determination of the quantity of an element or ingredient consists in the collection of a precipitate on a filter, washing, drying, burning away the paper at a red heat, and weighing the ignited residue. This requires a delicate balance, accurate weights, vessels of glass, porcelain, and platinum, which are unalterable by acids and by heat, and great nicety of manipulation. It also requires a perfect knowledge of the deportment of the precipitate towards all the reagents and solvents with which it must have contact, and a certainty that it can be obtained of perfectly definite and known chemical composition. Our present stock of this kind of knowledge is the fruit of a multitude of the most painstaking experiments, and every day the labor of skilled investigators is adding to its variety and extent.

To certain branches or general modes of analysis technical names are applied. Thus “blowpipe analysis” designates a system of operations carried on mainly by aid of the blowpipe, which serves for identifying a large share of the elements, and even for quantitatively estimating the precious metals, as well as lead, copper, nickel, and some others. “Spectral analysis,” which furnishes the most sensitive tests for the presence of the alkali metals, is based on the fact that the light proceeding from a flame in which

the vapor of any substance is intensely heated, manifests, when viewed there by a prism, lines or bands of color whose position and number are characteristic. "Volumetric analysis" is a branch of quantitative analysis, in which measured volumes of solutions of determined strength are employed in reactions whose completion is indicated by some change of color or other marked phenomenon. "Organic analysis" is either ultimate or proximate. The former signifies the estimation of carbon, hydrogen, nitrogen, and the other elements of organic compounds. Proximate organic analysis is the separation of organic compounds from each other, as is done, for example, in determining the proportions of water, oil, starch, etc. in seeds. "Assaying" is the term usually applied to the estimation of the valuable metals, or ingredients of an ore or other commercial article.

Some of the most striking discoveries of science have been steps in the development of chemical analysis. The recognition of oxygen, chlorine, baryta, and manganese were results of Scheele's analysis of the mineral "wad" or pyrolusite. Among the first fruits of quantitative analysis was the discovery of the laws of definite and multiple combining proportions. Those philosophers who, like Bergmann and Dalton, were the first to announce, and those who, like Berzelius, Dumas, and Stas, have done most to establish, these laws, have been eminent for their skill in analytical chemistry.

The utility of chemical analysis manifests itself in a multitude of directions. By it the values of bullion, coinage, and plate are established; ores of all the metals are worked and sold on the chemist's report of their analysis. The same is true of a host of commercial articles, such as various alkalies, acids, salts, medicines, dyestuffs, fertilizers, etc. Chemical analysis furnishes the consumers of these and many other articles a protection against the dishonesty or ignorance of producers or dealers. The physician often gathers decisive diagnostic hints from the analysis of urine; the advocate relies upon chemical analysis for the detection of poisons which can be employed in the perpetration of murder.

There are indeed limits to the application of chemical analysis. It is not difficult to make mixtures some of whose constituents no chemist can identify with the knowledge now at his disposal. The composition of a large number of drugs, such as vegetable extracts, is nearly or quite unknown; and if a professional chemist certifies that he has analyzed a "compound syrup" of sarsaparilla, yellow dock, and buchu, or a "bitters" containing the virtues of a dozen of the best vegetable remedies, and has found it to be a pure and efficacious medicine, the simple fact is, he has not done it, and cannot do it, and there is a fraud involved in the assertion.

The successful pursuit of analytical chemistry requires a long course of the most patient and conscientious experimental work; it is therefore an admirable disciplinary study, and is recognized as such in the higher schools of Europe and this country.

(The best extended treatises on chemical analysis are ROSE's "Handbuch der Analytischen Chemie;" FRESSENIUS, "Qualitative Analysis," and the same author's "Quantitative Analysis;" BUNSEN's "Gasometric Methods;" HOPPE-SEYLER's "Handbuch der Physiologisch- und Pathologisch-Chemischen Analyse;" and GORUP-BESANZ, "Zoochemischen Analyse.") The "Zeitschrift für Analytische Chemie," edited by Fresenius, and now (1872) in its eleventh volume, is a complete repository of all that is currently published on the subject. S. W. JOHNSON.

**Chemical Equivalents.** See CHEMISTRY.

**Chemillé**, a town of France, in the department of Maine-et-Loire, in the arrondissement Cholet, on a railway, 20 miles S. S. E. of Angers, and on a small stream called the Hyronne. It has manufactures of linen handkerchiefs, woollen cloths, flannels, blankets, etc. Here is also a trade in cattle and agricultural products. The neighboring country produces considerable quantities of grain and white wine. Pop. in 1881, 4420.

**Chemistry** [etymology uncertain\*]. The present con-

\* Perhaps the most probable etymology is that which derives the term from *Khem*, one of the ancient names of Egypt; signifying also "black" or "dark," in allusion perhaps to the dark and mysterious character of the art of alchemy, or else to the fact that Egypt was especially distinguished for its knowledge of secret and rare arts. The derivation from the Greek *χημός*, "juice," seems highly improbable, principally because the original spelling of the word as seen in *alchemy* (whence the modern *chemistry* is derived) had not the first syllable in *chy*, as it should have had coming from the Greek *χυ*; for the Greek term itself was *χημεία* (not *χυμεία*); though many modern writers, misled by this supposed etymology from *χυμός*, write *alchemy* (or *alchymie*), as well as *chymist* and *chymistry*. And though the interchange of one vowel or diphthong for another is very common in Greek, as *a* for *η*, *e* for *i*, we believe no instance can be pointed out in which *v* interchanges with *η*. There seems, moreover, no reason to suppose that the mixture or preparation of "juices" of any

kind was the chief occupation of the alchemists, their great problem having been the transmutation of baser metals into gold; and, from what we know of the experiments, their chief agent was fire.

**History.**—The alchemists had no science in any proper sense. Most of the valuable facts they have handed down to us were collected in the search for the philosopher's stone, the universal solvent, or the elixir vitae. Here and there, it is true, there were those who speculated upon the facts which had been observed, and who strove to evolve from them some general principles. But so unsatisfactory were the results that, although the word "chemistry"—signifying, however, the art of making gold and silver—came into use early in the fourth century, it was not until near the close of the seventeenth century that chemistry proper had any existence. For our present purpose it is sufficient to extend our investigation only to the progress of the conception of the constitution of matter. The four elements of Aristotle (B. C. 384–322), earth, air, fire, and water, held undisputed sway until the eighth century. Then the Arabian alchemist Geber introduced the theory that the metals were made of mercury and sulphur, and suggested, for the first time, the idea that differences of properties were due to differences of composition. In the thirteenth century Albertus Magnus united these two conceptions into one, by asserting that the physical properties of bodies depended upon the elements of Aristotle, and their chemical properties upon those of Geber. In the fifteenth century Basil Valentine, the last of the alchemists, added "salt" to Geber's elements, and refined the idea involved in them by asserting that by sulphur was meant the inflammable principle, by mercury the volatile principle, and by salt the fixed principle. Paracelsus (1493–1541) appeared mainly as the reformer of medicine. Accepting Basil Valentine's views of matter, he maintained that the health of the human body depended upon the presence in it of a just proportion of the three principles. The first book upon chemistry was written by Libavius in 1595; he defined it as the art of producing remedies. The period of Iatrochemistry closes with Lemery (1645–1715), who sought again to introduce the ideas of Aristotle by uniting two of his elements, water and earth, to those of Basil Valentine. A new and more hopeful era opens with the English chemist Boyle (1627–91). He opposed the views thus far held upon the constitution of matter, and argued that the true elements were the bodies—themselves undecomposable—which were obtained by the decomposition of other substances, and which could be used to form these substances again. The differences observed in the elements themselves he accounted for by supposing that their smallest particles differed either in size or form. Stahl (1660–1734) accepted the theory that chemical properties depended upon the presence of certain definite constituents, and sought to demonstrate it experimentally. By a closely-knit argument, founded on observed facts, he succeeded in giving to his theory of combustion—called the "phlogistic theory," because it assumed the presence of phlogiston in all combustible bodies, which phlogiston passed off in burning—a solidity which enabled it to maintain itself for nearly two hundred years. In the steady progress of the science, however, the materials for the overthrow of the phlogistic theory were being prepared. Black (1728–99), when a medical student in Edinburgh, wrote, on his graduation in 1754, a thesis entitled "De Humore acido a cibus orto, et Magnesia alba." Appended to it was a series of chemical experiments upon the mild and caustic alkalies, which were afterwards extended and published separately in 1756. In this paper he shows that the mild alkalies differ from the caustic in the fact that they contain a large amount of "fixed air," which, when a mild alkali is treated with an acid, escapes with effervescence. A mild alkali is therefore a caustic alkali, plus fixed air. Now between the current theories of phlogiston and of causticity there is a close analogy. As by the former combustible bodies were compounds of phlogiston, so by the latter caustic alkalies were compounds of the caustic principle. And as, in burning, the combustible gave up its phlogiston and became a calx, so a mild alkali in the fire took up the fiery caustic principle and became itself caustic. Black, however, proved that this explanation of causticity was false; he showed that in burning the mild alkali did not gain but lost something, this loss being the "fixed air;" and that it was this loss of fixed air which made a caustic alkali. This research of Black made the framing

kind was the chief occupation of the alchemists, their great problem having been the transmutation of baser metals into gold; and, from what we know of the experiments, their chief agent was fire.

of an argument against phlogiston easy. It is not surprising, therefore, that not long afterwards Lavoisier (1743-94), furnished with abundant material by the remarkable discoveries of Priestley (1733-1804), Cavendish (1731-1810), and Scheele (1742-86), undertook a crusade against the Stahlian hypothesis. As Black had shown that the loss of causticity depended upon the assumption of a gaseous matter—fixed air—by the alkali, so was it not clear that the loss of combustibility depended upon the assumption of another kind of gaseous matter—vital air—by the combustible? As the conversion of a mild into a caustic alkali did not consist of the taking up of "causticum," but in the evolution of fixed air, so the production of a metal from its calx did not consist in the taking up of "phlogiston," but in the evolution of oxygen. His conclusive experiment with mercury established the analogy, and gave phlogiston its deathblow.

Meanwhile, numerical relations had begun to take their place in the science. Though Homborg (1652-1715) had attempted to fix the quantity of a base required to saturate several different acids, yet it was not until 1777 that Wenzel (1740-93) succeeded in establishing the true idea of definite chemical combination. His analyses were surprisingly accurate. He proved, for example, that 123 parts of lime, or 222 parts of potash, neutralized 240 parts of nitric or 181.5 parts of sulphuric acid. Hence, 123 parts of lime are the equivalent, in neutralizing power, of 222 parts of potash; and so of the quantities of the acids, as given. Richter (1762-1807) extended these experiments, and drew up the first tables of equivalents. He showed that the quantity of the bases A and B which combined with an acid C would also combine with the acids D, E, and F, and hence, that the composition of many salts could be calculated from the known composition of other salts; thus laying the foundation of Stoichiometry. Richter also pointed out that the ratio between the amount of an acid required to saturate certain bases, and the amount of oxygen contained in those bases, was definite. Thus early was the law of definite proportions established. It was soon followed by another of not less importance. In 1804, Dalton (1766-1844), in a research upon olefiant and marsh gases, observed that the latter contained, to the same weight of carbon, twice as much hydrogen as the former. Extending this observation to other bodies, he was at once led to the law of multiple proportions, which asserts that when one body combines with another in more than one proportion, the quantities uniting in the second and subsequent cases are simple multiples of the first. It was in pondering upon the cause of so remarkable a law that Dalton devised the atomic theory. It seemed clear to him that the definite weights with which bodies enter into combination represent definite quantities of matter, indivisible by chemical means. These definite quantities of matter he proposed to call atoms; they were of the same size, but their weights were proportional to the combining weights in each case. These atoms combined with each other, forming compounds; hence the quantities combining must be definite in weight; they might be multiples in one case of the quantities in another, and the weight of the compound must be the sum of the weights of its constituents. These atomic weights being relative, Dalton chose the smallest of them, that of hydrogen, as a standard, calling it unity. In 1808 he published a table of atomic weights, in which that of nitrogen is 5, of carbon 5, of oxygen 7, of sulphur 13, of iron 38, of zinc 56, of silver 100, of mercury 167, etc. Some of Dalton's contemporaries accepted his views in full, others only in part. Among the latter was Wollaston (1766-1828), who accepted Dalton's numbers, but preferred to call them equivalents, on the ground that an equivalent was a fact, an atomic weight only a hypothesis. Davy (1778-1829) also rejected the hypothesis of atoms, but proposed "proportional numbers" for Dalton's atomic weights. Nevertheless, the atomic theory stimulated investigation, and chemists set themselves at work to revise, and if possible to make more accurate, these numbers of Dalton.

Contemporaneously with this progress in the determination of the combining weights of the elements was an advance in ascertaining their combining volumes. Gay-Lussac (1778-1850), in connection with Humboldt, proved in 1805 that water was formed by the union of one volume of oxygen with two volumes of hydrogen. Continuing his researches, he showed in 1809 that the combination of any two gases always took place in simple volume-ratios, and that the volume of the product always bore a simple ratio to that of its constituents. This discovery was not only an important confirmation of the law of definite proportions, but it furnished a means by which an atomic weight could with certainty be determined. For, since, according to Dalton, bodies combine in proportions represented by the weight of their atoms, and, according to Gay-Lussac, the simple gases also combine by volume in a simple ratio, it is

evident that the relative weights of these volumes ought to represent the atomic weights. But the relative weight of a given volume is the density; hence the atomic weights of simple gases are proportional to their densities. Singularly enough, Dalton—who, more than any other, should have welcomed this new confirmation of his views—refused to accept it, and attacked the accuracy of the results. Berzelius (1779-1848), however, warmly espoused the new theory of volumes, and constructed his tables of atomic weights in accordance with it. By the improvements in methods of analysis which he devised, he was able, in 1815, to give a wonderfully accurate table of this kind, in which—following Wollaston—he took oxygen as the standard and called it 100. Hydrogen he gave as 6.24. The influence of Gay-Lussac's law is here clearly apparent. For, since by Wollaston's equivalents the ratio of the hydrogen in water to the oxygen is as 1 to 8, and by Gay-Lussac's law the volumes are as 2 to 1, it is clear that the ratio of the weights of these volumes is as 2 to 16, or as 6.24 to 100, as Berzelius gave it. Moreover, he substituted for the arbitrary notation of Dalton—which consisted of circles—a system of symbols, in which each atom was represented by the first letter of its Latin name. A bar drawn through a symbol signified a double atom, and a dot over it indicated an atom of oxygen. Water was written  $\text{H}_2\text{O}$ , or, abbreviated,  $\text{H}\ddot{\text{O}}$ ; nitric acid,  $\text{N}_2\text{O}_5$ , or  $\text{N}\ddot{\text{O}}$ .

In order to bring his atomic weights into accordance with the equivalents of Wollaston and Davy, Berzelius had recourse to an unfortunate hypothesis. He admitted the existence among the elements of double atoms, inseparable in combination, which were represented by his barred symbols. These double atoms of Berzelius were equal in weight to the equivalents of Wollaston.

Two parties were now in the field. On the one side was Dalton with his atomic theory, maintaining that when but a single combination between elements took place it always took place atom to atom, and considering the atomic weight to be the quantity of a substance which united with one atom of hydrogen; and Wollaston and Davy, rejecting the theory of atoms, and asserting that an equivalent of any element was the quantity of it by weight which combined with 10 parts of oxygen. On the other was Berzelius—already more than a match for any of his contemporaries—accepting the theory of Dalton, and contending that the atomic weights were proportional to the gaseous volumes, being the relative weights of these volumes when equal, but conceding the existence of inseparable double atoms. Dalton confounded the idea of atomic weight with that of equivalent; Wollaston and Davy retained the idea of equivalent, but carried it out inconsistently; Berzelius conceived the true idea of an atom, and sharply distinguished it from that of an equivalent. In the case of non-volatile bodies, as the metals, however, he too considered an atomic weight to be the quantity which combined with 100 of oxygen to form the first degree of oxidation, though, for special reasons, he varied this rule in some cases. The great weight of his authority bore down all opposition, and for twenty years his views were the absolute basis of chemical science. His theory, nevertheless, had its weak points; and in 1848 Gmelin (1788-1853) in the fourth edition of his "Lehrbuch der Chemie," attacked the chief of these, the theory of double atoms. "There is no compound," he says, "containing but one atom of hydrogen, nitrogen, etc., as small as that adopted by Berzelius. Hence two atoms of these bodies are the equivalent of one atom of oxygen. If the atoms be supposed twice as great, the idea of an atom will coincide with that of an equivalent, and all confusion will be avoided." He therefore proposed that the formulas of water, hydrochloric acid, and ammonia, which Berzelius had written  $\text{H}_2\text{O}$ ,  $\text{H}_2\text{Cl}_2$ , and  $\text{H}_2\text{N}_2$ , should be written  $\text{HO}$ ,  $\text{HCl}$ , and  $\text{H}_2\text{N}$ . This argument of Gmelin, strengthened by the old idea of Wollaston that atoms were purely hypothetical and equivalents were actual, succeeded in leading chemists to ignore the positive results obtained by Gay-Lussac, and to sink back into the old equivalent system of notation. The view of chemical equivalency thus adopted, however, based as it was on negative statements mainly, was full of inconsistencies. Adopting, as less cumbersome, the hydrogen scale of equivalents, and therefore assuming that an equivalent of any substance was the quantity of it which united with one atom of hydrogen, the chemists who advocated it gave 14 as the equivalent of nitrogen, although it was certain that this quantity combined, not with one, but with three atoms of hydrogen. In the case of salts, a class of bodies termed ternary by Berzelius, and formulated on the dualistic or electro-chemical view, the same is true. Wenzel, Richter, and even Berzelius, had studied the neutralization of acids by bases, and had formed tables of equivalencies between them. It was impossible to assert that all bases were equivalent to each other. One equivalent of alumina, for example, sat-



urated three times as much sulphuric acid as one equivalent of potash; and phosphoric acid, equivalent for equivalent, required three times as much base as nitric. In general, polyacid bases and polybasic acids could not be brought into accordance with the theory except by strained hypothesis or arbitrary assumption. Consistency required the adoption of formulas which were at variance with fact. The need of a reform was apparent, and it was soon begun. The reformer was Gerhardt (1816-56). He was struck with the fact that on the existing notation, whenever any organic reaction gave rise to the formation of water or of carbonic gas, the quantity of these bodies evolved never corresponded to a single equivalent, but always to two or a multiple of two. Moreover, he observed that if the equivalents of carbon, hydrogen, and oxygen were taken at 6, 1, and 8, respectively, then that all organic formulas contained an even number of carbon and of oxygen atoms. If, he reasoned,  $C_2O_4$  (in which  $C_2=12$  and  $O_4=32$ ) be the smallest quantity of carbonic gas which can be set free in any reaction, is it not a complete molecule? and is it not better to write the formula  $CO_2$ , in which  $C=12$  and  $O_2=32$ ? So, if  $H_2O_2$  be a molecule of water, is it not better to double the weight of the oxygen atom and write it  $H_2O$ ? Thus did Gerhardt sharply define the ideas of molecule and atom, and thus did he construct his tables of atomic weights, which, while closely accordant with those of Berzelius, avoided his hypothesis of double atoms. In accordance with the law of Gay-Lussac, and with the law of Avogadro and Ampère—that equal volumes of all gases contained the same number of molecules—Gerhardt defined a molecule to be that quantity of any substance which in the gaseous state occupied two volumes, the standard volume being that occupied by an atom of hydrogen. As Berzelius had written many of his formulas in accordance with his dualistic ideas—nitric acid, for example, being  $N_2O_5H_2O$  or  $H_2N_2O_6$ —which formulas corresponded to 4 volumes of vapor, Gerhardt at once halved them, writing nitric acid  $HNO_3$ , and so brought them to the 2-volume standard. He regarded molecules as units, whence the name "unitary" given to his system. He maintained that the determination of the arrangement of the atoms within the molecule was impossible, and hence opposed the use of rational formulas. He rejected the compound radical theory of Lavoisier and Berzelius, and accepted, with curious inconsistency, Laurent's theory of "residues," essentially similar.

Gerhardt's early death prevented the full development of his views. His atomic weights were never fully accepted until after they had become modified by the influence of two physical laws discovered some time before. In 1819 two French chemists, Dulong (1735-1838) and Petit (1791-1820), showed that the specific heats of simple bodies were inversely proportional to their atomic weights; or, what is the same thing, that the atoms of all simple bodies have the same specific heat. Although Berzelius had regarded this law in fixing certain of his atomic weights, yet it was not until re-investigated by Regnault in 1849 that it was generally used. He called attention to the fact that to make the equivalent weights then in use accord with the law of specific heats, it was necessary only to halve the equivalents of hydrogen, nitrogen, chlorine, bromine, iodine, phosphorus, arsenic, potassium, sodium, and silver. But this, in all but the last three cases, was to return to the atomic weights of Berzelius. Gerhardt, however, in doing this, had arbitrarily assigned to the protoxides the formula  $R_2O$ , while the law of specific heats allowed this formula only in the cases of potassium, sodium, and silver. For all other metals, therefore, the protoxides were  $RO$ , and the atomic weights of Berzelius were more accurate than those of Gerhardt. The second law which influenced atomic weight was the law of isomorphism, discovered in 1819 by Mitscherlich (1794-1863). He proved that bodies similarly constituted crystallize similarly; and hence that bodies really isomorphous—i. e., having crystalline forms nearly or quite identical—ought to be represented by analogous formulas. For example, cuprous sulphide is isomorphous with silver sulphide; its formula should therefore be  $Cu_2S$ , analogous to  $Ag_2S$ , and not  $Cu_3S$ , as Gerhardt wrote it. Thus, in due time, all the considerations which bear upon the question of atomic weights appear to have been regarded, and these weights established to the satisfaction of all.

Another of the most prolific of modern chemical theories must be briefly glanced at in this place. This theory, called the theory of types, was first proposed in 1839 by Dumas, upon his discovery of trichloroacetic acid. He stated it thus: When equivalent substitution of any of the elements of a compound takes place, the compound itself retains its original chemical type, the replacing element playing the same part as that which is replaced. Ten years later Wurtz discovered the amines, and in his paper on the subject compared them either to ether, in which oxygen was

replaced by amidogen ( $NH_2$ ), or to ammonia, in which one atom of hydrogen was replaced by an alcoholic radical. The investigation of these "compound ammonias" was continued by Hofmann, who accepted the latter view, and has since given it a most remarkable development. In 1851, Williamson extended the idea of types by his beautiful researches upon etherification, and especially by the discovery of mixed ethers. The water-type had been suggested already by Laurent (1807-53), who had formulated caustic and anhydrous potash upon it; it had been extended by Sterry Hunt. But Williamson went farther: he showed conclusively that if an alcohol molecule contained the ethyl group once, that of ether contained it twice—that if alcohol be represented by replacing half the hydrogen in water by ethyl,  $C_2H_5$ ,  $\left\{ \begin{smallmatrix} C_2H_5 \\ H \end{smallmatrix} \right\} O$ , then ether ought to be

represented by replacing the whole,  $C_2H_5$ ,  $\left\{ \begin{smallmatrix} C_2H_5 \\ C_2H_5 \end{smallmatrix} \right\} O$ . By a rapid generalization of this view he showed that the acids, bases, and salts, not only of mineral, but also of organic chemistry, were readily referable to the water-type. Two types were now established, the water and the ammonia types. Gerhardt increased the number by proposing the type hydrogen ( $HH$ ), not only for free elements, like chlorine and potassium, but for the hydrides, aldehydes, ketones, and radicals of the carbon series; and the type hydrochloric acid ( $HCl$ ) as the type of the haloid salts and ethers. In the same year Williamson suggested the idea of "condensed types" for the polybasic acids and the polyacid bases. On the water-type twice condensed,  $\left\{ \begin{smallmatrix} H_2 \\ H_2 \end{smallmatrix} \right\} O_2$ , he formulated sulphuric acid, by replacing half the hydrogen by the radical  $(SO_2)$ ,  $\left\{ \begin{smallmatrix} SO_2 \\ H_2 \end{smallmatrix} \right\} O_2$ . Odling showed that phosphoric acid was derived from the water-type trebly condensed,  $\left\{ \begin{smallmatrix} PO''' \\ H_3 \end{smallmatrix} \right\} O_3$ ; the replacing power of a radical being indicated by dashes ( $PO'''$ ). In 1854 he introduced the conception of "mixed types," arguing that if a poly-equivalent radical could replace the hydrogen atoms in several similar molecules, either wholly or partially, it could also thus unite several dissimilar molecules.

Two distinct ideas are involved in the theory of types: one is the idea of the replacing body or radical; the other is that of the body in which the replacement takes place, or the type itself. The first of these involves clearly the conception of replacing power; those substances being first formulated upon the theory of types whose radicals replaced but a single atom of hydrogen. The brilliant research of Wurtz upon the glycols, made in 1856, proved that ethylene replaced two atoms of hydrogen. And, starting from this, Cannizzaro in 1858 established the analogy for several of the metals, and thus originated the principle of classifying the elements according to their replacing power. The same year Kekulé gave a vigorous impulse to this idea of elemental replacing power by establishing, in a paper on the chemical nature of carbon, the fact that this element had a replacing power of four. Gradually, the names atomicity, quantivalence, and equivalence came into use to express this replacing power—an atom being a monad, dyad, triad, or tetrad, or a univalent, bivalent, trivalent, or quadrivalent radical, according as its replacing power is equal to one, two, three, or four atoms of hydrogen. Wurtz, however, prefers to use the terms monatomic, diatomic, triatomic, etc. for the same purpose. But this combining or replacing power is not invariable. A given element, according to the law of multiple proportions, may form a series of compounds with another element, and in each of these its equivalence must be different. It was early observed, however, that this variation in equivalence always took place by twos; so that an atom might replace 1, 3, 5, or 7, or 2, 4, 6, or 8 hydrogen atoms. The equivalence never changes from even to odd, or the reverse. Odling therefore divided the elements into two groups, calling the group of even equivalence *artiads*, and the group of odd equivalence *perissads*. If an atom is a *perissad* in one of its compounds, it is so in all; and so if it is an *artiad*. Out of this classification of the elements according to their equivalence, involving as it does the predetermination of their compounds, there grew, insensibly and almost inevitably, the idea of molecular arrangement. Though isomerism had necessitated the supposition that differences of arrangement must exist, yet hitherto the precise character of this difference could not be determined. To express the idea, three sorts of graphic formulas were devised. The first, by Kekulé, consisted of ovoids, longer or shorter according to the equivalence:  $\bigcirc \bigcirc \bigcirc \bigcirc \bigcirc \bigcirc$ ; the second, by Foster, consisted simply of lines, thus:  $\vdash \vdash \vdash \vdash \vdash \vdash$ ; and the third, by Crum Brown, was composed of circles with radiating lines:  $\bigcirc \bigcirc \bigcirc \bigcirc \bigcirc \bigcirc$ . The latter notation—using symbols in

place of circles—is in general use. If oxygen be a dyad, and hydrogen a monad, the graphic formula of water must be  $\text{H}-\text{O}-\text{H}$ : the oxygen must link the two H atoms together; there is no other arrangement possible.

The second part of the theory of types is involved in the idea of the body in which the replacement is effected; i. e., the type itself. Four of these were fixed by Gerhardt—namely,  $\text{HH}$ ,  $\text{HCl}$ ,  $\text{H}_2\text{O}$ , and  $\text{H}_2\text{N}$ ; to which Odling subsequently added  $\text{H}_2\text{C}$ .  $\text{HH}$  and  $\text{HCl}$  were soon after united; and indeed it was soon shown that all the others were easily derived from the hydrogen type. Upon examination of these types, it is evident that the atoms united to the hydrogen successively increase in equivalence, the Cl being a monad, the O a dyad, etc. The reason, therefore, why these substances are really typical is obvious: it is because they represent the combinations of monads, dyads, triads, tetrads, etc. with other elements; i. e., all possible compounds. In this light the type theory appears as only a special case of the broader theory of equivalence, into which, by the labors of Kekulé, Wurtz, Hofmann, Boutle-  
row, and others, it has already been completely merged.

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*Theoretical Chemistry.*—Modern science regards matter as divisible into masses, molecules, and atoms. A mass of matter is any portion recognizable by the senses. A molecule of matter is the smallest quantity of any substance which can exist by itself, and which can enter into or leave a chemical change. An atom is the smallest particle of matter which can exist in combination. A molecule is made up of atoms, and a mass is made up of molecules. These divisions of matter are held together by attractions, called, respectively, mass, molecular, and atomic attraction. Mass attraction is called gravitation; molecular attraction is called cohesion; and atomic attraction is called chemism. Differences in molecular composition produce differences in the physical properties of bodies; differences in atomic composition produce differences in their chemical properties. The only differences possible in atomic composition are: (1) a difference in the kind of atoms in the molecule; (2) a difference in the number of these; and (3) a difference in their arrangement. Hence, upon these three all the chemical differences observed in matter must depend. Water differs from salt because a molecule of the former, made up of oxygen and hydrogen, differs from a molecule of the latter, made up of chlorine and sodium, in the kind of atoms which it contains. Litharge differs from red lead because their molecules, while containing in both cases lead and oxygen atoms, differ in the number of these present in each; cane-sugar and milk-sugar are different, because the kind and number of atoms composing their molecules being alike, the arrangement of them is different. Chemistry, therefore, may be defined as the science which treats of the atomic composition of bodies, and of those changes in matter which result from an alteration in the kind, number, or relative position of the atoms which compose the molecule.

Chemistry, then, is the science of atoms. It takes cognizance only of those facts which depend upon differences of atomic constitution. Hence, no substance is chemically understood until the kind, the relative and absolute number, and the arrangement of the atoms within its molecule, are known. To determine the first of these, the kind of atoms, is the business of qualitative analysis; it affirms that a water-molecule contains only oxygen and hydrogen atoms, and a salt-molecule only atoms of chlorine and of sodium. The relative number of atoms contained in a molecule of any substance is ascertained by quantitative analysis, being obtained by dividing the percentage of each constituent by its atomic weight, and clearing the quotients of fractions. The absolute number of atoms in any molecule is fixed from the molecular weight, which is obtained generally from physical data. Knowing the weight of the molecule, it is easy to distribute this weight among the constituent atoms in the proportions given by analysis; then, dividing the quantity of each substance present by its atomic weight, the absolute number of atoms is obtained. The arrangement of the atoms within the molecule is ascertained either directly, being deduced necessarily from

the law of equivalence, or indirectly, by experiment. Since the strength of the atomic attraction varies in the different parts of a molecule by reason either of distance or position, it is possible to break up the molecule so as to obtain certain groups existing in it in other and recognizable forms. Hence, by breaking up a molecule by suitable means, and studying its derivatives, the character of its groupings, and consequently the arrangement of the atoms within it, may be accurately determined.

Molecular constitution is the basis of chemical classification. In the first place, all substances are divided into two classes, according as their molecules are made up of like or of unlike atoms. A substance like sulphur, carbon, or iron is made up of molecules containing like atoms, and is called a simple or elementary substance; a substance like salt, water, or sugar is made up of molecules containing unlike atoms, and is called a compound substance. These two kinds of molecules are easily distinguished by the fact that upon rearranging the atoms between two contiguous molecules the former yields no new substance, while from the latter some different form of matter is obtained. If, for instance, two molecules of simple matter be represented by AA and AA, it is evident that rearrangement would only produce AA and AA again, exactly like the others; but if rearrangement be effected between two compound molecules, AB and AB, then the product would be AA and BB, two new forms of simple matter. It should be mentioned that if the agent employed was not powerful enough to produce the rearrangement, the result would be, apparently, that first given, even if the substance were compound; it may be, therefore, that some of the bodies now considered elementary will be proved compound upon the discovery of some new and more energetic rearranging force. Thus far, however, sixty-five substances have resisted all attempts to decompose them and to evolve from them other forms of matter. These substances, therefore, are regarded as elementary. Since each molecule is made up of like atoms, and these are peculiar to itself, it follows that the number of known kinds of atoms is sixty-three also. The number of atoms contained in a simple molecule is called its atomicity. It is obtained by dividing the weight of the whole molecule by the weight of a single atom. The molecular weight is generally obtained by means of the law of Avogadro or Ampère, which asserts that equal volumes of all gases contain the same number of molecules. Whence it follows (1) that the molecules of all bodies in the gaseous state must be of the same size; and (2) that the molecular weights must be as the weights of equal volumes. Taking, for example, the weight of one liter of hydrogen (.0896 gram) as unity, the weight of one liter of oxygen (1.43 grams) is 16, the weight of a liter of arsenic vapor (13.41 grams) is 150, and the weight of a liter of mercury vapor (8.96 grams) is 100. Hence, a molecule of oxygen is 16, a molecule of arsenic is 150, and a molecule of mercury is 100, times as heavy as a molecule of hydrogen. But the weight of a molecule of hydrogen, containing two atoms, is 2; hence the molecular weight of oxygen is 32, of arsenic is 300, and of mercury 200. Since the atomic weight of oxygen is 16, that of arsenic is 75, and that of mercury is 200, it is evident that the molecule of oxygen is diatomic, that of arsenic tetratomic, and that of mercury monatomic. Most of the elementary molecules are diatomic.

Atoms differ from each other (1) in weight, (2) in the quality of their combining power, and (3) in the quantity of this power. An atomic weight is the weight of an atom, referred to that of hydrogen as unity. Since an atom is the smallest quantity of an element which can enter into the composition of a molecule, it is evident that by analyzing the molecules of several different compounds of a given element, and by comparing together the quantity of this element contained in each, the atomic weight may readily be fixed. Thus, it is found that the quantity of bromine contained in a molecule of its hydrogen compound is 80; of its mercury compound is 160; of its boron compound is 240; and of its silicon compound is 320. Its atomic weight is therefore 80, because it is the smallest quantity by weight in which bromine enters into combination. According to the quality of their combining power, atoms are divided into two classes, called positive or negative, according as, in electrolysis, they go to the negative or positive pole. To the former or positive class belong the metals in general; to the latter or negative class, the non-metals. This distinction is a purely relative one, since an atom may be positive when associated with one atom and negative with another. This property of atoms affects the quality of the molecule into which they enter; the hydrates of positive atoms, for example, being bases, and the hydrates of negative being acids. Besides the differences now noticed, atoms differ also in their equivalence, or their power of entering into combination with other atoms. Taking the atom of



hydrogen as the standard, it is found that other atoms have combining powers two, three, four, five, and even six, times as great. Such atoms are called, therefore, monads, dyads, triads, tetrads, pentads, and hexads. The combining power of a hexad atom being six times as great as that of a hydrogen atom, and that of a dyad atom being twice as great, a complete molecule formed by their union must be composed of one hexad and three dyad atoms. But atomic equivalence is variable; a monad may act as a triad or even as a pentad. This variation, however, always takes place by twos; so that atoms of even equivalence (called artiads) remain even, and atoms of odd equivalence (called perisads) remain odd.

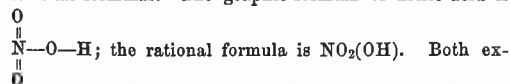
Compound molecules are built up by the union of dissimilar atoms. But since atoms do not exist free and uncombined, a direct union of these is impossible. Hence the union must take place by way of exchange. If, for instance, the two simple molecules AA and BB be brought together, the attraction of unlike atoms for each other being stronger than that of like, rearrangement will take place, and AB and AB, two compound molecules, will result. The number of atoms which a compound molecule may contain is apparently unlimited. Two classes of compound molecules are distinguished: in one the characteristic constit-

uent atoms are united directly together; in the other they are linked together by the intervention of a third atom. The former are called binary compounds, because, whatever the absolute number of atoms present, they can never be of more than two kinds. The latter are called ternary, because there must always be present at least three atoms. Salt, for example, is a binary compound, because made up of molecules containing sodium and chlorine atoms; nitric acid is a ternary compound, because made up of molecules consisting of hydrogen, nitrogen, and oxygen atoms, the two first being linked together by the last. It is evident that only a poly-equivalent atom can link others together; and, in fact, the dyad oxygen and the triad nitrogen perform by far the largest part of this work. Hence, ternary molecules may be divided into two groups, according as oxygen or nitrogen performs in them the linking function. Moreover, the quality of the chemism of atoms here comes in, and each of these groups may be subdivided into three classes, according as the dominant atom united to hydrogen is positive or negative, or as the molecule contains both thus united. The classification of simple and compound molecules above given may be conveniently presented in a tabular form, thus:

MOLECULES	{	Like atoms.....	.....	Element.		
		{	United directly.....	.....	Binary.	
	United indirectly			{	By a dyad	{
					{	$\bar{R}$ and H Base.
					{	$\bar{R}$ and $\bar{R}$ Salt.
		By a triad	{	$\bar{R}$ and H Amide.		
			{	$\bar{R}$ and H Amine.		
			{	$\bar{R}$ and $\bar{R}$ Alkalamide.		

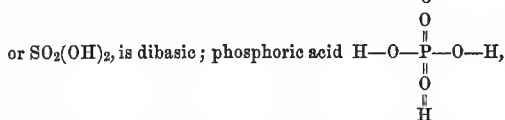
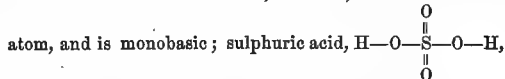
The principle upon which compound substances are named is essentially that proposed by Lavoisier. Every molecule must contain at least two atoms, one of which is positive to the other, which is negative. In the case of binary molecules the rule is: Place the name of the positive first, and then that of the negative, changing the termination of this into *ide*. A substance composed of potassium and sulphur would therefore be called potassium sulphide. If the positive atom varies its equivalence, this fact is indicated by giving it, for the higher of two stages, the termination *ic*, and for the lower the termination *ous*, as mercuric and mercurous oxides. Should a third stage be developed below the *ous*-compound, the prefix *hypo* is given, as hyposulphurous oxide; or if above the *ic*-body, the prefix *per*, as perchloric oxide. Ternary molecules are similarly named, except that the negative terminations are *ate* and *ite*, instead of *ide*. Sodium and iodine united directly form sodium iodide, a binary, but if united by oxygen they form sodium iodate, a ternary. So hydrogen and phosphorus united by oxygen form hydrogen phosphate; potassium and hydrogen thus united form potassium hydrate. Besides these systematic names the acids have more common ones, which are formed from the name of the characteristic atom by adding *ic* or *ous* as in the case of binaries, *ic* corresponding to *ate*, and *ous* to *ite*. Thus, hydrogen sulphate is sulphuric acid, and hydrogen nitrite is nitrous acid.

The system of chemical notation now in use is also old, being essentially that devised by Berzelius. The atomic symbols are the first letters of their Latin names, or, when two have the same letter, the first and some other distinctive letter. The symbol of sodium—Latin, *natrium*—being Na, and that of chlorine being Cl, a molecule of sodium chloride, or salt, is represented by placing them together, thus: NaCl, the positive coming first. If more than one atom of any constituent be present, the number is indicated by a numeral placed below and to the right of the symbol; thus, water is written H<sub>2</sub>O. In the case of ternary molecules especially it is necessary to express not only the kind and the number of atoms the molecule contains, but also their arrangement. The formula HNO<sub>3</sub>, for example, indicates only that a molecule of nitric acid contains one atom of hydrogen, one of nitrogen, and three of oxygen. But since several bodies might be represented by such a formula, it is necessary to go farther and to fix the constitution of the molecule. This may be done by the use of graphic or of rational formulas. The graphic formula of nitric acid is



press the fact that two of the oxygen atoms act simply to saturate the nitrogen, while the third links the hydrogen to it. Moreover, this question is one of practical importance, since the basicity or salt-forming power of the acid is directly as the number of hydrogen atoms, thus linked,

which it contains. Nitric acid, as above, contains one such



or SO<sub>2</sub>(OH)<sub>2</sub>, is dibasic; phosphoric acid H-O-P-O-H, or PO(OH)<sub>3</sub>, is tribasic. By exchanging its hydrogen for a metal, an acid forms a salt; KNO<sub>3</sub>, potassium nitrate, is formed by replacing the hydrogen in HNO<sub>3</sub> by potassium. When an acid and a base are brought together, a salt and water are the products. Thus hydrogen nitrate NO<sub>2</sub>(OH) and potassium hydrate K(OH) act to produce potassium nitrate NO<sub>2</sub>(OK) and H(OH), or H<sub>2</sub>O. Water, acting upon a positive oxide, yields a base; upon a negative oxide, an acid; while a positive oxide acting upon a negative oxide yields a salt.

Chemical changes are called reactions—the substances producing them, reagents. Reactions are represented by equations, in which the symbols of the factors, or substances acting, form one member, and the symbols of the products, or the substances which result, form the other. Reactions are of three kinds—analytical, in which a complex molecule is broken up into simpler ones; synthetical, where two or more simpler molecules unite to form a more complex one; and metathetical, in which a simple transposition of atoms takes place between molecules. Since every symbol represents an atom, and hence an atomic weight, the quantities of matter entering or leaving any chemical reaction are expressed in the equation. Whence, knowing the factors, it is easy to calculate the weight of the product, or to ascertain what quantity of the factors is required to yield a given weight of the product. Chemical calculations, founded on atomic weights, constitute the department of Stoichiometry.

*Bibliography.*—ODLING, "Manual of Chemistry," 1861; BUFF, "Grundlehren der theoretischen Chemie," 1863; GALLOWAY, "Second Step in Chemistry," 1864; FRANKLAND, "Lecture-notes for Chemical Students," 1866; WILLIAMSON, "Chemistry for Students," 1868; AD. WURTZ, "Leçons élémentaires de Chimie moderne," 1868; BLOMSTRAND, "Die Chemie der Jetztzeit," 1869; BARKER, "Text-book of Elementary Chemistry," 1870; ODLING, "Outlines of Chemistry," 1870; GEUTHER, "Lehrbuch der Chemie," 1870; COOKE, "First Principles of Chemical Philosophy," 1871.

*General Chemistry.*—This branch of chemical science is essentially descriptive. It takes up the elements, grouped according to their several analogies, and discusses their history, their occurrence, their methods of preparation, their properties, and their compounds with each other. It is obvious that such a treatment must be an extended one,

covering the entire sixty-three simple substances and their innumerable compounds. We must refer those interested, therefore, to any of the larger treatises upon chemistry for these details, and content ourselves with giving the annexed tabular statement of the names, equivalences, symbols, and atomic weights of the elements at present known:

PERISSADS.		Symbol.	At. wt.
<i>Monads:</i>			
Hydrogen,	.....	H	1
Fluorine,	.....	F	19
Chlorine,	I, III, V, VII.	Cl	35.5
Bromine,	I, III, V, VII.	Br	80
Iodine,	I, III, V, VII.	I	127
Lithium,	.....	Li	7
Sodium,	I, III.	Na ( <i>Natrium</i> )	23
Potassium,	I, III, V.	K ( <i>Kalium</i> )	39
Rubidium,	.....	Rb	85
Cæsium,	.....	Cs	133
Silver,	I, III.	Ag ( <i>Argentum</i> )	108
Thallium,	I, III.	Tl	204
<i>Triads:</i>			
Nitrogen,	I, III, V.	N	14
Phosphorus,	I, III, V.	P	31
Arsenic,	I, III, V.	As	75
Antimony,	III, V.	Sb ( <i>Stibium</i> )	122
Bismuth,	III, V.	Bi	210
Boron,	.....	B	11
Gold	I, III.	Au ( <i>Aurum</i> )	196
<i>Pentads:</i>			
Columbium,	.....	Cb	94
Tantalum,	.....	Ta	182
Vanadium,	III, V.	V	51.3
Also (V <sub>2</sub> ) <sup>III</sup> and (V <sub>2</sub> ) <sup>IV</sup> }			
ARTIADS.			
<i>Dyads:</i>			
Oxygen,	.....	O	16
Sulphur,	II, IV, VI.	S	32
Selenium,	II, IV, VI.	Se	79
Tellurium,	II, IV, VI.	Te	128
Calcium,	II, IV.	Ca	40
Strontium,	II, IV.	Sr	87.5
Barium,	II, IV.	Ba	137
Magnesium,	.....	Mg	24
Zinc,	.....	Zn	65
Cadmium,	.....	Cd	112
Glucinum,	.....	G	9.3
Yttrium,	.....	Y	61.7
Cerium,	.....	Ce	92
Lanthanum,	.....	La	92
Didymium,	.....	D	96
Erbium,	.....	E	112.6
Mercury,	(Hg <sub>2</sub> ) <sup>II</sup> , II.	Hg { <i>Hydrargyrum</i> }	200
Copper,	(Cu <sub>2</sub> ) <sup>II</sup> , II.	Cu ( <i>Cuprum</i> )	63.5
<i>Tetrads:</i>			
Carbon,	II, IV.	C	12
Silicon,	.....	Si	28
Titanium,	II, IV.	Ti	50
Tin,	II, IV.	Sn ( <i>Stannum</i> )	118
Thorium,	.....	Th	115.7
Zirconium,	.....	Zr	89.5
Aluminum,	(Al <sub>2</sub> ) <sup>VI</sup>	Al	27.5
Platinum,	II, IV.	Pt	197
Palladium,	II, IV.	Pd	106.5
Lead,	II, IV.	Pb ( <i>Plumbum</i> )	207
Indium,	.....	In	74
<i>Hexads:</i>			
Molybdenum,	II, IV, VI.	Mo	96
Tungsten,	IV, VI.	W ( <i>Wolfram</i> )	184
Ruthenium,	II, IV, VI.	Ru	104.2
Rhodium,	II, IV, VI.	Ro	104.3
Iridium,	II, IV, VI.	Ir	197
Osmium,	II, IV, VI.	Os	199
Chromium,	II, IV, VI.	Cr	52.5
Manganese,	II, IV, VI.	Mn	55
Iron,	II, IV, VI.	Fe ( <i>Ferrum</i> )	56
Cobalt,	II, IV.	Co	59
Nickel,	II, IV.	Ni	59
Uranium,	II, IV.	U	120

G. F. BARKER.

**Chem'mis** [Gr. *Χέμμις*], the name given by Diodorus Siculus to the Egyptian king who built the great pyramid; the same as CHEOPS (which see).

**Chemnitz**, a town of Germany, in Saxony, on the Chemnitz River, and at the base of the mountain called Erzberg, about 44 miles W. S. W. of Dresden. It is on the railway from Riesa to Zwickau. It is the principal manufacturing town of Saxony, and has extensive manufactures

of cotton, linen, wool, hosiery, machinery, etc. Nearly 20,000 looms are employed in this vicinity in the production of stockings, mitts, etc., which are partly exported to the U. S. Chemnitz has also works for printing calico. The factory laborers own cottages and gardens in which they work when the looms are still, and their condition is superior to that of their class in most other cities. For four centuries it was a free imperial city. It was formerly fortified, but the walls have been converted into promenades. It has a castle, a gymnasium, a school of commerce, several technical schools, and an exchange. Pop. in 1880, 95,123.

**Chem'nitz** [Lat. *Chemnitius*], (MARTIN), an eminent German Lutheran theologian, was born at Treuenbrietzen, in Brandenburg, Nov. 9, 1522. He was educated at Wittenberg, and became minister of a church at Brunswick in 1554. In a work called "Examen Concilii Tridentini" (1565) he ably refuted the doctrines approved by the Council of Trent. Chemnitz and Mörlin were the authors of the "Corpus Doctrinæ Pruthenicæ" ("Body of Prussian Doctrine," 1566), which was a standard work among the Protestants. He was appointed superintendent at Brunswick in 1567. He was one of the authors of the "Formula Concordiæ" (1579). Among his works is "Loci Theologici" ("Theological Topics," 1591), which excels most similar books in learning and method. Died April 8, 1586.

**Chemung**, she-mūng', a river of New York, formed in Steuben county by the union of the Conhocton and Tioga rivers. It flows in an E. S. E. direction through Chemung county, and enters the North Branch of the Susquehanna about 1 mile below Athens, in Bradford co., Pa.

**Chenango River** rises in Oneida co., N. Y., flows S. S. W. through Madison and Chenango counties, and enters the Susquehanna at Binghamton. Length, 90 miles.

**Cheney** (CHARLES EDWARD), D. D., was born at Canandaigua, Ontario co., N. Y., Feb. 12, 1836. He graduated at Hobart College, Geneva, N. Y., in 1857, and studied at the Theological Seminary of Virginia. Nov. 21, 1858, he was ordained deacon, and became assistant rector of St. Luke's church, Rochester, N. Y. Subsequently he took charge of St. Paul's church at Havana, N. Y., and in Mar., 1860, he was ordained a presbyter, and took charge of Christ's church in Chicago. He was in Dec., 1873, elected assistant bishop of the Reformed Episcopal Church.

**Cheney**, on R. R., capital of Spokane co., Wash. Ter. (see map of Washington Territory, ref. 3-D, for location of county). Pop. not in census of 1880.

**Chénier, de** (ANDRÉ), an excellent French poet, a brother of the following, was born at Constantinople in 1762. He was educated in Paris, and was sent to London in 1787 as secretary of legation. He returned to Paris in 1790, and became a moderate supporter of the popular cause. He produced beautiful elegies and eclogues, in which the influence of Greek poetry was predominant, and which gave a new direction to the poetry of France. Having in some of his writings censured the acts of the Jacobins, he was committed to prison. He there wrote an admirable poem entitled "The Young Captive." He was executed in July, 1794, and left unfinished poems called "America" and "Hermes." (See H. DE LATOUCHE, "Notice sur André Chénier;" SAINTE-BEUVE, "Causeries du Lundi," tome iv.)

**Chénier, de** (MARIE JOSEPH), a French poet of the Revolution, born Aug. 28, 1764, at Constantinople, where his father was consul. His tragedies "Græchus," "Fénélon," "Timoléon," and others were inspired by an intense love of freedom, and composed in a noble style. He wrote likewise patriotic songs; among them "Le Chant du Départ." Died Jan. 10, 1811.

**Cheno'a**, R. R. junction, McLean co., Ill. (see map of Illinois, ref. 5-E, for location of county), 48 miles E. of Peoria. Pop. in 1880, 1063.

**Chenopodia'ceæ** [from *Chenopodium*, one of the genera], a natural order of exogenous plants, chiefly herbaceous. They are destitute of stipules, have small inconspicuous flowers, and a persistent calyx. The stamens are never more numerous than the segments of the calyx. They are found in most parts of the world. The order comprises the beet and spinach, and many species which have a weed-like appearance and grow in waste places.

**Chenopo'dium** [from the Gr. *χῆρ*, a "goose," and *πούς*, *ποδός*, a "foot"], a genus of herbaceous plants of the order Chenopodiaceæ, natives of America, Europe, and Asia. They are weeds, growing in gardens and waste places, and often covered with a white mealiness. Several species are naturalized in the U. S., and are known by the names of goosefoot, pigweed, and lamb's quarter. The *Chenopodium anthelminticum* (wormseed) is a native of the U. S. The seeds of this plant are administered as a

remedy for worms. Among the more important plants of this genus is QUINOA (which see).

**Che'ops** [Gr. Χε'ωψ], the name given by Herodotus to the despotic builder of the great pyramid in Egypt, now identified with Suphis I. (or Shufu) of the monuments. He was the second king of the fourth dynasty, which was established at Memphis about 2500 B. C., according to the more sober English Egyptologists.

**Chep'stow**, a town and river-port of England, in the county of Monmouth, on the river Wye, 2½ miles from its entrance into the estuary of the Severn, and 141 miles by rail W. of London. At Chepstow occurs the highest tidal bore in Europe, rising suddenly often fifty feet, and sometimes more than sixty-five. Pop. in 1881, 3591.

**Cher**, a river of Central France, rises in the department of Creuse, flows in a general north-west direction through the departments of Allier, Cher, and Loir-et-Cher, and enters the river Loire immediately below Tours. Its total length is 207 miles. Destructive floods sometimes occur. It is navigable in the last 47 miles of its course.

**Cher**, a central department of France, has an area of 2853 square miles. It is bounded on the E. by the river Loire, and intersected by the Cher. The surface is nearly level, and extensively covered with forests; the soil is variable; the staple products are wine, hemp, flax, and wool. It has mines of coal and iron, and manufactures of woollen fabrics. Capital, Bourges. Pop. in 1881, 351,405.

**Cheraw**, R. R. junction, Chesterfield co., S. C. (see map of South Carolina, ref. 5-F, for location of county), on Pedee River, at the head of navigation, 140 miles N. of Charleston. It has two academies, several other schools, and a public library. During the late civil war this place was captured, Mar. 3, 1865, by the Federal forces under Gen. Sherman. It had been a dépôt of supplies for the Confederates, and twenty-five cannon, thousands of small-arms, tons of gunpowder, and immense commissary stores fell into the hands of the Federals. Pop. in 1870, 960; in 1880, 918.

**Cherbourg** [Lat. *Caroburgus*], a fortified seaport-town and important naval station of France, department of Manche, on the English Channel, and at the N. end of the peninsula of Cotentin, 229½ miles by rail W. N. W. of Paris; lat. 49° 38' N., lon. 1° 37' W. Its climate is mild. The streets are narrow. It contains a communal college, a public library, a museum, and a theatre; also manufactures of hosiery, chemicals, lace, and leather, but the industry of the inhabitants is chiefly employed in the arsenal and dockyards. Vast sums of money have been expended here in fortifications and in public works for the improvement of the harbor. The latter is sheltered by land on three sides, but is open to heavy seas and storms on the N. To protect it from these a breakwater, or *digue*, was commenced in the reign of Louis XIV. and completed under Napoleon III. Cherbourg breakwater is the most gigantic work constructed for such a purpose in ancient or modern times, and is a noble monument of the skill and perseverance of the French engineers. (See BREAKWATER.) At the apex of the angle formed by the meeting of the two branches of the breakwater there is a central fort or battery measuring 509 feet on the inner line of the parapet, which forms a flat semi-ellipse. Besides the batteries on the mole (*digue*), Cherbourg is defended by twenty-four regular forts and redoubts. On the land side it is defended and commanded by La Roule and Fort d'Octeville, which occupy two adjacent heights. The naval port consists of an outer harbor 776 feet long by 663 wide, its minimum depth being 58 feet, and the entrance to it is 206 feet wide. The harbor communicates by means of a lock with a wet-dock 957 feet long by 712 wide. In Aug., 1858, the government completed an inner wet-dock, which is cut out of the solid rock, and is about 930 yards long by 437 wide. Cherbourg was besieged by the English in 1378, 1418, and 1450. William the Conqueror founded a hospital here. Pop. in 1881, 35,691.

**Cherbuliez** (ANTOINE ELYSÉE), born in 1797 at Geneva, professor of law and political economy, first at Geneva, and subsequently at the Polytechnicum at Zurich; wrote against the Socialists, and especially against Proudhon, "Outline of the Science of Political Economy" (2 vols., 1862). Died at Zurich Mar. 14, 1869.

**Cherbuliez** (VICTOR), nephew of the preceding and son of André Cherbuliez, professor of Hebrew at Geneva, born about 1832, has become known as a clever novelist. His "A propos d'un Cheval," a revery on ancient art, appeared in 1860, and was followed by the romances "Comte Kostia" (1863), "Paule Meré," "Le Roman d'une honnête femme" (1866), "Le grand œuvre" (1867), "Ladislas Bolsted" (1869), "Samuel Brohl et Comp" (1877), and others.

**Cherea** (CASSIUS). See APPENDIX.

**Cher'ibon**, or **Sher'ibon**, a seaport-town of Java, capital of a division on its northern coast, 128 miles E. S. E. of Batavia. It is the residence of a Dutch governor, is defended by a fort, and has a considerable trade in coffee, indigo, teakwood, etc. Pop. about 11,000.

**Cherimoy'er**, or **Chirimoy'a** (*Anona Cherimolia*), a fruit of South and Central America, now common in the East Indies and other tropical countries. Both flowers and fruit emit a pleasant fragrance, but when the tree is covered with blossoms the odor is almost overpowering. The fruit varies from the size of an orange to sixteen pounds or more in weight. It is roundish or heart-shaped, greenish, and covered with small knobs and scales. Internally, the fruit is snow-white and juicy, and contains a number of small brown seeds. The eatable part is soft like a custard, and forms almost the entire mass of fruit. It is of the order Anonaceæ.

**Cherokee**, capital of Cherokee co., Ia. (see map of Iowa, ref. 3-D, for location of county), on R. R. and the Little Sioux River, 59 miles E. N. E. of Sioux City. Pop. in 1870, 438; in 1880, 1523.

**Cherokee**, Kan. See APPENDIX.

**Cher'okees'**, a tribe of North American aborigines who were formerly numerous and powerful. They occupied the southern portion of the Appalachian Mountains and large tracts in Georgia and Alabama. They have been considered the most civilized of the Indians in the U. S. In 1838 all the Cherokees living in Georgia were removed to the Indian Territory beyond the Mississippi, in which a large tract of land was appropriated to them. Many of them cultivate the soil and are industrious in their habits. They have a written language, written laws, and an organized government. Their syllabic alphabet, which was invented by George Guess or Sequoyah, a half-breed Cherokee, consists of eighty-five characters.

**Cher'ry**, the name of numerous trees and their fruit belonging to the genus *Prunus* and order Rosaceæ, but placed by some in a separate genus or sub-genus (*Cerasus*), distinguished by having the stone or pit of the fruit round, while the plums of the genus *Prunus* proper have flattened pits; but with several species the distinction does not hold good. But those cherries which have their flowers and fruit in racemes (clusters), called bird cherries, are properly placed in a sub-genus, *Padius*; and the evergreen species, called cherry-laurels, are placed in a sub-genus, *Lauwocerasus*.

Cultivated cherries are of many varieties, and belong to two distinct species—*Prunus avium* and *vulgaris*—both Old World species, the former comprising the "dukes," "ox-hearts," "bigarreans," etc., and the latter the "morellos," "guignes," and sour cherries. The former in Europe yields valuable timber. There are numerous wild species of cherry in both continents. Those best known in the U. S. are the choke-cherry and the black cherry (*Prunus Virginiana* and *serotina*); the bark of both species is very useful in medicine; the latter is a large tree yielding a very useful timber. Cherries are said by Pliny (xv. 30) to have been brought from Portus to Italy by Lucullus.

**Cher'ry Lau'rel**, a name given to the evergreen cherry trees, such as the bay laurel, *Prunus Lauwocerasus*, a native of Asia; the Portugal laurel, *Prunus Lusitanica*, a native of Southern Europe; and the "mock orange" of the Southern U. S., *Prunus Caroliniana*. They are all prized as ornamental shrubs or trees, and all abound in poisonous hydrocyanic acid, especially in the kernels and leaves. They have also an essential oil, resembling that of bitter almonds. The leaves of the first-mentioned species are used in flavoring sauces, etc. and in preparing cherry-laurel water; sometimes employed in medicine as a sedative, but its strength is variable, and it should not be used.

**Cherry Vale**, Kan. See APPENDIX.

**Cherry Valley**, on R. R., Otsego co., N. Y. (see map of New York, ref. 5-H, for location of county), 68 miles W. of Albany. It has an academy. Cherry Valley was the scene of a dreadful massacre by the Tories and Indians in the British service Oct. 11, 1778. Thirty-two inhabitants, nearly all women and children, were murdered, besides sixteen soldiers of the Continental army. The rest of the citizens were made prisoners and taken away, and all the buildings were burned. Pop. in 1870, 930; in 1880, 856.

**Cher'siphron** [Gr. Χερσίφρων], an eminent Cretan architect who flourished about 600 B. C. He designed the temple of Diana at Ephesus, one of the Seven Wonders of the World, but he died before it was finished. It was adorned with 127 Ionic columns of marble sixty feet high, and was 425 Roman feet in length.

**Cher'so** (anc. *Crepea*), an island of Illyria, in the Adriatic, 12 miles S. S. W. of Fiume. Area, with Oserso, 95 square miles. The products are oil and wine. There are large anchovy-fisheries. Capital, Cherso. Pop. 17,500.

**Cherso**, a town of Illyria, in the Austrian province of Trieste, situated on the above island, 25 miles S. of Fiume. It has a fair harbor, and trades in fish, wine, and lumber. Pop. 8095.

**Chersonesus** [Gr. *Χερσόνησος*], the ancient name of several peninsulas of Europe and Asia, as Chersonesus Aurea (Malacca), Chersonesus Cimbrica (Jutland), Chersonesus Thracia (Gallipoli), and Chersonesus Taurica (Crimea).

**Chert**, or **Hornstone**, a silicious mineral, a variety of quartz with many of the characters of flint, but differing from it in being of a tougher nature, and breaking with a splintery instead of a conchoidal fracture. It is always massive, and is of various colors—white, red, yellow, gray, and brown. It is common in the mountain limestone, oolite, and greensand formations; it sometimes forms rocks, and often contains petrifications. The term chert is often applied to the silicious concretions which occur as nodules in limestone rocks. The limestone is said to be "cherty" when it contains so much of these concretions as to render it unfit for building and conversion into lime.

**Cher'ub** (plu. **Cher'ubim** or **Cherubs**), a kind of winged being mentioned in the Scriptures. A cherub guarded Paradise and prevented the return of fallen man, and cherubim were placed over the mercy-seat in the Holy of Holies, and were wrought into the hangings of the temple. They appear as four-winged beings of a generally human form in Christian art. Most writers regard them as angels, but many critics believe that they are symbols rather than real existences.

**Cherubini** (MARIA LUIGI CARLO ZENOBI SALVADOR), an eminent Italian composer, born at Florence Sept. 8, 1760, was a pupil of Felici and Sarti. He visited London in 1784. After 1786 he passed the most of his time in Paris, where his opera "Lodoiska" was performed with success in 1791. He composed, besides other works, operas entitled "Iphigenia in Aulide" (1788), "Elisa" (1794), "Medea" (1797), and "Anacreon." He acquired a European reputation as a composer of sacred music. Among his works in this department is a grand requiem. He was a professor in the Conservatory of Paris, and a member of the Royal Academy. Died Mar. 15, 1842. (See L. DE LOMÉNIE, "M. Cherubini, par un homme de bien," 1841; RAOUX-ROCHETTE, "Notice sur la Vie et les Ouvrages de Cherubini.")

**Cherus'ci**, an ancient and celebrated German tribe mentioned by Cæsar, inhabited a country on the north side of the Silva Baccenis (Hartz Forest). The famous Hermann (Arminius) was a chief of the Cherusci. Having formed a league with other German tribes, he defeated the Roman general Varus near the Lippe in 9 A. D. According to Tacitus, the Cherusci were conquered by the Catti or Chatti after the death of Arminius.

**Cher'vil** [Fr. *cerfeuil*, from the Lat. *cerefolium*], an umbelliferous plant which is cultivated in Europe as a pot-herb and used in soups. The leaves have a peculiar, somewhat sweetish and aromatic smell and taste. It is a native of Europe and naturalized in the U. S.

**Chesapeake Bay** [from an Indian word meaning "mother of waters"], a large inlet of the Atlantic, extends from Capes Charles and Henry northward through Maryland and Virginia to the mouth of the Susquehanna River. It is about 200 miles long, and varies in width from 4 to 40 miles. The distance from Cape Charles to Cape Henry is nearly twelve miles. The coasts on each side are deeply indented by numerous inlets and estuaries, which are navigable. The Chesapeake is so deep that the largest ships can ascend from the ocean nearly to the northern extremity. It contains numerous islands. The largest rivers which flow into it are the Susquehanna, the Potomac, and the James River.

**Chesapeake and Ohio Canal.** See NAVIGATION, INLAND. (For reports of last surveys see *Ex. Docs.* 208 and 265, 43d Congress, 1st session, and *Ex. Docs.* 157, 44th Congress, 1st session.)

**Chesebro** (CAROLINE), an American writer, born at Canandaigua, N. Y. She contributed largely to periodical literature, and was the author of several novels, among which are "Dreamland by Daylight," "Isa, a Pilgrimage," "The Foe in the Household," etc. Died Feb. 16, 1873.

**Ches'elden** (WILLIAM), F. R. S., an English anatomist and surgeon, born in Leicestershire in 1688. He began to lecture on anatomy in London about 1711, and published in 1713 "The Anatomy of the Human Body," which was long used as a text-book. He was afterward chief surgeon of St. Thomas's and Westminster Hospitals, and acquired a high reputation as an operator. Among his works is "The Anatomy of the Bones" (1733). Died in 1752.

**Cheshire**, England. See CHESTER.

**Chesney** (CHARLES CORNWALLIS). See APPENDIX.

**Ches'ney** (FRANCIS RAWDON), an officer noted as an explorer, was born in Ireland in 1789. Aided by the British government, he explored a route from Europe to India by way of the Red Sea, and in 1836 descended the Euphrates in a steamer from Beer (Bīr) to its mouth. He published "The Expedition for the Survey of the Euphrates and Tigris" (4 vols., 1850). In 1855 he obtained the rank of major-general. Died Jan. 30, 1872.

**Chess** [Fr. *échecs*; Ger. *Schach*; from Persian, *shah*, a "king" \*]. The origin of this game is undoubtedly Oriental, but its date is lost in antiquity. Terms connected with it are found in the Sanscrit, as well as in some other Asiatic languages. It was probably introduced into Europe by the Arabians as early as the eighth century. Some slight modifications have been made in it in modern times, but the game appears to have been, in its most essential characters, the same for two or three thousand years. No other game approaches it in the scope afforded, by the number and variety of powers of the pieces, for skill and foresight, involving the faculties of memory and conception especially to a large degree. Dr. Benjamin Franklin admired it greatly, and wrote upon the advantages obtainable by it in the cultivation of the mind and character; particularly in promoting the habit of circumspection. With Napoleon I. it was a favorite recreation, and many other men of superior intelligence (as, for instance, J. J. Rousseau) have greatly enjoyed it. Yet capacity for eminent skill in it has often been possessed by men who have not otherwise displayed remarkable ability.

The *chess-board* is divided into sixty-four squares, alternately white and black. A white square should always be at the corner next to the right hand of each of the two players. The pieces used are as follows, upon each side, of different colors, commonly white and red:

A *King*, placed at the beginning of the game near the middle of the back line or row of squares. This is the most important piece on the board. It can move but a single square in any direction; it can take any piece belonging to the adversary which is upon an adjoining square, except the king—although the piece near it may be protected by some other piece being in a position to take in return. The king can never be taken; when so placed that if it were any other piece it might be captured by the adversary, the king is *in check*; and it is always necessary for the king in such a case, at the next move, to be placed where he is not in check. If this cannot be done, it is *checkmate*, and the game is ended. *Stalemate* occurs when, there being few pieces on the board, none of them, including the king, can be moved without placing the king in check.

A *Queen*, the most valuable active piece on the board, placed, on commencing, next to the king in the back row, on that square nearest the middle which has her own color—i. e. white queen on white square, black or red queen on black square. The queen can move and take any piece of the adversary (except the king, as above said) at any distance in a straight line upon the board, either in the direction of the squares or diagonally; always provided that it cannot leap over intervening pieces. The queen can be taken by any other piece.

Two *Rooks* or *Castles*—one placed in the beginning of the game at each end of the back row of squares. The rook can move or take only in the direction of the lines of squares (i. e. not diagonally), but at any distance when not obstructed by other pieces. It ranks in value next to the queen.

Two *Bishops*, one of which stands at the side of the king, and the other at the side of the queen, on the back row. One is thus upon a black square, and one upon a white one; and as they move or take only diagonally across the board, each keeps upon the same color throughout the game.

Two *Knights*, whose station is, at the opening, one at the side of each of the bishops, being thus next to the castles or rooks, and completing the back row. The movement of the knight is peculiar—one square diagonally, and then one forward or backward; or the converse, one square forward or backward, and then one diagonally. It can, moreover, leap over any intervening pieces to occupy an empty square or to take an adversary's piece. The knight and the bishop rank as about equal in value; probably in the early part of the game the knight is worth rather the most, and the bishop somewhat more when but few pieces are left upon the board.

Eight *Pawns*, arranged at first in the row of squares next to the more important pieces just described. The pawn moves only forward, but takes only diagonally. In either case it can go but a single square, except that, when a pawn first moves from its place in the second row, it may, at the option of the player, move two squares. If, how-

\*Checkmate is *shah mat*—i. e. "king confounded or overcome."

ever, an adversary's pawn is at that time so placed as to take the pawn moved if it were moved but one square, the moving pawn may be taken, as it is called, *en passant*. When a pawn can be advanced so far as to reach the adversary's back row, it becomes a queen or any other piece the player chooses, except a king. It is possible, therefore (as the game is conducted by many, though not all, players), to have more than two queens upon the board at a time. Pawns are the least valuable of all the pieces. Yet skill in their use is important towards winning the game; so much so that in the famous treatise of Philidor ("L'Analyse du Jeu des Echeecs," London, 1749) the theory was maintained that "the pawns are the soul of chess."

*Castling* is a change of position allowed on either side, by which the king and a castle or rook are made to pass each other, each moving two squares if the change be made upon the king's side, and the castle three squares and the king two if it be upon the side of the queen. Castling can only be effected, however, when no pieces intervene, when neither the king nor the castle has yet been moved, and when the king is not in check, and will not have to move, in castling, over a square exposed to check from any piece belonging to the antagonist.

The squares are commonly named after the principal pieces. Thus, that upon which the king stands is the king's square; next to it, the queen's square; then, on one side, king's bishop's square, king's knight's and king's rook's squares; on the other side, queen's bishop's square, queen's knight's and queen's rook's squares; in front of these the king's pawn, queen's pawn, king's bishop's pawn, queen's bishop's pawn, king's knight's pawn, queen's knight's pawn, king's rook's pawn, and queen's rook's pawn.

A *gambit* is a mode of opening the game in which a strong attack is gained by the sacrifice of a pawn. There are several kinds of gambit in use. A curiosity of the chess-board is the "knight's problem"—viz. to place a knight alone upon any square, and then move it, in its usual manner, over every square of the board successively until it returns to the place from which it started. This was thought worthy of resolution by a mathematical process by the celebrated Euler, but many persons have resolved it experimentally.

The *rules* of chess are, with slight variations among individual players, absolute. The most important are the following:

1. If a piece be touched it must (if possible) be moved somewhere.

2. When a move has been made, and the hand has been withdrawn from it, the move cannot be retracted.

3. If you touch one of the adversary's pieces which can be taken, it must be taken, unless this be omitted with the consent of the adversary.

4. On giving check to the adversary's king, notice must be given by saying "check;" otherwise he is not bound to pay any attention to it.

5. When all the pieces on both sides have been removed in the course of a game, except just enough for one player to checkmate the other (as, king and rook, or two bishops, or bishop and knight, against king), the checkmate must be accomplished within fifty moves or it is counted a drawn game.

Among the most famous chess-players have been Danican-Philidor, Kermay de Légal, La Bourdonnais, Deschappelles, Lewis, McDonnell, Paulsen, and Paul Morphy. The last named, a native of the U. S., now living, is the most extraordinary chess-genius ever known. In 1858 he visited Europe, and conquered in turn all the most distinguished living players. His most astonishing feat has been on four occasions playing, *blindfold*, eight games at once with as many different players.

The *automaton* chess-player of MM. Kempelen and Maelzel, exhibited in Europe and America many years ago, was a very ingenious contrivance by which many persons were induced to believe (what is impossible) that the game was actually played by machinery wound up for the purpose. After the death of Maelzel, this automaton, having been taken to pieces, was purchased at Philadelphia by several gentlemen, and about 1842 the late Dr. J. K. Mitchell solved the riddle of its construction and operation, and put it together again for the amusement of his friends. A skillful player was, when it was exhibited, concealed within the table at which the "automaton" figure sat, the game being played upon a board on that table, and made known to the hidden operator by the rising and falling of magnetic "keepers" under the influence of the pieces, each of which contained a small portion of iron. (See "The Chess-player's Hand-book," by HOWARD STAUNTON, London, 1847; "Chess and Chess-players," by GEORGE WALKER, London, 1850; and "Life of Philidor," by GEORGE ALLEN, Greek professor in the University of Pennsylvania, Philadelphia, 1863.)

H. HARTSHORNE.

**Chess, or Cheat**, a common name of *Bromus secalinus*, a plant of the order Gramineæ. It is a troublesome weed which often infests wheat-fields. Many farmers believe (incorrectly) that wheat is liable to be transmuted into chess.

**Chest** [Lat. *pectus*; Fr. *poitrine*], or **Tho'rax**, is the part of the body between the neck and the abdomen. The chest is rather conical in form, the lower end of the cone being shut in by the diaphragm, a large muscular partition which projects upward from the lower ribs, convex towards the chest and concave towards the abdomen. The combination of bone, cartilage, muscle, and tendon in the chest is such as to permit of an expansive movement, and yet to guard against over-expansion, which would be fatal to the delicate textures within. The bones of the chest are an effectual protection against injury from without.

The parts which constitute the chest walls are—1. The spinal column, divided into twenty-four vertebræ, twelve of which, called the dorsal vertebræ, form the thoracic portion. 2. Twelve ribs, attached to the transverse processes of the dorsal vertebræ, and ending in front in the costal cartilages, by which most of the ribs are connected with 3. The sternum or breast-bone, occupying the middle line in front. 4. The diaphragm. The chief contents of the chest are the heart, the great blood-vessels, the lungs, the trachea or windpipe, the bronchi or branches of the trachea, the œsophagus, and the thoracic duct, by which most of the chyle and lymph are discharged into the blood. The importance of these parts and their liability to deranged action render the chest the seat of a large number of diseases which may end in death. Of the three organs which Bichat called the "tripod of life"—viz. the brain, heart, and lungs—the chest contains two; hence its condition in many diseases is an object of solicitude to the physician.

Chest diseases depend in some cases on alterations in form by disorders affecting the bones in early childhood, such as rachitis (rickets). The lungs and air-passages are subject to many diseases, among which are consumption or phthisis pulmonalis, pneumonia, pleurisy, and bronchitis. The heart is subject to pericarditis, endocarditis, and chronic organic disease of the valves, as well as to enlargement (hypertrophy), dilatation, and degeneration of its muscular texture, besides many functional derangements. The aorta may be affected with degeneration of its walls, and with consequent aneurism. The great veins are liable to over-distension, and to obstruction by tumors or by coagulation of the blood. The exploration of the chest by physicians is now conducted not only by investigation of the symptoms of the disease, but by a minute and elaborate examination into the physical conditions of the contained organs by means of auscultation, percussion, measurement, etc.

REVISED BY WILLARD PARKER.

**Ches'ter, or Chesh'ire**, a maritime county of England, is bounded on the N. by Lancashire, from which it is separated by the Mersey, on the N. E. by Yorkshire, on the E. by Derbyshire and Staffordshire, on the S. by Shropshire and Denbighshire, on the W. by Flintshire, and on the N. W. by the Irish Sea. It has a coast on the Irish Sea and the estuaries of the Dee and Mersey. Area, 1105 square miles. The surface is mostly level and well-wooded; the soil is a fertile clayey or sandy loam adapted to grazing and dairy-farming. The surface-rock is new red sandstone. The chief rivers, besides the Mersey, are the Dee and Weaver. Coal, copper, and lead are found in the county. Here are many extensive dairies which produce good cheese; the quantity of cheese made annually is estimated at 12,000 tons or more. Chester has a good system of canals, and is traversed by several railways. Capital, Chester. The other chief towns are Macclesfield, Stockport, and Birkenhead. In 828 A. D. Egbert annexed Chester to his kingdom. William the Conqueror erected it into a county palatine. Pop. in 1881, 643,237.

**Ches'ter**, an episcopal city of England, capital of the county palatine of Chester, is on the right bank of the Dee, 22 miles from the sea and 16 miles S. E. of Liverpool. Six important railways converge to this point, and connect it with Liverpool, Manchester, London, Holyhead, and other towns. It stands on a rocky eminence, is mostly enclosed by ancient and massive walls, and is one of the most picturesque cities of England. The two main streets were cut out of the rock by the Romans five feet or more below the level of the houses. These streets are lined with shops, over which are piazzas or "rows" for foot-passengers. It has an old and massive sandstone cathedral 375 feet long, with a tower 127 feet high. Among its other edifices are a castle and St. John's church, the latter supposed to have been founded in 698 A. D., and now partially in ruins. Here is a stone bridge across the Dee with a single arch 200 feet in span. Chester has a public library,



a museum, and a theatre. It returns two members to Parliament. Cheese, coal, copper, and cast iron are exported from this port by the river, which is navigable for small vessels. Chester occupies the site of an important Roman station called *Deva* (or *Devana*) *Castra*. Pop. in 1881, 36,788.

**Chester**, a beautiful port of entry, post-village, and township of Lunenburg co., Nova Scotia, 45 miles W. by S. of Halifax, is on Chester Basin, which is studded with numerous islands. Its manufactures and fisheries are important. The village of Chester Basin, 5 miles distant, is also celebrated for its beauty. Pop. in 1881, 2974.

**Chester**, a city, capital of Randolph co., Ill. (see map of Illinois, ref. 10-D, for location of county), on R. R. and the Mississippi River, 76 miles below St. Louis. It is the shipping-point for the Chester coal-fields. It has rolling-mills, foundries, flour-mills, and an elevator. Pop. in 1870, 1615; in 1880, 2580.

**Chester**, capital of Choctaw co., Miss. (see map of Mississippi, ref. 6-G, for location of county). Pop. in 1880, 163.

**Chester**, a city and R. R. centre of Delaware co., Pa. (see map of Pennsylvania, ref. 6-J, for location of county), on the Delaware River, 15 miles W. S. W. of Philadelphia. It was settled by the Swedes in 1643, and is the oldest town in the State. In Chester are large shipyards, and manufactures of woollen and cotton goods, metals, etc. There is an academy in the city, and in the neighborhood is the Crozer Theological Seminary (Baptist). Chester was incorporated a city in 1866. Adjacent are the boroughs of Upland and South Chester, which have considerable manufactures. Pop. in 1870, 9485; in 1880, 14,997.

**Chester**, R. R. junction, capital of Chester co., S. C. (see map of South Carolina, ref. 4-E, for location of county), 65 miles N. N. W. of Columbia. Pop. in 1880, 1899.

**Chester**, on R. R., Windsor co., Vt. (see map of Vermont, ref. 7-C, for location of county), 39 miles S. E. of Rutland. Here are manufactures of furniture, leather, lumber, carriages, boots and shoes, sash and blinds, etc. It is the seat of an academy. Pop. of township in 1870, 2052; in 1880, 1901.

**Chester** (COLBY M.), U. S. N., born in 1845 in Massachusetts, graduated at the Naval Academy as ensign in 1863, became a master in 1866, a lieutenant in 1867, a lieutenant-commander in 1868, and afterward commander. He served in the steamer *Richmond* at the battle of Mobile Bay Aug. 5, 1864, and was commended "for coolness and courage" by the commanding officer of that vessel, Capt. Thornton A. Jenkins, in his official report to Rear-Admiral Farragut of the part taken by the *Richmond* in the battle. FOXHALL A. PARKER.

**Chester** (JOSEPH LEMUEL), a distinguished American antiquary, born in Norwich, Conn., in 1821. He has published "Greenwood Cemetery, and other Poems" (1843), a treatise on "The Law of Repulsion" (1853), "Educational Laws of Virginia," etc. (1854), and other works. He was afterward engaged in the publication of all the marriage, burial, and baptismal registers of Westminster Abbey, with annotations. Died May 28, 1882.

**Chester Court-house**, S. C. See CHESTER.

**Ches'terfield**, a town of England, in Derbyshire, 24 miles by railway N. N. E. of Derby. It has a church built in the thirteenth century, with a remarkable twisted spire 230 feet high. Here are manufactures of silk and cotton stuffs, laces, hosiery, earthenware, and machinery. Mines of coal, lead, and iron are worked in the vicinity. Pop. in 1881, 12,221.

**Chesterfield Court-house**, capital of Chesterfield co., S. C. (see map of South Carolina, ref. 5-F, for location of county), is about 90 miles N. E. of Columbia. Pop. of township in 1880, 2357.

**Chesterfield**, capital of Chesterfield co., Va. (see map of Virginia, ref. 6-H, for location of county), is about 12 miles S. S. W. of Richmond. Pop. not in census of 1880.

**Chesterfield Inlet**, a long and narrow inlet of British America, extends westward from the N. part of Hudson's Bay. It is about 250 miles long, and 25 miles wide at the broadest part. It encloses many islands.

**Chesterfield**, EARLS OF (1628), Barons Stanhope (1616, England).—GEORGE PHILIP STANHOPE, eighth earl, born Nov. 29, 1822, succeeded his kinsman Nov. 30, 1871. Died Dec. 1, 1872.

**Chesterfield** (PHILIP DORMER STANHOPE), FOURTH EARL OF, an English author and courtier distinguished for his wit and politeness, was born in London Sept. 22, 1694. He was the eldest son of Philip the third earl and Elizabeth Saville, who was a daughter of the marquess of Hali-

fax. He studied at Cambridge, made a tour on the Continent in 1714, and was elected a member of Parliament in 1715. In 1726 he inherited the earldom and passed into the House of Lords. He became an eloquent debater, and gained distinction by his graceful manners and fine taste. In 1733 he married Melusina Schulemburg, countess of Walsingham. He was a strenuous opponent of Sir Robert Walpole about 1734-40, was appointed lord lieutenant of Ireland in 1745, and one of the principal secretaries of state in 1746. He resigned office in 1748. He was intimate with Pope, Swift, Voltaire, and Bolingbroke. His reputation as a writer is founded chiefly on his "Letters to his Son" (1774), the style of which is much admired. "Take out the immorality," said Dr. Johnson, "and it should be put into the hands of every gentleman." Died Mar. 24, 1773.

**Ches'tertown**, on R. R., a seaport, capital of Kent co., Md. (see map of Maryland, ref. 2-G, for location of county), on the right (W.) bank of Chester River, about 30 miles in a direct line E. of Baltimore. It is the seat of Washington College. Pop. in 1870, 1871; in 1880, 2359.

**Chest, Military** [Fr. *caisse militaire*], is a technical name for the money and negotiable securities carried with an army, and intended to defray its current expenses. In the British military system this department is managed by the commissariat; in the U. S., by the paymaster-general.

**Chest'nut** [Lat. *castanea*; Fr. *châtaigne*], a forest tree of the natural order Cupuliferae. The genus *Castanea* is distinguished by having sterile flowers interruptedly clustered in long and naked cylindrical catkins, and coriaceous and farinaceous ovoid nuts enclosed in a hard and prickly 4-valved involucre. The *Castanea vesca* is a large tree growing wild in Europe and the Northern U. S. It has oblong-lanceolate and pointed leaves, serrate with coarse pointed teeth, and smooth and green on both sides. Each involucre (called the bur) contains from one to three edible nuts, often compressed and flattened on one or both sides. The wood is light and coarse-grained, but durable, is a valuable material for fences, and is much prized for finishing rooms. The chestnut is an ornamental and stately tree, and in Europe attains a great age. A chestnut tree on Mount Etna is celebrated for its longevity, and is said to have measured 200 feet in circumference. The fruit of the Spanish chestnut (which some botanists call *Castanea vulgaris*) is larger than that which grows in the U. S. This tree prefers a dry, light soil, and usually grows in hilly districts. Chestnuts form an important article of food in France and other countries of Southern Europe, where they are cultivated, and used either roasted or boiled. The best variety of French chestnuts are called *marrons*. Among the other species of *Castanea* is the silvery chestnut of Java (*Castanea argentea*), the fruit of which is edible, and the chinquapin (*Castanea pumila*), a small tree indigenous in the Southern U. S. The nuts of the chinquapin are good to eat, but are not so large as chestnuts. California has another species of chinquapin. At Totworth, in England, there is a chestnut tree which was a boundary-mark in the reign of King John (1199-1216).

**Chesun'cook Lake**, in Piscataquis co., Me., is about 24 miles long and from 2 to 4 miles wide. It is an expansion of the Penobscot River.

**Chetimach'es Lake**, or **Grand Lake**, is in the S. part of Louisiana, between the parishes of St. Mary's and St. Martin's. It is about 40 miles long, and is too shallow for navigation. It is an expansion of the Atchafalaya Bayou.

**Cheto'pa**, or **Cheto'pah**, a city of Labette co., Kan. (see map of Kansas, ref. 8-J, for location of county), on the Indian Territory line, on R. R. and the Neosho River, 72 miles S. S. W. of Fort Scott. It has planing-mills, flour-mills, a foundry, large stock-yards, and a school building costing \$25,000. Pop. in 1870, 960; in 1880, 1305.

**Chet'wynd**, VISCOUNTS and BARONS RATHDOWNE (Ireland, 1717).—RICHARD WALTER CHETWYND, sixth viscount, born Dec. 13, 1800, succeeded his father Feb. 27, 1821.

**Chevalier** (MICHEL), a French political economist, born at Limoges Jan. 13, 1806. He was sent to the U. S. in 1832 to examine the American railroads, and published in 1836 "Letters on North America." Among his important works is one entitled "On the Material Interests of France" (1838). He became an advocate of free trade. In 1840 he was appointed professor of political economy in the College of France, and in 1841 chief engineer of mines. He was deprived of these places by the republicans in 1848, but was reinstated by Napoleon in 1852. In 1851 he was admitted into the Institute. He was the author of "History and Description of the Ways of Communication in the United States" (2 vols., 1840-42), "Mexico, Ancient and Modern" (1863), and other works. D. Nov. 29, 1870.



**Chevaux-de-Frise**, a French military term, used also in English, and applied to large and strong pieces of timber from which wooden or iron spikes project in various directions. They are employed to impede the advance of cavalry or of a storming-party in a fortified place. The cheval-de-frise is variously constructed of wood or iron. Sometimes it consists of an iron barrel or cylinder about six feet long, having twelve holes to receive as many spears, which can be packed away in the barrel when not in use.

**Chevaux-legers.** See APPENDIX.

**Cheverus** (JEAN LOUIS ANNE MADELEINE LEFEBVRE), D. D., a French cardinal and philanthropist, born at Mayenne Jan. 28, 1768. He was appointed bishop of Boston, Mass., in 1808, archbishop of Bordeaux in 1826, and a cardinal in 1835. Died July 19, 1836. (See HUEN-DUBOURG, "Vie de Cheverus.")

**Cheves** (LANGDON), LL.D., an American statesman and lawyer, born in Abbeville district, S. C., Sept. 17, 1776. He was a member of Congress from 1811 to 1816, and was Speaker of the House of Representatives during one session (1814-15). In this position he voted against the bill to recharter the U. S. Bank, but he was afterwards president of that bank (1819-22). Died June 25, 1857.

**Cheviot Hills**, a mountain-range extending along the border between England and Scotland. The range is about 35 miles long. Its direction is nearly N. E. and S. W. The highest point is Cheviot Peak, which rises 2684 feet above the level of the sea. The rocks of which the range is formed are porphyry, trap, and mountain limestone. Grouse abound on these hills, which afford good pasture, and are grazed by sheep of a superior breed, called Cheviots. They have been the scene of many conflicts between the English and Scotch.

**Chevreau** (HENRY), a French politician and devoted partisan of Louis Napoleon, born Oct. 23, 1823, at Belleville, near Paris, was appointed at the age of only twenty-six years prefect of the department of Ardèche, and, after being employed for a short time in the ministry of the interior, in succession prefect of Loire-Inferieure, of the Rhône, and of the Seine. From Aug. 9 to Sept. 4, 1870, he was minister of the interior in the last Bonapartist ministry.

**Chevreul** (MICHEL EUGÈNE), a French chemist, born at Angers Aug. 30, 1786. He published in 1823 "Chemical Researches on Fat Substances of Animal Origin," and became director of the dyeworks at Gobelin in 1824. He succeeded Vauquelin as professor of applied chemistry in the Museum of Natural History in 1829. He published in 1839 an important work "On the Law of the Simultaneous Contrast of Colors and the Distribution of Colored Objects." Among his other works is "Lectures on Chemistry Applied to the Art of Dyeing" (1831).

**Chevron** [Fr. *chevron*, signifying "rafter"], an ornament and badge of rank of gold or silver lace, or of braid, worn on the sleeve, deriving its name from its resemblance in form to a pair of rafters. It is of French origin, and has been used to denote periods of service in the ranks (*chevrons d'ancienneté*) or the rank of non-commissioned officers. The corporals and the various grades of sergeant have from one to four chevrons, of different colors in different branches of the service.

**CHEVRON**, in heraldry, an ordinary representing the rafters of a house, and generally denoting the foundation of his own family by the bearer. The chevron is formed of two lines, joined at the top, and descending to the extremities of the field in the form of a pair of rafters.

**CHEVRON**, or **ZIGZAG MOULDING**, in architecture, a moulding in the form of a succession of chevrons. In general it is characteristic of Norman architecture, but is also found during the transition period from Norman to Early English.

**Chevy Chase**, one of the most famous of British ballads. In its present form the piece does not seem to be older than the beginning of the seventeenth century. But more ancient versions existed; and Bishop Percy has published a poem of the sixteenth century which obviously suggested passages in the more recent composition. It is impossible to reconcile its incidents with history, but the event commemorated appears to have been the battle at Otterburn (1388) between the Scotch and English.

**Chew** (RICHARD S.), U. S. N., born Sept. 7, 1843, in the District of Columbia, graduated at the Naval Academy in 1861, became an ensign in 1862, a lieutenant in 1864, and a lieutenant-commander in 1866. He served in the frigate *Minnesota* when she was attacked by the iron-clad *Merrimack*, Mar. 8 and 9, 1862, and was attached to the West Gulf blockading squadron during 1863 and 1864, and participated in the battle of Mobile Bay. D. Apr. 9, 1875.

FOXHALL A. PARKER.

**Chewink', Ground Finch, or Tow'hee Bun'ting**

(*Pipilo erythrophthalmus*), a very common passerine bird of the U. S. and Canada, glossy black, with breast and abdomen white, and with the sides and lower tail-coverts rufous. It nests on the ground and flies with a peculiar jerking motion.

**Cheyenne**, R. R. centre, capital of Wyoming Territory and of Laramie county (see map of Wyoming Territory, ref. 6-G, for location of county), 106 miles N. of Denver and 516 miles W. of Omaha. Elevation, 6075 feet. It has extensive railroad-shops, a fine court-house, water-works, a driving-park, three artificial lakes, a public library, and a \$25,000-school-house. This is the great beef-growing centre, the shipping-point for beef-cattle to Eastern markets, and the supply-dépôt for the trade of the Rocky Mountain region. Pop. in 1870, 1450; in 1880, 3456.

**Cheyenne Indians**, a tribe of savages dwelling in the U. S. Territories E. of the Rocky Mountains. Most authorities refer them to the Algonquin stock, but other as confidently to the Dakota group. They are a tall, courageous race, and are fine horsemen, often at war with their neighbors. They probably do not number more than 3000 persons.

**Chézy, de** (ANTOINE LÉONARD). See APPENDIX.

**Chiabre'ra** (GABRIELLO), an eminent Italian lyric poet, born at Savona June 8, 1552. He was an admirer and imitator of Pindar, and the founder of a new school of poetry. He composed canzoni and odes remarkable for their sublimity, and in some of his verses rivalled the graceful style and genial spirit of Anacreon. He wrote numerous poems in many varieties of verse. In his mature life he resided at Florence, Genoa, and Savona. Died Oct. 14, 1637. "He borrowed from Pindar," says Hallam, "that grandeur of sound, that pomp of epithet, that rich swell of imagery, that unvarying majesty of conception which distinguishes the odes of both poets." (See "Vita di G. Chiabrera," written by himself, Milan, 8vo, 1821; HENRY STEBBING, "Lives of the Italian Poets," 1831.)

**Chia'pas**, a state in the S. E. part of the Mexican confederation, has an area of 16,771 square miles. It is bounded on the N. by Tabasco, on the E. by Guatemala, and on the W. by Tehuantepec. It exports cocoa and vanilla. Extensive and remarkable ruins of an ancient city are visible at Palenque in this state. Capital, San Cristóbal. Pop. in 1880, 219,735.

**Chiaramonte**, a town of Sicily, in the province of Noto, situated on a hill about 30 miles W. S. W. of Syracuse, commands a beautiful prospect. Wine of good quality is produced in this vicinity. Pop. 7108.

**Chia'ri**, a town of Italy, in the province of Brescia, on the railway from Milan to Brescia, 11 miles W. of the latter, was formerly fortified. It has several churches and manufactures of silk fabrics. Pop. 10,414.

**Chiaroscuro** [It. "clear dark;" Fr. *clair-obscur*], the distribution of light and shadow in art. The reproduction of the effects of light and shade is one of the greatest difficulties an artist has to deal with. The conditions of its treatment are: (1) The natural separation of the lights and darks, the play of light in the shadow and of shade in the light, as is seen in nature; the softening of the lights and the transparency of the shadows. In connection with chiaroscuro must be taken into consideration the choice of colors and the preservation of the color-effects. (2) In composition chiaroscuro consists in the massing of lights and shades in different regions of a painting, and the juxtaposition and balancing of these masses, so as to duly heighten or modify the effect of each, and to render the effect of the whole simple and harmonious instead of patchy and confused. The greatest masters of chiaroscuro were Rembrandt, Titian, and Correggio.

**Chiasma.** See DECUSATION.

**Chia'vari**, a town of Italy, in the province of Genoa, on the Gulf of Rapallo, at the mouth of the Sturla, 21 miles E. S. E. of Genoa. The streets are bordered with arcades and well-built houses. The town is enclosed by cultivated hills, and has many handsome villas in the environs. Here are several picturesque old towers and three churches; also manufactures of silk, lace, and furniture. Chiavari has a valuable anchovy-fishery and a slate-quarry. Pop. 11,940.

**Chibouque**, a smoking-pipe used in Turkey and Egypt. It has a mouthpiece of amber or glass, a rather long wooden stem, and a bowl of clay.

**Chica**, *chee'k'a*, a resinous dyestuff, used to give an orange-red color to cotton. It is obtained by boiling the leaves of the *Bignonia Chica*, a plant which grows on the banks of the Orinoco. This plant is a climber with bipinnate leaves, heart-shaped leaflets, and flowers in drooping clusters.

**Chica**, or **Pito**, is a fermented liquor made from Indian corn in some parts of South America, and similar to

ordinary beer; but the Indians sometimes prepare it by chewing the grains, and that which is so prepared is most highly esteemed. To make this liquor particularly strong and well flavored, they pour it into an earthen jar which contains beef; and having made the jar airtight, they bury it in the ground, where it is left for years. On the birth of a child it is their custom thus to bury a jar of chicha, to be drunk at the same child's marriage. Chicha has an agreeable flavor, and is very intoxicating.

**Chicago**, an important R. R. and commercial centre, capital of Cook county, Ill. (see map of Illinois, ref. 2-C, for location of county), the largest city on the great lakes, also the largest interior city, and the fourth in the U. S. The court-house square is in lat. 41° 52' 20" N., lon. 87° 35' W. of Greenwich. The city is 18 miles N. of the S. end of Lake Michigan.

*Its site* was determined by the Chicago River, up the S. branch of which, ages before the white man set foot upon the American continent, the Indian paddled his canoe, and thence on, through Mud Lake, down the Des Plaines and the Illinois to the Mississippi. Upon the spot marked out by nature modern commerce has built up a great city within the lifetime of some of its present inhabitants. It is situated on a low flat prairie from 10 to 18 feet above the lake, and yet skilful engineering and the energy of its people have made it a perfectly dry and very healthy city. This is due largely to the fact that it is upon the summit or dividing ridge between the St. Lawrence and the Mississippi, about 600 feet above the sea. Since the upper level of the canal was cut down only 8 feet, the pure water from Lake Michigan flows directly through the city into the Des Plaines, and down the Illinois River and Mississippi to the Gulf of Mexico. Its position makes it the commercial centre of the upper valleys of the two greatest rivers of the continent, the St. Lawrence and the Mississippi. The N. and the S. branch of the Chicago River, with no current whatever except after severe storms, unite half a mile or more from the lake. Hence through them and the main stream lake-craft have free access to a very considerable portion of the city. Dock room along their shores extends some 15 miles, and it may be increased indefinitely by slips cut at right angles from both branches.

*The growth* of the city in business, in wealth, and in commercial facilities has more than equalled its increase in population. Here are a few facts:

**Grain.**—The first shipment of grain of any kind, 78 bushels of wheat, was made in 1838; in 1883, total bread-stuffs of all kinds shipped, 141,720,259 bushels—the largest grain port in the world.

**Cattle, etc.**—In 1883, 1,878,944 cattle and 5,697,163 hogs were received, making this by far the largest meat and animal product market in the world.

**Lumber.**—The same is true of lumber, the receipts in 1883 being 1,909,910,000 feet; shingles, 1,064,816,000: The immense pine forests of Michigan, Wisconsin, and Western Canada, easily accessible by lake-vessels, and the vast fertile country tributary to Chicago and dependent upon this market for lumber, have for many years made the figures in this department of trade almost fabulous.

**Manufactures.**—In 1883 Chicago had 2378 manufactories, with \$109,000,000 capital, employing 114,457 hands; wages, \$58,570,000; value of products, \$249,022,948. Among the principal articles were slaughtering and meat-packing products, not including retail butchering establishments, \$105,910,000; men's clothing, \$29,217,000; iron and steel, \$44,293,000; foundry and machine-shop products, \$11,341,000; planed lumber, \$5,000,000.

**Finance, Commerce, etc.**—In 1880 the clearings of the banks were \$1,725,684,894. The value of the manufacturing, mercantile, and general business of the city for 1880 was \$900,000,000. The packing business is immense, and the storage capacity of the warehouses is over 20,000,000 bushels.

**Railways** connect the city with all parts of the U. S. and of Canada. The first railway, of 16 miles, was opened in 1849, but not till 1852 did railway progress really commence. Now Chicago has 14 great trunk lines; the N. W. R. R. has 2 and the St. Paul 1 extra, making in all 17; 127 passenger and about 100 freight trains leave every day, and of course as many arrive. Water transit is afforded by the great lakes and the Erie and Welland canals to the ocean, and by canal also with the vast river-system of the Mississippi and its branches. The coast-line of the great lakes extends more than 3000 miles.

**Public Buildings and Parks.**—The great fire of 1871, while it was thought to have ruined the city, swept away all the old rookeries, and their place has been supplied by splendid structures, including a very large post-office and an immense court-house. The public parks and boulevards of Chicago are laid out on the most extensive scale. Lincoln Park, on the N. side, is a favorite resort for all classes.

From Lincoln Park a fine boulevard extends to Humboldt Park, nearly due W. Thence another S. to Central Park, and thence still another runs S. to Douglas Park. Thence a grand boulevard, some 4 miles S., to Gage Park, at the corner of Fifty-fifth street. Thence a splendid boulevard joins Gage with the North Park, the two S. parks. The Botanical Garden attached to this park is a great success, specimens of trees, plants, and shrubs, and thousands of varieties of seeds, having been received and successfully cultivated from all parts of the world. Still another park, lying on the lake-shore S. and E. of the one last named, has been beautifully laid out. These parks are connected by a pleasure 600 feet wide. These two parks embrace over 1300 acres. Lincoln Park and the three on the W. side, with others, together contain more space than the two S. parks, and all together, with the boulevards connecting them, make a continuous and splendid driveway of 25 or 30 miles. Besides these, there are a number of smaller parks: Lake Park, directly in front of the city; Union Park, on the W. side; and Jefferson and Washington Parks.

**Educational, etc.**—There are in and near the city 3 universities—the Chicago University in the S. part of the city; the North-western, at Evanston; and Lake Forest, at Lake Forest. Besides these, the Roman Catholics have St. Ignatius's College, a successful institution, founded in 1870. Each school in medicine has one or more colleges, and the Congregationalists, Lutherans, Baptists, Methodists, and Presbyterians each have theological seminaries. There is also a very successful law school connected with the Chicago University under a corps of professors drawn from the best legal talent in the city.

The public school system is modelled after that of New England; the income is ample for the free education of every child in the city. The public library is maintained by a tax, and the historical and other societies are active and prosperous. Theatres and places of amusement abound, churches of all denominations are numerous and efficient, while the newspapers are considered among the most enterprising and valuable in the U. S.

**History.**—Marquette, the Jesuit missionary, was the first white man who (in 1673) set foot upon the site of Chicago. Subsequently, he, La Salle, Joliet, and Hennepin—some of them several times—passed from the lakes by the S. branch of the Chicago River and the route above indicated to the Mississippi. Fort Dearborn was built by the government near the mouth of the river in 1804, and maintained with a small garrison till 1812, when the soldiers and several of the few inhabitants then here were massacred by the Indians. James Thompson, by direction of the canal commissioners, commenced surveying the plat for the town in 1829. His first map bore date Aug. 4, 1830. The residents of the town were then John Kinzie and family, Dr. Wolcott, his son-in-law, Indian agent, John Miller, who kept a "log tavern," John B. Beaubien, and some three or four Indian traders. To these must be added the garrison and its officers. In spite of the Black Hawk war in 1832, a very considerable addition was made in that year. On Aug. 10, 1833, the people having previously by a vote of 12 to 1 decided to become incorporated, five trustees were appointed, the total number of votes being then 28. The first newspaper was issued by the late John Calhoun Nov. 26, 1833. In 1836-37 the town increased rapidly, but suffered severely from the financial crash of 1837. A city charter was obtained from the legislature March 4, 1837, and on the first Tuesday in May the city government was organized by the election of officers. Only 703 votes were cast.

**The Great Fire.**—The great fire of Oct. 9, 1871, will ever be memorable in history, both on account of its extent and the value of the property destroyed. It commenced about 11 o'clock on the night of the 8th, at the corner of De Koven and Jefferson streets, and did not cease its ravages till the afternoon of the 9th. The city had been sweltering under the scorching rays of the sun for six weeks, scarcely rain enough falling to lay the dust or moisten a roof. With few exceptions, the interiors of all the buildings were constructed of wood, and a very large proportion of them entirely of that material. Of course, the whole city was really a tinder-box, and it burned with a fury never before witnessed. A violent wind was blowing from the S. W., which, under the stimulus of the fire, soon became a gale. When once the fire fairly got started, no fire department could stand before it. It would leap over one or more blocks at a single bound. The whole atmosphere in front of it seemed to be on fire itself. The blazing current swept on, for most of the way not more than two or three blocks wide, reaching Lincoln Park, nearly four miles, long before daylight. But in all great rivers there are eddies, and it was by these that the fire worked westward to the Chicago River and eastward to Michigan Avenue, as far S. as Congress street, thus keeping up its ravages till the afternoon. Its effects in

some places can be compared only to those of the oxyhydrogen blowpipe, for iron safes, three or four feet of iron pillars twenty inches square, and parts of car-wheels were all burned up, no residuum whatever remaining to show where they stood. Some 2100 acres were burned over in a few hours; 100,000 people were homeless; and about \$200,000,000 of property was destroyed. The business portion of the city was all gone. This terrible calamity was followed at once by the most unbounded liberality and the most spontaneous sympathy the world has ever witnessed, every part of our own country, all civilized and some heathen nations joining in a generous contribution. The total amount received by the Chicago Relief and Aid Society, managed by a directory of our very best business men, was \$4,996,782.74. Of this magnificent sum, nearly \$600,000 remained over, the interest of which, and whatever of the principal was actually needed, have been distributed among the poor during the winters that have followed. The fires were not out before busy hands and brave hearts were at work clearing away the rubbish and putting up buildings. In two years the traces of the fire had mainly disappeared. Hardly a vestige of this great calamity remains, and the city is now (1885) growing more rapidly and is far more prosperous than ever before in all its eventful history.

**Population.**—July 1, 1837, 4170; 1840, 4479; 1850, 28,269; 1860, 112,172; 1870, 298,977; 1880, 503,185.

WILLIAM BROSS.

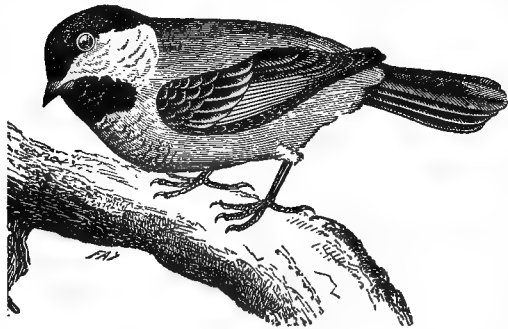
**Chic'ory, or Suc'ory**, an herb of the order Compositæ, sub-order Ligulifloræ. The common chicory or sucory (*Cichorium Intybus*) is a perennial plant found wild in most parts of Europe and naturalized in the U. S., growing in waysides, borders of fields, etc. It has a long, carrot-like root of a dirty or brownish-yellow color, and white within. The stem rises 2 to 5 feet, the leaves resembling those of the dandelion; the flowers rather large, beautiful, and generally blue. Chicory is extensively cultivated in Europe for its roots and for feeding cattle with its leaves. The blanched leaves are sometimes used as a salad. To this genus belongs also the endive. Chicory is much used with coffee.

**Chichen'**, a town of Central America, in Yucatan, 18 miles S. W. of Valladolid. Here are the remains of an ancient town, comprising a vast ruined building 450 feet long, a pyramid the base of which is 550 feet square, and a remarkable domed edifice.

**Chich'ester** (anc. *Regnum*), an episcopal city of England, capital of Sussex, on the South Coast Railway, 17 miles E. N. E. of Portsmouth. It stands on a plain between an arm of the sea and the South Downs. It is well built, and has clean wide streets. Here is a cathedral built in 1199, which is 410 feet long by 227 wide. The town is connected by a canal with the sea, which is two miles distant. It sends two members to the House of Commons. It was formerly the capital of the kingdom of Sussex. Pop. in 1881, 8092.

**Chichester, EARLS OF** (United Kingdom, 1801), Barons Pelham (England, 1763), and baronets (1611).—HENRY THOMAS PELHAM, third earl, first church estate commissioner, born Aug. 25, 1804, succeeded his father in 1826.

**Chickadee** [a name derived from its note], the popu-



Chickadee.

lar name of the black cap titmouse (*Parus atricapillus*) and other American passerine birds of the same genus and of nearly related genera. The common chickadee is frequent all the year round throughout a great part of North America, and is one of the bravest and most cheerful of our winter birds. It shares with several others the name snowbird, and its familiar cry and sprightly manners render it a great favorite with children. It nests in a hollow tree, and feeds on insects in their season, and on seeds in winter.

**Chickahom'iny**, a river in the E. part of Virginia, rises about 20 miles N. W. of Richmond, flows south-eastward, and after a course of about 75 miles enters the James River. It forms the boundary between Henrico and Charles City counties on the right, and Hanover, New Kent, and James City on the left. Along the margins of the Chickahominy is found the theatre of operations of Gen. McClellan operating against Richmond during May and June, 1862. In close proximity to this river occurred the battles of Seven Pines and Fair Oaks, May 31–June 1, 1862, Mechanicsville, June 26, Gaines's Mill, June 27, Savage's Station, June 29, White Oak Swamp, June 30, 1862, and Cold Harbor, June 3, 1864. (See CONFEDERATE STATES, by HON. HORACE GREELEY, LL.D.)

**Chickamauga**, a creek which rises in Walker co., Ga., flows north-eastward and northward, and enters the Tennessee River about 6 miles above Chattanooga.

**Chickamauga**, Hamilton co., Tenn. (see map of Tennessee, ref. 7–H, for location of county), on R. R. and the Chickamauga Creek, 12 miles E. of Chattanooga. Pop. in 1880, 145. (See CHICKAMAUGA, BATTLE OF.)

**Chickamauga, Battle of.** The battle of Chickamauga, fought between the forces of the U. S., under command of Gen. W. S. Rosecrans, and those of the Confederates, under Gen. Braxton Bragg, commenced on the morning of Sept. 19, 1863, about 9 o'clock. Of Rosecrans' army Gen. McCook commanded the right wing, Thomas the left, and Crittenden the centre, while Gen. Polk held chief command of the Confederate right and Hood of the left. The Confederates first attacked the extreme left of the U. S. army with heavy masses, the endeavor being to turn it, and thus gain possession of the roads to Chattanooga. A desperate conflict was continued during the day, but Thomas maintained his position. On the right the conflict had been severe at times, but on the whole the day closed with the advantage on the Union side. During the night Thomas was reinforced from the other wings of the army, and had strengthened his position by hastily thrown up breastworks. The attack was renewed by the Confederates on the morning of the 20th against the left and centre, and the tide of battle here ebbed and flowed throughout the day, with heavy losses on both sides, but without material advantage to either; but Bragg was unable to turn Thomas's flank and occupy the coveted passage to Chattanooga. The fight along the left centre had been equally desperate, bloody, and indecisive. But on the right a fearful disaster had fallen. In answer to Thomas's call for aid, Rosecrans had despatched Negley's and Van Cleve's divisions from the right and centre. Wood was directed to close up on Reynolds on the right centre, and Davis to close on Wood. According to Rosecrans' report, Wood overlooked this direction, but supposed that he was to support Reynolds, and attempted to do so by withdrawing from the line and passing in the rear of Brannan, thus opening a gap in the line of battle, which being quickly perceived by Longstreet, a decisive charge was made, striking Davis in flank and rear, and throwing the whole division into confusion. Pouring in through this gap, the Confederates cut off the Federal right and centre, and attacking Sheridan's division, which was advancing to the support of the left, compelled it, after a gallant struggle, to give way. It was afterwards rallied, however, and by a circuitous route joined Thomas, who was now left to breast the tide of battle against the whole army of Bragg. The right and part of the centre had been broken and sent flying in disorder towards Chattanooga, with terrible loss. Rosecrans, McCook, and numerous subordinate commanders were carried along in the whirl. Sheridan and Davis rallied and re-formed their decimated and scattered commands on the way, and halted at Rossville. Rosecrans, being unable to join Thomas, hastened to Chattanooga to prepare that place for defence in case of a total rout of his army, which now seemed imminent. But Gen. Thomas still remained immovable in his position. His line had now assumed a crescent shape, with its flanks supported by the lower spurs of the mountain; and here he repulsed the furious onsets of the Confederates. About 3½ p. m. the Confederates discovered a gap in the hills in rear of his right flank, through which Longstreet poured his massive columns. At this critical moment Gen. Gordon Granger, who had been posted with his reserves to cover the left and rear, arrived on the field. He had heard the sound of the cannon, and marched his force there without orders. Gen. Thomas pointed out to him the gap through which the Confederates were debouching, and he at once threw in Steedman's brigade of cavalry. The conflict was terrible, but the gap was taken. Two divisions of Longstreet's corps repeatedly assaulted the position, but a battery of six guns placed in the gorge repelled them with fearful slaughter. About sunset they made their last charge, when

they were met and driven back at the point of the bayonet, and returned no more. In the mean time, Thomas had repulsed the repeated attacks on his left and front, and at nightfall the Confederate army retired beyond range of his artillery, leaving Thomas in possession of his hard-fought field. Considering the extreme labor of his troops, the scarcity of ammunition, food, and water, Gen. Thomas determined to retire on Rossville, where they arrived and took post before morning of the 21st, receiving supplies from Chattanooga, and offering battle during the day, but the attack was not seriously renewed. On the night of the 21st he withdrew within the defences of Chattanooga.

The result of the battle was a nominal victory to the Confederates on the field, though Chattanooga and the possession of East Tennessee, the prize for which the battle was fought, still remained in possession of the Union forces. The Union loss is reported at 16,000, killed, wounded, and missing; the Confederate loss, 18,000; they captured 36 guns, 8500 small-arms, and large quantities of accoutrements.

**Chickasaw Bluffs, Battle of,** before Vicksburg, Miss. The U. S. forces under Gen. W. T. Sherman assaulted this strongly fortified position Dec. 29, 1862, but, though the head of the assaulting column reached the works, the severe fire from the rifle-pits and batteries caused them to fall back to the point of starting, leaving many dead, wounded, and prisoners on the field. The Confederate loss was but light.

**Chickasaw In'dians,** a warlike tribe which formerly occupied the northern parts of Alabama and Mississippi. They were visited by De Soto in 1540. They waged war against the French in 1736. Having ceded their lands to the U. S. for a large sum of money, they removed beyond the Mississippi River to the Indian Territory in 1837-38, and formed a political connection with their kindred tribe, the Choctaws. The united tribes number some 22,000 souls, the Choctaws being the more numerous.

**Chick'en-pox,** a contagious febrile disease, chiefly of children, and bearing some resemblance to a very mild form of smallpox. Chicken-pox is distinguished by an eruption of vesicles or blebs, which rarely become pustular or yellow, and leave only a very slight incrustation, which falls off in a few days, without any permanent mark or pit as in smallpox. It is a disease of little or no danger, the fever being often hardly perceptible, and never lasting long. It usually occurs but once in any one patient.

**Chick'ering** (JONAS), an American philanthropist, born in New Ipswich, N. H., April 5, 1798. He became distinguished as a pianoforte-maker, having begun that business for himself in 1823. He acquired great wealth, which he used freely, but not ostentatiously, in various charities. Died Dec. 8, 1853.

**Chickering** (THOMAS E.), a son of Jonas Chickering, was born at Boston, Mass., Oct. 22, 1824. He succeeded his father as the head of a large pianomaking business, and was colonel of the Forty-first Massachusetts Infantry in the civil war, serving chiefly in Louisiana. Died at Boston Feb. 14, 1871.

**Chick's Springs,** Greenville co., S. C. (see map of South Carolina, ref. 4-C, for location of county), about 9 miles N. E. of Greenville. Here are two mineral springs—one alterative and slightly sulphurous, the other a tonic iron spring. Pop. of township in 1870, 1226; in 1880, 2247.

**Chick-pea** (*Cicer*), a genus of plants of the order Leguminosæ, having pinnate leaves and 2-seeded pods, inflated like bladders. The common chick-pea (*Cicer arietinum*) grows wild in the countries around the Mediterranean. It is an annual, of a stiff upright habit. The seeds abound in farina, and have a slightly bitterish taste. They are about the size of common peas, and curiously wrinkled. They are used as food, either boiled or roasted, and are the common pulse of the East. They are an important article in French and Spanish cookery. They have been in general use from the earliest times, and the plant is extensively cultivated in Egypt, Syria, India, Europe, Mexico, etc. The herbage affords nutritious food for cattle. Drops exude from this plant, which, on drying, leave crystals of almost pure oxalic acid. In France, in India, and in Mexico the free use of the chick-pea as food is said sometimes to lead to paralysis.

**Chicla'na,** a town of Spain, in the province of Cadiz, 12 miles S. E. of Cadiz. The houses are built of white stone. It has a fine hospital, and manufactures of linen, earthenware, and brandy. Here are mineral springs which are much frequented. Pop. 11,627.

**Chi'co,** chee'co, cap. of Butte co., Cal. (see map of California, ref. 3-B, for location of county), on R. R. and Chico Creek, 96 miles N. of Sacramento, with which it has a steamboat connection. Pop. in 1880, 3300.

**Chic'opee,** a river of Massachusetts, rises in Worcester county, flows nearly westward, and enters the Connecticut 4 miles above Springfield. It affords abundant water-power.

**Chic'opee,** R. R. junction, of Hampden co., Mass. (see map of Massachusetts, ref. 3-D, for location of county), on the Connecticut River, at the mouth of the Chicopee, 4 miles N. of Springfield. It was formerly called CABOTVILLE. It has several cotton-mills of the Dwight Company (which employs a capital of \$1,500,000 or more); also manufactures of swords, cutlery, machinery, and brass cannon. The Ames Company have here the largest manufactory of swords in the U. S. Pop. of Chicopee township, including Chicopee and Chicopee Falls, in 1870, 9607; in 1880, 11,286.

**Chicopee Falls,** in Chicopee township, Hampden co., Mass. (see map of Massachusetts, ref. 3-D, for location of county), on R. R. and the Chicopee River, 5 miles N. of Springfield and 1½ miles E. of Chicopee Centre, with which it is connected by a branch railroad. It has extensive water-power, four large cotton-mills, a bleachery, and manufactures of knitting machines, agricultural tools, Maynard rifles, guns, pistols, levels, planes, and plumbers' goods. Pop. in 1870, about 3000; in 1880, not in census.

**Chicoutimi,** a post-village, capital of Chicoutimi co., Quebec (Canada), on the S. side of the river Saguenay, 75 miles from its mouth. It has a court-house, jail, a convent of the Good Shepherd, and an important trade in lumber, which is shipped direct to England and other regions. Pop. in 1881, 1935.

**Chief-Justice,** the title of the highest in rank of the judges of a court. The chief-justice of the U. S. is an officer who presides over the Supreme Court, controlling its docket, regulating the order of business, and assigning to the associate justices the cases in which they are to prepare opinions. He reads decisions in practice cases; administers the oath to the President and Vice-President at their inauguration; presides when the President is on trial after impeachment; and nominates persons to be appointed registers in bankruptcy by the district judges. Like his associates, he is required to attend at least one term of the circuit court in his circuit during each period of two years. He ranks next to the President in official dignity. His salary is \$10,500.

**Chiem See,** a lake of Bavaria, 42 miles S. E. of Munich, is at an elevation of 1726 feet above the sea. It is 12 miles long, about 7 miles wide, and 458 feet deep. It contains many fish. The surplus water is discharged through the Alz into the river Inn.

**Chie'ri** (anc. *Carrea Potentia*), a town of Italy, in the province of Turin, on the slope of a hill 8 miles S. E. of Turin. It had manufactures of fustians, etc. in 1422. Here is the church of St. Domenico, built in 1260, and the church of Santa Maria della Scala, which was founded in 1405, the largest Gothic structure in Piedmont. Chieri has manufactures of silk, cotton, and linen fabrics. Pop. 10,036.

**Chie'ti,** formerly **Abruzzo Citeriore**, a province of Central Italy, is a mountainous region. The chief products are corn, oil, fruits, rice, and wine. Area, 1277 miles. Pop. in 1881, 339,986.

**Chieti** (anc. *Teate*), a fortified episcopal city of Italy, capital of the province of Chieti or Abruzzo Citeriore, is situated on a hill near the Pescara, 40 miles E. of Aquila, 115 miles N. of Naples, and 6 miles from the Adriatic. It is the see of an archbishop, and has a cathedral, a college, and a fine theatre. Here are some manufactures of silk and woollen goods. Chieti occupies the site of the ancient *Teate*, a large and important city, the remains of which are still visible. Among these are the ruins of a theatre and several temples. Pop. in 1881, 21,835.

**Chignec'to Bay,** an inlet in British North America, is the northern part of the Bay of Fundy, and extends between New Brunswick and Nova Scotia. It is about 30 miles long.

**Chi'goe,** or **Jig'ger** (*Sarcopeylla penetrans*), a species of flea, much smaller than the common flea, found in the West Indies and North and South America, attacking any exposed part of the human body, effecting a lodgment between the skin and flesh, often under the nails of the toes, and also infesting dogs and mice. At first its presence is indicated by a slight itching, but ulceration is likely to result, which is not only painful, but even dangerous when the female chigoe is allowed to remain and deposit her eggs, about sixty in number. Before these are deposited her abdomen becomes distended to the size of a pea. The ulcer speedily contains a great colony of chigoes. The natives are very expert in extracting the chigoe, which is also removed by washing with tobacco juice. Rubbing with tobacco leaves is a preventive of its attacks, but

cleanliness and the wearing of shoes is still better. Death has followed neglect to remove the chigoe.

**Chi-** (or **She-**) **Hoang-Ti**, called also **Tsin-Chi-Hoang-Ti**, and sometimes **Ching-Wang**, one of the greatest emperors of China, ruled that country from 246 to 210 B. C. The country now called China was then divided into eight feudatory kingdoms or principalities. He formed the design of subjugating them all and consolidating them into one great empire. This he at length accomplished, and by expelling some barbarous nations extended the empire to nearly its present limits. He also built the Great Wall of China, employing upon it several millions of men for ten years, of whom it is said half a million perished before the work was finished. He is also said to have been the first Chinese sovereign who caused a statistical survey of the whole empire, with a valuation of lands, products, etc., in order that the tributes might be justly apportioned. But his memory is stained by his attempted destruction of the ancient books of the country. This attempt he made in order to weaken or destroy the authority of the learned class, who were his enemies, and also to obliterate the national reverence for antiquity, which formed the chief support of the authority of that class. He appears to have been the first ruler of China (if we except those of a very remote antiquity) who assumed the title of *hoang* or "emperor," his predecessors having been called by the more modest title of *wang* or "king." Chi-Hoang-Ti has been compared to Napoleon, whom he certainly resembled in the force of his will, as well as in the extent of his power.

**Chihuahua**, a state of Mexico, bordering on Texas, has an area of 105,300 square miles. It is bounded on the N. E. by the Rio Grande del Norte, and is drained by the Conchos. The W. part is occupied by a long mountain-chain called Sierra Madre. The surface E. of this chain is mostly a high table-land; the soil is generally arid and sterile. The state is rich in minerals, including gold, silver, copper, lead, tin, and cinnabar. The silver-mines, which are in the Sierra Madre, were formerly very productive. The chief wealth of the inhabitants consists in herds of cattle, horses, and mules. This state is infested by Apaches, who greatly retard its prosperity. Capital, Chihuahua. Pop. of the state in 1880, 180,758.

**Chihuahua**, a town of Mexico, the capital of the above state, is about 310 miles N. N. W. of Durango; lat. 28° 50' N., lon. 105° 33' W. It has a fine stone cathedral which cost about \$800,000, a state prison, a state-house, and a mint. It is supplied with water by a good stone aqueduct three miles long. Silver-mines have been opened in the vicinity. Chihuahua has an active trade with San Antonio in Texas. Pop. 12,116.

**Chilblain** [Lat. *pernio*], one of the secondary effects of cold and moisture upon the human system, principally affecting the feet, hands, nose, ears, etc. Chilblains are frequently chronic in their character. Mild cases are marked by swelling and redness of the affected part, accompanied by intolerable itching. The more severe forms assume an ulcerated, and sometimes even a gangrenous, character. Those troubled with chilblains should carefully protect the feet and hands from cold, should wash the feet frequently and dry them very thoroughly, and avoid going near a fire when they are very cold. Benzoeated oxide-of-zinc ointment, citrine ointment, borax and sugar of lead in oil or glycerine, tincture of iodine, sulphurous acid solution, and various stimulant applications are all useful, some being suited to the condition of certain patients, while others may require different applications. The severer forms may need surgical treatment.

**Chilcott** (GEORGE M.), born at Trough Creek, Pa., Jan. 2, 1828; removed to Jefferson co., Ia., 1844, and in 1856 to Burt co., Neb.; member of Neb. legislature 1856-57; removed to Denver, Col., in 1859, and was member of constitutional convention; in 1860 removed to S. Col.; member of Territorial legislature in first two sessions; register of U. S. land-office 1863; in 1867 delegate to Cong.; member of Territorial council 1872-74; in 1878 member of State legislature; Apr. 11, 1882, was appointed U. S. Senator, to succeed Henry M. Teller; term expired in 1883.

**Child** (FRANCIS J.), PH. D., born in Boston Feb. 1, 1825, graduated at Harvard in 1846. After taking his degree he was for some time tutor in mathematics at Harvard, and subsequently in rhetoric and history. In 1849 he visited Europe, where he spent about two years. In 1851 he succeeded Prof. E. T. Channing as Boylston professor of rhetoric and oratory. Prof. Child is especially distinguished for his thorough acquaintance with early English literature. As a Chaucer scholar he has perhaps no superior in America or Europe. He has contributed to this "Cyclopædia" the admirable article on BALLAD POETRY.

**Child** (LYDIA MARIA), an American writer, born at Medford, Mass., Feb. 11, 1802. Her maiden name was FRANCIS. She was married in 1828 to David Lee Child, a lawyer, and became editor of the "National Anti-Slavery Standard" in 1841. She published, besides other works, "The History of Women" (1832), "Letters from New York" (2 vols., 1844), "The Oasis," "Fact and Fiction," "Philothea, a Grecian Romance," and "The Progress of Religious Ideas" (3 vols., 1855). D. Oct. 20, 1880.

**Childbirth**. See OBSTETRICS.

**Childe** (JOHN), an American officer and engineer, born Aug. 30, 1802, at West Boylston, Mass., graduated at West Point in 1827. He served, while lieutenant of artillery, on ordnance duty 1828-34; garrison and engineer duty at Newport Harbor, R. I., 1834-35. Resigned Dec. 31, 1835, and assumed the profession of civil engineer, in which he became eminent, particularly in the construction of railroads and bridges and improvements of rivers and harbors. His official reports are models of logical force and accuracy, and his inventive talent for mechanical improvements was remarkable. Died Feb. 2, 1858, at Springfield, Mass., aged fifty-five. GEORGE W. CULLUM.

**Chil'dermas** [from *child* and *mass*], or **Holy Innocents' Day** (Dec. 28th, or in the East the 29th), is observed by the Roman, Anglican, Greek, and various Eastern churches as a festival in honor of the children killed by Herod. The learned John Gregory says: "It hath been a custom, and yet is elsewhere, to whip up the children upon Innocents' Day morning, that the memory of Herod's murder might stick the closer, and in a moderate proportion to act over the cruelty again in kind."

**Childs** (GEORGE W.), an American journalist and publisher, born in 1829 at Baltimore, Md. He became a resident of Philadelphia in his youth, and in 1849 a partner in a publishing-house. He purchased in 1864 the "Public Ledger," a daily newspaper of Philadelphia, which he made very successful. He is also distinguished for liberality.

**Childs** (HENRY HALSEY), M. D., a son of Timothy Childs (see below), was born in Pittsfield, Mass., June 7, 1783, and graduated at Williams in 1802. He was for many years president of the Berkshire Medical College, and was lieutenant-governor of Massachusetts in 1843. He was distinguished for his benevolence, integrity, and professional enthusiasm. Died Mar. 22, 1868.

**Childs** (LINUS), born in 1803 at Southbridge, Mass., graduated at Yale in 1824, became a lawyer of Boston, Mass., and was for some time agent of a manufactory at Lowell. He was active in State politics, and was a prominent member of the prudential committee of the American board of commissioners for foreign missions, and of the trustees of Andover Theological Seminary and Phillips Academy. Died Aug. 26, 1870.

**Childs** (ORVILLE W.), an able civil engineer, was chief engineer of the New York State works (1840-47), aided in constructing the Champlain Canal, and in the survey of the Nicaragua ship-canal route. He contributed much to professional literature. Died at Philadelphia Sept. 6, 1870.

**Childs** (THOMAS), an American officer, born in Pittsfield, Mass., in 1796, graduated at West Point in 1814 in the artillery. He served with distinction in the war of 1812-15 at the battle of Niagara, and at Fort Erie in 1814; he was engaged in the Florida war against the hostile Indians from 1836 to 1842, and in the war with Mexico, at Palo Alto, Resaca de la Palma, Monterey, Vera Cruz, and Cerro Gordo. For his distinguished conduct in the Florida war he was brevetted major, lieutenant-colonel, and colonel, and in the Mexican war brevetted brigadier-general. Died Oct. 8, 1853.

**Childs** (TIMOTHY), M. D., born in Deerfield, Mass., in 1748, was a distinguished patriot and an army-surgeon in the Revolutionary war. At the end of the war he successfully resumed his medical practice at Pittsfield. Died Feb. 25, 1821.

**Chili**, a South-American republic, stretches from Cape Horn, lat. 56° S., to the Rio Cameronis, lat. 19° S., between the Pacific Ocean, and the Andes, its breadth varying from 40 to 200 miles. Area, computed at 218,925 square miles; pop. 2,400,396 in 1882.

**Physical Features, Productions, etc.**—The surface is mountainous, and belongs entirely to the western slope of the Andes, which here attain a very great height. The mean elevation is nearly 14,000 feet above the level of the sea. Among the peaks the porphyritic Nevado of Aconcagua, which rises 22,422 feet, was once said to be the highest peak in South America. The volcano of Antuco near the eastern border of Concepcion is 8917 feet high. Other active volcanoes occur, and the whole region is subject to earthquakes, one of which in 1822 destroyed several



cities, and raised the coast four feet above its former level, which change of level proved permanent. The predominant rocks of Chili are granite, porphyry, basalt, quartz, clay-slate, limestone, etc. Many silver-mines have been opened in the N. part of Chili, but the desert nature of the country and the scarcity of water render the mining operations difficult and expensive. Gold, copper, lead, iron, bismuth, antimony, cobalt, and quicksilver are also found here, the mines of copper being especially important. Extensive beds of bituminous coal have been opened near Talcahuano. The richest and most fertile soil is found in the central and southern parts. The climate is remarkably healthy. In the central part of the country rain falls between June and September, but the northern desert is subject to long droughts which continue for years, and in the southernmost region the rain-fall is so heavy as to prevent wheat from ripening. In the central part storms of hail and terrific thunder are frequent in the winter. The hottest months of the year are January and February, during which the mercury sometimes rises to 95° F. in the shade. The southern part is covered with dense forests. The laurel, myrtle, cypress, and other evergreens attain here a gigantic size. In the middle portions the soil is adapted to grazing and the cultivation of grain. The staple productions are wheat (about 10,000,000 bushels a year), barley (about 1,500,000 bushels), maize, hemp, kidney-beans (forming the principal national dish), and potatoes. Apples, pears, plums, peaches, oranges, and grapes are abundant. The chief articles of export are silver, copper, nitrate of soda, wheat, hides, tallow, and wool. In 1880 the value of exports amounted to \$51,683,810, of imports to \$30,343,725.

*Population, Religion, Government, etc.*—Of the population about one-third is urban and two-thirds rural; the wandering Araucanians and Patagonians number about 45,000. The Chilians themselves hold the same relation to Spanish civilization as do the inhabitants of the U. S. to English civilization. Their language, instincts, conventionalities, etc. are Spanish. The religion of the State is Roman Catholic, but the public worship of other denominations is tacitly allowed. There are two small Protestant congregations in Valparaiso, and the German settlers in Valdivia and Llanquihue have an evangelical minister residing at Puerto Montt. The Chilian Church is poor. Its estates were seized by the State at the separation from Spain. The president of the republic appoints the bishop. The State pays the priests, but their salary is as insufficient as their number. The country is divided into fifteen provinces, named Chiloe, Llanquihue, Valdivia, Arauco, Concepcion, Nuble, Maule, Talca, Curico, Colchagua, Santiago, Valparaiso, Aconcagua, Coquimbo, and Atacama, to which must be added the colony of Magallanes. The chief cities are Santiago, the capital, Valparaiso, Talca, and Concepcion. The executive power is exercised by a president elected for a term of five years. The legislature consists of two houses—the chamber of deputies, who are elected for three years, and the senate, the members of which are chosen for a term of nine years. In 1880 the public debt amounted to \$74,582,050; in 1881 the revenue was \$16,920,000, and the expenditure \$17,057,729. In 1880 about 1122 miles of railway were in operation, and 2483 miles of telegraph lines.

*History.*—Chili was a part of the dominions of the inca of Peru when the latter was conquered by Pizarro. Almagro invaded Chili in 1535, soon after which the conquest of the country, except Araucania, was completed by Valdivia, who founded Santiago in 1541. He was defeated and killed in 1553 by the Araucanians, whom the Spaniards were never able to conquer. In 1810 the Chilians revolted against the king of Spain, a junta which met at Santiago elected the marquis de la Platte, a native of Chili, president of the republic, and on Jan. 1, 1818, the independence of Chili was formally proclaimed by Bernardo O'Higgins, the commander-in-chief of the Chilian patriots. The last stronghold of the Spaniards, the island of Chiloe, was captured in Jan., 1826. A constitution was adopted in 1824, and remodeled in 1828, and on April 25, 1844, a treaty was concluded with Spain which recognized the independence of Chili. During the administrations of President Bulnes (1841-51) and of President Manuel Montt (1851-61) Chili remained free from the troubles which agitated most of the other South American republics. Two insurrections during the administration of the latter were easily suppressed. Agriculture, mining industry, and navigation steadily advanced, and a considerable immigration from Europe took place. During the two administrative terms of President Perez (1861-71) Chili, in union with Peru, Bolivia, and Ecuador, was involved in a war with Spain, which began in 1865. A Spanish fleet on Mar. 31, 1866, bombarded Valparaiso, but had to raise the blockade on April 14, owing to the remonstrances of the European

powers. Actual hostilities soon after ceased, but a formal truce was not concluded until July, 1869, through the mediation of the government of the U. S. By a treaty with the Argentine Confederation in 1881, Chili gave up all claims to that part of Patagonia lying E. of the crest of the Andes. After the brilliant war with Peru and Bolivia (1879-82) the northern frontier of Chili was moved from lat. 24° S. to lat 19° S., and will probably be moved still farther N.

CLEMENS PETERSEN.

**Chil'iad** [Gr. *χίλις*, from *χίλις*, a "thousand"], an assemblage of things grouped or ranged by thousands. The word is chiefly used by the early computers of logarithmic tables, who expressed the extent of the table by saying it contained the logarithms of so many *chiliads* of absolute numbers.

**Chiliasts.** See MILLENNARIANS.

**Chillicothe**, city of Peoria co., Ill. (see map of Illinois, ref. 4-D, for location of county), on R. R. and the Illinois River, 18 miles N. N. E. of Peoria. It is a large grain dépôt, and possesses various manufacturing industries. A daily packet-boat runs to Peoria. P. in 1880, 936.

**Chillicothe**, city and R. R. junction, capital of Livingston co., Mo. (see map of Missouri, ref. 2-F, for location of county), 76 miles E. of St. Joseph. It is the principal town in the Grand River Valley, and contains flouring-mills, planing-mills, foundry and machine-shop, one academy, and graded free schools. Plenty of timber and water. Coal in abundance in the vicinity. Pop. in 1870, 3978; in 1880, 4078.

**Chil'licothe**, or **Chillicothe**, a beautiful city and R. R. centre, the capital of Ross co., O. (see map of Ohio, ref. 7-E, for location of county), is finely situated on the Scioto River, and in a plain enclosed on several sides by verdant hills nearly 500 feet high. It is on the Ohio and Erie Canal, about 48 miles S. of Columbus and 99 miles E. by N. from Cincinnati. The streets are wide, straight, and lighted with gas. It has a stone-front court-house, which cost about \$100,000, commodious brick union school-houses; also manufactures of steam-engines and farming-implements, flour-mills and other manufactories, and the Marietta and Cincinnati R. R. shops. Chillicothe was the capital of Ohio 1800-10. Pop. in 1870, 8920; in 1880, 10,938.

**Chil'ingworth** (Rev. WILLIAM), an eminent English divine and controversialist, born at Oxford in Oct., 1602. In 1618 he became a scholar, and in 1628 a fellow of Trinity College, Oxford. In 1630, through the influence of John Fisher, the famous Jesuit, he became a Roman Catholic, and entered the Jesuit College in Douay, France. In 1631 he was persuaded by his godfather, Laud, then bishop of London, to reconsider the question and return to Oxford. In 1637 he put forth his great work, "The Religion of Protestants a Safe Way to Salvation," a work of singular acuteness and ability. He became chancellor of Salisbury and prebendary of Brixworth. In theology he was a latitudinarian, and in politics a royalist. Died at Chichester Jan. 30, 1644. His collected works appeared in 1742. (See DES MAIZEAUX, "Life of Chillingworth," 1725; AUGUST NEANDER, "Erinnerung an den evangelischen Gottesgelehrten W. Chillingworth," 1832.)

**Chillon**, commonly pronounced shil'lon [Fr. pron. she'yón'], a castle and fortress of Switzerland, in the canton of Vaud, 6 miles S. E. of Vevey. It is at the E. end of the Lake of Geneva, on an isolated rock, almost surrounded by deep water. It was built by Amadeus IV. of Savoy in 1238, and was long used as a state prison. Bonivard was confined here from 1530 to 1536 for his efforts to liberate the Genevese. This place is the scene of Byron's poem, "The Prisoner of Chillon."

**Chi'lo**, or **Chi'lon** [Gr. *Χίλων* or *Χείλων*], a Spartan who is enumerated among the Seven Wise Men of Greece. He became one of the ephori of Sparta in 556 B. C. Among the maxims ascribed to him is "Know thyself." He is said to have died of joy when his son gained a victory at the Olympic games.

**Chil'oe**, an island of South America, in the Pacific Ocean, forms (with many small isles) a province of the republic of Chili. Area, 2398 square miles. It is separated from the mainland by a strait about a mile wide. Length from N. to S., about 110 miles; average width, nearly 40 miles. It is mountainous and covered with magnificent forests. The western shores are rocky, and rise abruptly to the height of 1500 feet or more. The climate is extremely moist. The soil is fertile, and produces wheat, barley, potatoes, etc. Capital, San Carlos. Pop. in 1878, 67,440.

**Chil'tern Hund'reds, The Stewardship of**, in England, a nominal office which a member of Parliament, desiring to withdraw, receives and immediately resigns; since a member cannot resign unless disqualified, and an appoint-

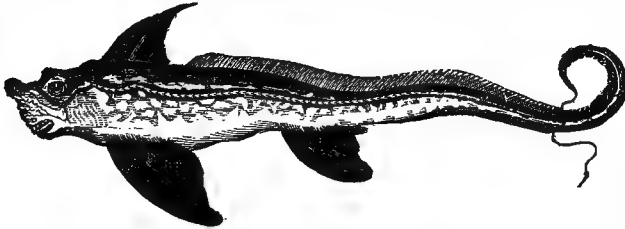


ment by the Crown works such disqualification. In old times the steward's duties were to protect from the robbers who lurked in the forests of the Chiltern Hills. When this office is occupied the stewardship of the manors of East Hendred, Northhead, and Hempholme is made to serve the same purpose.

**Chil'ton**, city, capital of Calumet co., Wis. (see map of Wisconsin, ref. 5-F, for location of county), on R. R. and the Manitowoc River, 24 miles N. E. of Fond du Lac. Pop. in 1870, 363; in 1880, 1132.

**Chimæ'ra** [Gr. *Χίμαιρα*], a monster of classic mythology, was described by Homer as having the head of a lion, the body of a goat, and the tail of a dragon. It was supposed to exhale flames of fire. In modern languages the term chimera is applied to any wild or incongruous fancy.

**Chimæ'ridæ**, a family representing a peculiar order



Chimæra, or Sea Cat.

of cartilaginous fishes (Holocephali), characterized by a naked skin, two dorsals, of which the first is short and high with a spine in front, the second long; a short posterior anal, a slender diphycercal tail, and a peculiar system of muciferous lines. The best known species is *C. monstrosa* of the European seas, most common in northern latitudes, and sometimes called the "king of the herrings." It pursues the shoals of herrings, and is therefore sometimes taken in the herring-nets. It is seldom more than 3 or 4 feet long. Its general color is silvery white, the upper parts mottled with brown. It produces very large leathery eggs. A deep-water North American species is *C. plumbea*.

**Chima'ra, or Chimari** (anc. *Ceraunii Montes*, i. e. "thunder mountains"), a mountain-range of Albania, between lat. 40° and 41° N., and near lon. 19° E., terminating in Cape Linguetta, called by the ancients *Acroceraunia*.

**Chimborazo**, a conical mountain-peak of South America, is the culminating point of the Equatorial Andes, and is 90 miles S. by W. from Quito. Its height, according to Humboldt, who ascended to within 1663 feet of its summit, is 21,414 feet. It rises only 12,000 feet above the adjacent table-land. It was formerly supposed to be the highest mountain in the world, but it is exceeded by Aconcagua, Paríacota, and Sahama of the Andes, and several of the Himalayas. No person has ever reached the summit of Chimborazo, which presents a magnificent spectacle from the Pacific Ocean at a distance of 100 miles or more.

**Chime** [Fr. *carillon*], the consonant or harmonic sounds of several instruments; correspondence of sound; music performed on a set of bells in a church tower. The term is sometimes used to denote a set of bells which chime or ring in harmony.

**Chimere** [Fr. *chimère*, from the Sp. *samarro*, a "sheep skin"], the upper robe worn by a bishop, to which the lawn sleeves are now generally attached. Since the time of Queen Elizabeth it has been of black satin, but previously it was of a scarlet color, like that now worn by bishops assembled in convocation and when the sovereign attends Parliament.

**Chim'ney** [Fr. *cheminée*], a flue or cluster of flues for carrying off smoke or sustaining a draft in fires maintained in buildings for economical or other purposes. There are no remains of chimneys in the ruins of ancient cities, and no evidence from literature that such chimneys existed. Fires were either of charcoal in open braziers, or the smoke of a wood-fire was allowed to escape through a hole in the roof. The earliest remains of chimneys in Europe are somewhat doubtfully referred to the twelfth century. An earthquake in Venice in 1347 destroyed many chimneys. The year 1368 is assigned for the building of the first chimney in Rome. Early in the seventeenth century many houses of well-to-do yeomen in England had no chimneys. Their general use in France was of even later date. The earliest chimneys were cylindrical and very high. Many-flued chimneys are much later. Of late the construction of tall chimneys for manufacturing purposes is very common, some exceeding in height the tallest spires. They are built from the inside.

**Chimpan'zee** (*Anthropopithecus niger*), an anthropoid or tailless ape of tropical Africa, noteworthy as one of the species of mammals which most closely approach the form and anatomical structure of man. It is about five feet high, covered with dark hair, is gregarious, and arms itself for defence with clubs and stones. It can be tamed and taught to walk, sit in a chair, and eat like a human being. Its arms are much longer than a man's, it has thirteen dorsal vertebrae and pairs of ribs instead of twelve, and the structure of its hand is far less delicate and complete than man's.

**China.** See CHINESE EMPIRE.

**China**, *ki'na*, a name of cinchona bark often to be met in books, and in common use on the continent of Europe. It is especially used by homœopathic practitioners. The name is derived, not from the empire of China, but from *kina* or *quina*, the Peruvian name of cinchona.

**China, or China-ware.** See POTTERY AND PORCELAIN MANUFACTURE, by PROF. C. F. CHANDLER, PH.D., LL.D.

**China Clay.** See KAOLIN.

**China Grass, or Chinese Grass**, a vegetable fibre which the Chinese manufacture into a beautiful fabric called "grass cloth." It is also manufactured in Europe to some extent. It is obtained mostly from the *Bahmeria nivea*, a plant of the order Urticaceæ. (See RAMIE.) Grass cloth has a glossy appearance and a silky lustre. The plant yielding this excellent fibre flourishes in the southern parts of the U. S. under proper cultivation.

**China, Great Wall of**, the most remarkable fortification ever erected by human hands, was constructed by order of the celebrated emperor Chi- (or Tchi-) Hoang-Ti, for the purpose of protecting the northern and north-western frontier of the empire from the hordes of barbarians who were then swarming in that part of Asia. To accomplish this great object, several millions of men, it is said, were occupied for the space of ten years, during which time half a million of those employed on the work perished. It was completed in 211 B. C. The entire length of the wall is about 1250 miles, the height being from twenty to twenty-five feet, with towers about 100 yards apart and forty feet high. The wall is much thicker at the base than at the summit, which, however, is sufficiently broad to admit of six horsemen riding abreast. Each face of the wall was built of hewn stone or brick, with earth filled in between. No inconsiderable part of this great fortification is now in a ruinous condition.

**Chinande'ga**, a town of Central America, in Nicaragua, is in a fertile plain about 10 miles from the Pacific Ocean and 18 miles N. W. of Leon. The houses are built of adobes, and are only one story high. Cotton and sugar are produced in the vicinity. Pop. 8000.

**China, Pride of** (*Melia Azedarach*), a small and beautiful tree of the order Meliaceæ, a native of Southern and Western Asia, naturalized in the Southern U. S. It is often called "pride of India," "China tree," and "bead tree." The bark of its root is used as a vermifuge, and constitutes the drug azedarach. It has a sweetish fruit about the size of a cherry, often eaten by children without harm, though considered poisonous. Its wood is hard and beautiful. This tree is naturalized in the south of Europe. An allied species, the *Melia Azedarachta*, the margosa or neem tree of India, yields a febrifugal bark, and a sap (toddy) used as a beverage, while the pulp of its fruit, like the olive, affords a useful oil.

**China Root**, the rhizome of *Smilax China*, a climbing shrubby plant allied to sarsaparilla, a native of China, Cochín-China, and Japan. The stem is round and prickly, the leaves thin and roundish oblong; the rhizome tuberous and large, sub-astringent and diaphoretic. It is occasionally used in medicine in Europe, but it is also employed in the East as an article of food, for it abounds in starch.

**China Sea** [Fr. *Mer Orientale*; Chinese, *Toong Hai*] is that portion of the Pacific Ocean which extends between China and Siam on the W., the Philippine Islands on the E., and Borneo on the S. The chief ports on this sea are Canton, Manila, and Singapore.

**China Wax**, a substance resembling beeswax, produced by an insect (*coccus*) which lives on the *Fraxinus Chinensis*, an ash tree of China. The wax is scraped from the branches, melted, and strained. China also exports Japan wax, obtained from the fruit of *Rhus succedanea*, a sort of sumach tree.

**Chin'cha Isl'ands**, three small islands in the Pacific Ocean, about 14 miles from Peru, to which they belong;

lat. 13° 39' S., lon. 76° 28' W. Here are large deposits of guano, and here multitudes of penguins and other oceanic birds build nests and breed. Neither of these islands is more than a mile in extent. They present cliffs 300 feet high and perpendicular, with numerous caves into which the sea dashes. The entire supply has been recently exhausted. (See GUANO.) The exportation of this manure from Peru in the years 1871-72 was 1,187,327 tons.

**Chinch-bug**, the *Rhyaparochromus leucopertus* of Say, a hemipterous insect of the family Lygæidæ, which is a subdivision of Latreille's great family Corisæ. The chinch is a great pest to the wheat crops of the U. S., attacking also Indian corn, grass, and the various kinds of grain and garden vegetables, destroying, in some years, much property. The female lays her eggs, some 500 in number, in the ground, and there are often two broods of larvæ in a single year—the first attacking the wheat sometimes as early as the middle of June, and not always disappearing until the middle of August. The next brood comes in autumn. The bug is  $\frac{3}{16}$  of an inch long, and has white fore wings, each having a black spot on the middle of its edge; the body is mainly black, but the wingless young are at first red, with a white band on the back. The chinch-bug attacks the tender parts of plants, sucking the juices, and apparently poisoning the part which is bitten. The insect is not uncommon in the E. and N. E. of the U. S., but there its ravages are not conspicuous, and little attention is paid to it. The valley of the Mississippi has in some years suffered terribly from this cause. Thus, in 1864 one-half the corn (maize) and three-fourths of the wheat were destroyed by this pest throughout large districts, and the total damage to crops was estimated at \$100,000,000 in U. S. currency. In 1865 a seemingly providential epidemic attacked the larvæ of the chinch-bug, and most effectually checked the destructive process, so that for some years it was not easy for entomologists to find specimens; but since that time the species has so multiplied that in some districts great destruction of grain has ensued. The false chinch-bug is often mistaken for the foregoing.

**Chinchil'la** [Sp. pron. chin-cheel'yâ], (*Chinchilla*), a South American quadruped of the order Rodentia, and of a family, Jerboidæ, allied to the rabbits. There are several genera of Jerboidæ, distinguished in part by the toes, the true *Chinchilla* having four, with the rudiment of a fifth, on the fore feet, and four on the hind feet. All the family are gregarious, feed on roots, and live either in holes in rocky districts or in burrows. They are valued for their fur, particularly the chinchilla of the Andes (*Chinchilla lanigera*), of which the fur constitutes an important article of commerce. Their numbers are decreasing in consequence of the demand for the fur. The ancient Peruvians were accustomed to employ this fur as wool for the manufacture of fine fabrics. It might profitably be kept in a domesticated state. Chinchilla wool is variable in quality, and is perhaps the product of several species. The chinchilla is about the size of the common rat.

**Chinchi'la** (anc. *Salaria*), a city of Spain, in the province of Albacete, on a hill 10 miles S. E. of the city of Albacete. It was formerly fortified, and is still enclosed by old walls. It has a fine church, and manufactures of cloth, linen, glass, earthenware, etc. Pop. 6080.

**Chinese Architecture.** In China the rise of the arts seems to have been constantly repressed by the state of mechanical drudgery and servitude in which the people are kept. In their painting, for example, the most exact imitation of plants, fruits, and trees is thought indispensable. Every matter relating to building is the subject of regulation by the police, which, rather than theory, governs its architecture. The laws of the empire detail and enforce with the greatest precision the mode of constructing a lou or palace for a prince of the first, second, or third rank, of a grandee, of a mandarin, etc. According to the ancient law of the kingdom, the number and height of the apartments, the length and height of a building, are all regulated with precision, from the plain citizen to the mandarin, and from the latter up to the emperor himself. This alone is sufficient to account for the poverty and want of invention in Chinese art.

In speaking of the principles of Chinese architecture, the word is not applicable in the same way as when we speak of classical architecture, but is meant to apply to those primitive causes which gave birth to it. Character and taste in every species of architecture are the necessary results of these elements. There can be no doubt that the tent is the real model of all Chinese buildings. One of the strongest proofs of this fact is the form of the Chinese roof. Nothing but a tent or pavilion could have given the idea of it. Again, there is nothing like the appearance of a member of wood, similar to the architrave, destined to lie on the tops of the columns, and receive and support the

remainder of the carpentry. The Chinese roofs, on the contrary, jut out beyond the columns, whose upper extremity is hidden by the eaves; hence the omission of the use of capitals. It is easy to perceive that extreme lightness must result from this imitation.

Lightness, in fact, is the essential character of Chinese architecture, but there is another characteristic quality, both of the model and the copy, that is observable in the edifices of China; and this is its gay appearance. In this respect scarcely any style presents a more pleasing effect. Its roofs, single and double, brilliantly painted, its gayly-diapered porticoes, the gloss over the whole surface, the harmony of this species of decoration with the light and flowing forms of the buildings themselves, so please the eye when it is accustomed to see them that our cold and monotonous mode of decoration may well appear uninviting in contrast.

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**Chinese Empire, The**, a vast territory of Eastern and Central Asia, lies between lat. 18° 20' and 53° 30' N., and between lon. 70° and 135° E., and is bounded N. by Russian Asia, W. by Independent Tartary, S. by Hindostan and Farther India, and E. by the Pacific Ocean. Its area is estimated at about four million square miles—nearly one-third of Asia and one-tenth of the habitable part of the globe; its population at from four to five hundred millions of souls. It comprises, besides China Proper, the kingdom of Corea, the hierarchy of Thibet, and the provinces of Mongolia, Manchouria, Soongaria, and Eastern Turkestan. China Proper is the controlling state of the empire; Corea and Thibet are nearly independent; the position of Eastern Turkestan is also very loose; Mongolia, Manchouria, and Soongaria are governed by China civil and military officers. Each of these divisions will be described in a special article of this work; we shall speak here only of China Proper.

*China Proper* extends between lat. 18° 20' and 41° N., and between lon. 98° and 123° E., and is bounded N. by Mongolia, from which it is separated by the Great Wall, W. by Eastern Turkestan and Thibet, S. by Burmah, Anam, and the Chinese Sea, and E. by the Yellow Sea, the Pacific Ocean, and the China Sea. With a coast-line of about 2500 miles, it occupies an area of 1,279,072 square miles; its population is estimated at 350,000,000 souls. It is divided into the following eighteen provinces:

PROVINCES.	Area in sq. miles.	Pop. in 1882.	Capitals.
Pe-Chee-Lee.....	59,934	28,000,000	Pao-Ting-Foo.
Shan-Tong.....	65,100	29,000,000	Tsee-Nan-Foo.
Shan-See.....	55,278	14,000,000	Tie-Yuen-Foo.
Ho-Nan.....	65,100	23,000,000	Kai-Foong-Foo.
Kiang-Soo.....	44,500	37,800,000	Nan-King.
Ngan-Hwi.....	48,461	34,200,000	Ngan-King-Foo.
Kiang-See.....	72,180	23,000,000	Nang-Chang-Foo.
Che-Kiang.....	44,470	8,100,000	Han-Chow-Foo.
Fo-Kien.....	39,183	14,800,000	Foo-Chow-Foo.
Hoo-Pee.....	70,460	27,400,000	Woo-Chang-Foo.
Hu-Nan.....	74,325	18,700,000	Chang-Sha-Foo.
Shen-See.....	67,400	10,200,000	Si-Ngan-Foo.
Kan-Soo.....	86,608	9,000,000	Lan-Choo-Foo.
See-Chuen.....	166,832	35,000,000	Ching-Too-Foo.
Quang-Tong.....	79,451	19,200,000	Canton.
Quang-See.....	78,260	7,300,000	Kwei-Lin-Foo.
Kwei-Chu.....	64,547	5,600,000	Kwei-Yang-Foo.
Yun-Nan.....	107,983	5,300,000	Yun-Nan-Foo.

The capital of China Proper is Peking, which is also the capital of the whole empire. The two large islands Hainan and Formosa belong to China Proper.

**Physical Geography.**—China is divided into three great valleys, each with its great river. These valleys are separated by two principal mountain-chains. The most northern of these chains (the Thsin-Ling, or Blue Mountains) extends in an irregular manner from W. to E., separating, to some extent, the valley of the Hoang-Ho on the N. from that of the Yang-Tse-Kiang on the S. South of the valley of the latter river is the great Yan-Ling chain, which extends north-eastwardly from the Himalayas to the Pacific. This range is said to have but few passes, and to have peaks 12,000 or more feet high. The valley of the Choo-Kiang, or Canton River, lies S. of this range. It is much the smallest of the three great basins, but is very populous, and commercially important. The eastern parts of the two former valleys constitute the Great Plain of China, a fertile and populous district. In the N. E. is a fourth basin, that of the Pei-Ho. The Yang-Tse-Kiang, the largest river of China, is a magnificent stream, which is of great importance to the internal commerce of the empire. It has a course of 2900 miles. The Hoang-Ho, which rises in the "Sea of Stars," but ends as the "Sorrow of Han," is about 2000 miles in length, but is so rapid as to be unsuited to Chinese navigation; but at present both these mighty streams are successfully navigated by American and European steamers, built expressly for the purpose. The two

rivers are connected with each other and with Peking by the Grand Canal, said to be the largest, and which was formerly the most important, in the world. It is 650 miles long. A recent alteration in the course of the Hoang-Ho has, it is said, greatly diminished the usefulness of this famous canal. During the floods of 1851, 1852, and 1853 the northern bank of the river was broken through E. of Kai-Foong-Foo, and the waters, inundating the low-lying country to the northward and gradually spreading over a tract of land about 12 miles in width, finally found their way into the bed of the Ta-tsing River, which they followed to the sea. The results of this change were that the old bed became dry and the adjacent fields were transformed into desert wastes by want of irrigation, that a large region became permanently flooded, and that by destroying the banks of its new bed the river is preparing for a new catastrophe. According to Chinese records, the Hoang-Ho has changed its course in that way no less than nine times in the last 2500 years.

**Productions and Industry.**—China furnishes the principal supply of tea to the whole world, Japan and Assam being the only other countries where its production is at all important. It also produces great quantities of silk, cotton, camphor, varnish, indigo, rhubarb, rice, maize, barley, wheat, tobacco, and fruits of many kinds. The population of China is so great that it has become necessary to carry on agriculture with great care in order to produce sufficient food. Every year the emperor of China, accompanied by the great dignitaries of the state, repairs to the Sacred Field and ploughs a furrow, by way of example to the nation. The steepest hillsides, it is said, are terraced, to increase the surface of the soil, rocks are covered with earth, the lakes have numerous floating gardens, and the bottoms of streams are planted with aquatic vegetables whose seeds or roots are used as food. The greatest economy is practised in the saving of manures. The production of food, however, is not sufficient for the home-supply, great quantities of rice being imported from Siam and the Malay islands. Trade is carried on in small vessels, called *droghers*, which are often commanded by Englishmen or Americans.

The botany of the empire is very rich, from the extreme range of its latitudes and its great variations in altitude. In general, the flora may be said to resemble that of America more than that of Europe. The bamboo is one of the characteristic plants of China, and is largely used in building and for a great variety of purposes. It is said to be next to the rice crop, commercially the most valuable production of the country. Among the native trees of China may be mentioned the curious ginkgo tree, well known in our parks and private grounds. The wealthy Chinese have a strong liking for ornamental horticulture, and many of the most beautiful of our cultivated flowers have been developed in their gardens.

The zoology of China has not been thoroughly explored. The elephant, rhinoceros, antelope, and deer of several species are known, and bears, tigers, and other carnivorous animals are said to exist. Wild camels have been found in the western dependencies. Among the native insects is the silkworm. The ichthyology of this empire is very rich, though little studied by Europeans. The rivers teem with fish, which form one of the principal articles of food. The domestic animals of China are generally inferior to those of the Western nations. In addition to the kinds kept by us, they make use of the camel in the northern provinces. Domestic fowls are kept in great numbers, including several beautiful pheasants of kinds not known in Europe.

The geology of China is not well known. Coal and petroleum are found, the former abundantly. It is said that coal-beds are found in every one of the eighteen provinces, and that China Proper is one of the first coal countries in the world. The anthracite coal seems to be especially important, but the mines are not effectively worked. Silver is mined very extensively in the S. W. Gold, copper, lead, mercury, zinc, and especially iron, are abundant. Kaolin and the fictile clays are excellent in quality, and industrially very important. The engineering of mines stands at a very low point of development. Salt is produced in very great quantities, and yields the government a large revenue.

**Manufactures and Commerce.**—The Chinese are excellent mechanics, so far as skill and training are concerned, but they have a taste of their own very different from that of the Western world, and they seem to be somewhat deficient in inventive power. Their fabrics of silk, porcelain, glass, and paper (lacked ware) have not been surpassed—perhaps even not equalled—by the manufactures of Europe and America; their knickknacks and curiosities in gold, silver, ivory, pasteboard, etc. are often marvels of ingenuity, patience, and delicacy of manipulation. Nevertheless, if China had to meet the Western world at once in open competition, her whole manufacturing industry would,

no doubt, in a very short time become one of the "lost arts."

The internal trade of the country must be enormous, but nothing is known about it. The foreign commerce is principally carried on with Great Britain and her colonies and the United States. The following ports (the so-called treaty-ports) are open to those nations which have commercial treaties with China.

Name of Port.	Province.	Estimated Population.	Open to Trade in—
Tien-sin .....	Pe-Chee-Lee .....	930,000	May, 1861.
Chefoo .....	Shan-Tong .....	35,000	March, 1862.
Ichang .....	Hoo-Pee .....	34,000	April, 1877.
Hankow .....	Hoo-Pee .....	600,000	January, 1862.
Kew-Keang .....	Kiang-See .....	50,000	January, 1862.
Woo-hoo .....	Ngan-Hwi .....	40,000	April, 1877.
Nanking .....	Kiang-Soo .....	150,000	April, 1877.
Chin-Kiang .....	Kiang-Soo .....	130,000	April, 1861.
Shanghai .....	Kiang-Soo .....	300,000	May, 1854.
Ningpo .....	Che-Kiang .....	260,000	May, 1861.
Wenchow .....	Che-Kiang .....	83,000	April, 1877.
Foo-Chow-Foo .....	Fo-Kien .....	630,000	July, 1861.
Tamsui .....	Fo-Kien .....	90,000	September, 1863.
Kelung .....	Fo-Kien .....	70,000	September, 1863.
Taiwan .....	Fo-Kien .....	135,000	September, 1863.
Amoy .....	Fo-Kien .....	88,000	April, 1862.
Takow .....	Fo-Kien .....	100,000	March, 1864.
Swatow .....	Quang-Tong .....	30,000	January, 1860.
Canton .....	Quang-Tong .....	1,600,000	October, 1859.
Kiang-Chow .....	Quang-Tong .....	30,000	April, 1876.
Pakhoi .....	Quang-Tong .....	25,000	April, 1877.

To the above must be added the port Newchang, not situated in China Proper, but in the province of Sheng-King in Manchuria. In 1881 the total value of exports from these places to Great Britain and her colonies amounted to £19,947,288; that of imports from Great Britain and her colonies to £25,658,453. During the period from 1872 to 1881 the imports have increased 36 per cent., while the exports have decreased 5 per cent. The principal articles of exportation are tea and raw silk; the principal article of importation is opium. China consumes nine-tenths of the opium produced in India. (See OPIUM.) In India the manufacture and exportation of opium is a government monopoly. In 1858–60, England waged war upon China in order to compel the Chinese government to permit the importation of opium from India. Toward railroads and telegraphs the Chinese government has proved very hostile. The first and only railway-line was opened in 1876, between Shanghai and Kiangwang, but was closed in 1877, having been bought by the government. A telegraph line between Shanghai and Peking was completed in 1881, and is still in operation.

**Inhabitants, Religion, Emigration, etc.**—The Chinese belong to the Mongolian race, and their language to the so-called monosyllabic family. (See CHINESE LANGUAGE AND LITERATURE.) They are generally a peaceable, industrious, and thrifty people, but they are said to be sensual, cruel, dishonest, and deceitful. Their customs and manners differ much from ours, but are certainly far removed from barbarism. Vice, as in all populous countries, is very prevalent, but among the better classes, at least, virtue is held in high honor. Crime is punished with extreme severity. Notwithstanding the rigor of the legal administration, the personal freedom of good citizens is remarkably secure, and great domestic happiness is, no doubt, generally enjoyed. The religious (or rather philosophical) system of Confucius is the basis of the social life of China. (See CONFUCIUS.) It is received by most of the educated classes. BUDDHISM (which see), modified by Confucianism, is the popular religion. The worship of deceased ancestors is a highly important part of the national religion. There is also a numerous sect called Taoists, who worship certain beings called Sang-Ching, or the "Three Pure Ones." (See TAOISM AND LAO-TSE.) The Taoists are believers in spirits, and many of their performances resemble the wonders of our modern Spiritualists. There have been a few Jews and many Mohammedans in the empire for centuries. Christianity was introduced by the Nestorians in 505, but Nestorianism seems to have been entirely suppressed by persecution in the fourteenth century. Authentic information of its vicissitudes are very scanty, and the only monument it has left of itself on Chinese ground seems to be a stone tablet, dated 781 and still standing, at Si-ngan, the ancient capital. Roman Catholic missionaries first went to China in 1292, while Nestorianism was still alive. The Chinese mission, especially in the hands of the Jesuits, forms a very curious chapter of ecclesiastical history. The work was often interrupted by persecutions. Louis Philippe first procured toleration and legal recognition for the native converts in 1844. By the treaty of 1860 the exercise of Christianity in all its forms was sanctioned throughout the empire. According to the "Baseler Evan-

gelisches Missions-Magazin" (April and June, 1882), the Roman Catholic Church in China numbered, in 1881, 1,094,000 members, 41 bishops, 664 priests of European descent, and 559 native priests. There are many Protestant and several Russian-Greek missionaries in China, who have had some success in making converts. The Bible was translated into Chinese by Robert Morrison, who labored in China from 1807 to 1824, supported by the London Missionary Society. The Protestant mission, however, in China really dates from 1844. In 1879 it numbered 466 workers, men and women, supported by 25 societies in the United States, Great Britain, and Germany. There were 280 ordained ministers, distributed over 92 stations, and aided by 93 native pastors and 1039 colporteurs and schoolmasters. They reported 18,707 communicants in their churches, and 6227 children in their schools.

In consequence of the density of the population of China, vast numbers of her people have in late years emigrated to Manchouria, Borneo, Siam, the Sandwich Islands, the United States, Peru, Guiana, and the West Indies. They are a remarkably industrious and thrifty class of emigrants, but the low rates at which they are willing to work render them objects of dislike to other laborers, and threaten seriously to complicate the social problems of the time. In 1880 the number of Chinese residing in the United States was 105,465. The number of immigrants was 20,727 in 1881, and 27,565 in 1882.

**Education** is held in the highest esteem in China, and learning is rewarded not only by honorary titles, but by lucrative offices under the government. A great majority of the men can read and write. Recently, the government has sent quite a number of young men to America to be instructed in the sciences. There is a foreign college at Peking with a literary and scientific curriculum.

**Government.**—The government is a patriarchal despotism. The emperor, though theoretically absolute, is really limited in his power by a carefully-digested code of laws, which, however, he can modify by his edicts. Most of his time is occupied by the performance of ceremonies. At the capital reside the ministers of state, six in number, three being Chinese and three Manchos. These, with several assistants, constitute the privy council of the emperor. Next below this council is the grand college, which has important legislative and administrative functions. Besides these there is a college of censors or inspectors, who see that all officers in the country are faithful in their duties. The six privy councillors are each at the head of one of the six departments of state, viz.: (1) civil service, (2) the finances, (3) religion, (4) war, (5) justice, (6) public works. A seventh department, that of foreign relations, has recently been established by the prince Kung, uncle to the emperor T'oong-Chee. Each of the eighteen provinces is under a governor, and has an internal administration of its own. Government officers have the title of mandarin, and are of various grades. The principle of competitive examination for the public service has long been carried out in China more thoroughly than in any other country.

The Chinese army consists of two, as it would seem, very different divisions—the Tartar and the Chinese. The former, numbering about 300,000 combatants and stationed in the large cities along the coast and the frontier, is organized after European pattern and provided with European arms; the latter, probably numbering about one million of combatants, and distributed in camps over all the provinces, is only a kind of militia, and is principally used as a constabulary. The navy consisted in 1881 of 60 vessels of various kinds, mounted with 300 guns. Two large steel vessels (ram-cruisers) were launched at Glasgow in 1881, and two immense iron-clads at Stettin in 1882, for the Chinese government. (See SHIPS OF WAR.)

The public debt amounted in 1882 to £2,073,201, secured on the customs revenue. Of the budget of the state, its revenues and its expenditure, nothing is published but the customs. They amounted in 1881 to £4,099,608. They fall more heavily on exports than on imports.

**History.**—Although the Chinese civilization is undoubtedly far older than that of the Greeks, only the merest hints of the existence of China are to be found in the ancient classic authors. All the best geographers appear to be agreed in considering the *Serica* of the later Latin writers (ἡ Σερικὴ of Ptolemy) as corresponding with the north-western part of China. The name *Serica* (which is also the Latin term for "silk") was doubtless derived from the silk (called, according to Klaproth, *sirkek* by the Mongols) for which the country was so celebrated. The Latin word *Sina* (Gr. *Σιναι* and *Σιναι*), supposed to be identical in origin with the Chinese *Tsin*, or *Tseen*, the name of a province which has furnished, through the Hindoos, to the Western nations the name for the whole country, properly denoted the people of a city or province in the central part of China. It was applied by Ptolemy to the people dwelling

in the south of China: it appears also to have been used in a vague and general sense for the Chinese nation. (See CATHAY and MARCO POLO.)

The Chinese myths give the empire a duration of 7000 years, but the historical period, according to most authorities, begins with the year 2207 B. C., though some dates previous to that time are given with tolerable certainty. Bunsen, however, states that systematic Chinese history hardly goes farther back than 1991 B. C., the date of the accession of the great emperor Yu, the Charlemagne of the East, who extended the sway of the Shen-See dynasty to Southern China, and who rendered the Great Plain habitable by diverting the Hoang-Ho to a new channel.

The national hero of China is the great emperor Shee- (Chi-) Hoang-Ti, sometimes called Ching-Wang (246-210 B. C.), who restored unity to the divided empire, expelled the Mongols, and caused a great part of the national literature to be burned, in order to destroy the power of the learned classes and overcome the popular reverence for tradition. He was the builder of the Great Wall above alluded to.

The art of printing was practised as early as 202 B. C. Buddhism was introduced in 65 A. D. The earliest authentic account of China known to have been published in Europe is that of Marco Polo, who lived seventeen years in the country, and returned to Europe in 1295. The country had been previously visited by Roman Catholic missionaries.

The long course of Chinese history has been disturbed by many civil wars and contests with the Mongols. The present reigning dynasty, said to be the twenty-sixth in number, is of Manchoo origin, and was established in 1649; and to this day the Manchos have an influence in the national politics far exceeding their relative importance as a people.

The Chinese long excluded foreigners with the utmost jealousy from their country. China was visited by the Portuguese in 1517, but they were forbidden to land in the empire in 1521. In 1537, however, they obtained a footing at Macao, which has since been in their power. In 1862 it was definitively ceded to them. The Dutch and Spanish early opened a trade with China by way of their Eastern colonies. The British made several unsuccessful attempts to establish commerce with China. The first effort was made in the reign of Queen Elizabeth, but it was not till 1700 that Canton was opened to their trade. The Russian overland trade was established in 1727, and the first American consul was allowed to reside in Canton in 1802. During all this time foreign merchants were often treated with much indignity. In 1838, in consequence of the unlawful importation of opium by British ships, serious troubles broke out at Canton, and in the following year actual hostilities began between Great Britain and China. After the capture of Canton, Amoy, Shang-Hai, and other important cities the Chinese were compelled to make peace, to cede Hong-Kong to the victors, and to open Canton, Amoy, Foo-Chow, Shang-Hai, and Ning-Po to European commerce. The number of these "treaty-ports" has since been increased to twenty-two. The Russians have an overland trade and regular mails from Kiakhta on the Siberian frontier, and British merchants are attempting to establish a land trade between India and China by way of the Irrawaddy River.

In 1850 a man of humble origin, named Tao-Kwang, who had received some notion of Christianity from a tract issued by missionaries, conceived the idea of founding a new religion and at the same time expelling the Manchoo dynasty. He was joined by many of the lower orders who were suffering from want, and in October of the same year the first battle of the Tae-Ping rebellion was fought. This rebellion at one time threatened the existence of the empire, and was finally suppressed in 1864, after great bloodshed. It is probable that but for the aid of contingents furnished by England and France the rebellion might have been successful.

The foreign warehouses at Canton were burned in 1856, and attempts having been made to poison the British at Hong-Kong in 1857, hostilities were commenced against China by Great Britain and France; and in December of that year Canton was bombarded, and on the 5th of Jan., 1858, it was taken. In the following June a treaty was made by the Chinese, which was soon violated. In Oct., 1860, the English and French forces entered Peking, and the Chinese government granted all their demands. The allies then turned their arms against the Tae-Ping rebellion, which received its fatal blow by the capture of Nanking (July 19, 1864) and the suicide of the rebel emperor. The rebellion of the Mohammedans in the province of Yun-Nan, called Panthays, which began about 1850, led in 1868 to the establishment of an independent Mohammedan government in the capital of the province. The leader assumed the name of King Solomon (Ooensoi), and his empire in 1872

embraced about 63,000 square miles, with a population of 4,000,000. In 1873 this government was reported as subjugated, its sultan killed, and Yun-Nan reduced to Chinese rule. Another Mohammedan rebellion, which in 1862 broke out in the capital of the province of Shan-See, led to the establishment of the independent empire of East Toorkistan, under the rule of Yakob Ooshbegi (reconquered in 1877). In 1867 the American minister, Mr. Burlingame, was sent by the government as extraordinary ambassador to the U. S. and the principal European nations, but unfortunately died before his plans had been fully carried out. In 1868 the government established a university at Peking, to which American and European professors were appointed. On June 21, 1870, a bloody massacre of Europeans and native Christians took place at Tien-Tsin. (The best work on China is by S. WELLS WILLIAMS, LL.D., 2 vols.; rev. ed., 1883.) C. W. GREENE. REVISED BY CLEMENS PETERSEN.

**Chinese Language and Literature.** As the leading member of the group of monosyllabic languages which occupy South-eastern Asia, and constitute, with a possible exception or two, the whole of the monosyllabic class, the Chinese has for the student of language a very great interest. This monosyllabism is not, as a few scholars have held, a state to which they have been reduced by a process of phonetic decay, but manifestly a primitive condition. It represents a stage out of which all other languages, whether of the agglutinative or inflective type, have passed, while these, from arrested development, have remained behind. Chinese words are not only altogether destitute of inflection, but they are hardly parts of speech in the sense which we attach to the term, being to a great extent still in the root state. The same word may, according to its position in the sentence, be noun, adjective, adverb, or verb; e. g., *sin* must be variously translated "fidelity," "faithful," "faithfully," "believe." This indefiniteness, however, attaches to the words only when taken separately, and disappears in the sentence. Chiefly by the value given to position, but partly also (especially in the spoken language) by the use of certain words as signs of grammatical relation, logical precision of statement is attained. Of this class are such words as *tsü* and *erh*, both meaning "son," and *t'eu*, "head," which have nearly the force of substantive endings, and *tih*, of an adjective ending. Being cut off from the resources of derivation for the multiplication of forms, while the development of signification has gone on as in other languages, the number of homophonous words is very great. The phonetic combinations of which the language admits are comparatively few and simple, and this poverty has been still further increased by phonetic decay, the effects of which are traceable even here, though of course to a much more limited extent than in inflective languages. The number of distinct vocables differs considerably in the various dialects, the highest limit being not far from 1000 and the lowest 500. The Kwan-hwa has, according to Edkins, 532 monosyllables; according to Morrison, who, however, includes in one class the aspirate and unaspirated mutes, only 411; the Shanghai dialect (Edkins), 570; the Fuchau (Baldwin and Maclay), 928; the Canton (Williams), 707. By the aid of tones, similar to those which we use for the purpose of emphasis and expression, this number is increased two or three fold, being raised in the Kwan-hwa to about 1600. The same phonetic combination pronounced in different tones constitutes so many different words, and so essential a part of the pronunciation is the tone, that a wrong tone will sooner occasion misunderstanding of a word than will the substitution of a wrong consonant. In the modern dialects the number of tones varies from four to eight, the smaller number being found in some of the districts of Central China; in the Kwan-hwa there are five, in the Fuchau and Amoy dialects, seven, in the Canton, eight. In the dictionaries of the T'ang dynasty (A. D. 618-905), which are still the standard rhyming dictionaries, only four tones are recognized—namely, the *p'ing*, "level," *shang*, "rising," *ch'u*, "vanishing," and *juh*, "re-entering" or "abrupt;" and these, divided into an upper and lower series, constitute the eight tones of the Canton dialect. The original identity of meaning in words which differ merely in tone is in some cases still apparent; e. g., *ting* (noun), "nail," and *ting* (verb), "to nail;" *mai*, "buy," and *mai*, "sell;" but in general the etymological connection, if it exists, cannot be traced. The number of words which coincide both in sound and tone being, however, still very large, other means are necessary to remove the ambiguity, and in the spoken language phrases composed of two or more words are largely used in the place of simple terms. Two synonyms are frequently thus joined; e. g., *shu-mu*, "tree." *Shu* and *mu* have each various significations besides that of "tree," but there is no other in which they agree, and the combination thus becomes definite. Other phrases are taken in a collective sense; e. g., *hiung-ti*, "older brother

younger brother," for "brother" or "brothers;" or in a derived sense; e. g., *tung-si*, "east-west," for "thing." These phrases, which often extend to four or five words, make a near approach to proper compounds, one of the words uniformly receiving a stronger accent, supported in the case of the longer phrases by a secondary accent.

Another feature not peculiar to the Chinese, but worthy of mention for the prominent part which it plays, is the frequent use of numeratives in counting; like our *head* of cattle, *brace* of ducks. More than a hundred such words are in use, each limited to a certain class or classes of objects.

Spoken by a population variously estimated at from two to four hundred millions, the Chinese not unnaturally is divided into strongly marked dialects. Of these the Kwan-hwa, commonly called by Europeans the mandarin or court dialect, has the widest currency, being spoken with minor differences over the whole north and west of the empire, and on the east reaching as far south as the Yang-tze Kiang. It is, further, the language of official communication throughout the empire, and the only one of the popular dialects which has received any considerable literary cultivation. Phonetically, it is the poorest of the dialects. The only consonant finals of which it admits are the nasals *n* and *ng*, and the sonant initials *b*, *d*, *g*, *v*, *z*, found in some of the other dialects, are wanting here. The south-eastern dialects, in the provinces of Canton and Fukien, on the other hand, are the most archaic, having preserved the final mutes *p*, *k*, *t*. Differing largely in vocabulary, as well as in the form and tone of the words common to them, these several dialects are not generally understood (except the Kwan-hwa) beyond the limits of a single province. There are in addition many local dialects, less marked in character and of a more limited currency. This diversity does not, however, extend to the written language, which is uniform throughout the empire, and, to a degree unapproached in any other literature, uniform also throughout the whole course of its history. Its development has been to some extent independent of the spoken language, and forms one of the most interesting chapters in the history of writing.

According to Chinese tradition, knotted cords, similar perhaps to the Peruvian *quippos*, were used in the earliest times for keeping records. In the mystical figures of the Yih-king, ascribed to Fuh-hi, Chinese scholars are wont to find a kind of graphic system. The date of the invention of the present characters, commonly ascribed to Tsang-kié, about 2600 B. C., cannot be fixed even approximately, but the history of the successive stages of the development of the system is written in the characters themselves. The first signs were purely ideographic, being rude representations of the objects named. A circle with a point in the centre stood for the sun, a crescent for the moon, a three-pointed peak for a mountain. The changes of form which they have undergone, arising in part from the different materials used in writing, have left in the present characters little resemblance to the objects pictured. The limits of this method of direct representation were soon reached. A few words denoting position and number were represented by points and strokes; thus, a point above or below a horizontal line signified "above" or "below;" a stroke through the centre of a circle, "middle;" one, two, or three horizontal strokes, the numerals 1, 2, 3. The combining of two or more signs to express a single idea, either by direct or symbolical representation, was another easy step; thus "water" and "eye" make up the sign for "tear;" "man" and "mountain" stand for "fairy;" "sun" and "moon" for "light."

By far the greater number of characters, however, are formed on a new principle, the combination of an ideographic and phonetic element in one sign. The number of homophonous words is, as we have seen, very large, and a sign having been found for one of these, it is used phonetically to represent the sound of the others, being differentiated in each case by an additional sign, which indicates in a general way the meaning. In this combination one of the parts, termed the *phonetic* or *primitive*, gives up its meaning and retains only its sound; the other, the *radical*, gives up its sound and retains only the meaning. For example, the syllable *tau* has among other significations the following: "sword," "anxious," "appetite," "heart of a tree," "long narrow boat," "a species of fish of a slender form." The first of these, "sword," being represented ideographically, the others are written phonetically by the same sign, further defined by the radicals for "heart," "eat," "tree," "boat," "fish." The Chinese written language aims to provide a sign not merely for every word etymologically distinct, but to a considerable extent also for the different significations of the word. In the example above given the boat and fish were sword-shaped, and hence apparently their name, and possibly the other



meanings may be traced ultimately to the same origin. The word *tau* has various other significations besides those given, and is written with at least half a dozen different phonetics, each of which enters into combination with one or more radicals. The number of different phonetics employed in writing a single word is in some cases twenty or more, and the aggregate number of characters thus formed may exceed a hundred. Some characters are used both as phonetics and radicals. *Tau*, "sword," which in the above examples appeared as a phonetic, enters into other characters as a radical, with the meaning "cut," "divide." A character composed of a radical and phonetic may itself be employed as a phonetic in forming new characters. The sound of a composite character is not always that of the phonetic which it contains, but the variation is usually not great, and more frequently in the initial than in the final sound. The number of phonetics in common use is about 1000. Marshman in his "Clavis" enumerates 3867, but more than half of these are employed only once or twice each. These phonetics represent the sound of the word as a whole, without analyzing it into its elements.

There is, however, a kind of syllabic spelling called *Fan-t'sieh*, introduced from India by Buddhist priests, and first currently used in dictionaries of the fifth and sixth centuries to mark the sound of characters with more precision. One series of characters is chosen to represent the initial sounds, another the final sounds, together with the tone, the number of both varying according to the dialect. Thus, *king*, "classic," in the dictionary of K'ang-hi is spelled with the characters *k-ien l-ing*, the first being simply the sign of the initial *k*, the second of the final *ing*.

In the arrangement of the characters Chinese dictionaries follow three different methods. By the first the characters are distributed according to their meaning under a certain number of categories, such as heaven, earth, body, etc. This method is found in the "Erh-ya," the oldest dictionary in the language, containing definitions of classical terms, and itself sometimes reckoned among the classics; also in many others, especially dictionaries of foreign languages, Mongol, Mantchoo, etc. The second principle of arrangement is according to the radical part of the character. This appears first in the "Shwuh-wen," published A. D. 100, in which 10,000 characters are arranged under 540 radicals, a number slightly increased in subsequent dictionaries, but in the "Tzu-wui," published during the Ming dynasty, reduced to 214. This last number is retained in the two principal dictionaries of the present dynasty, the "Cheng-tzu-tung" and the "K'ang-hi-tz'ien." In the last-mentioned work, with a total of about 44,000 characters, the number found under the different radicals varies from 5 to 1300, or, counting duplicate forms, 1900, the following radicals having each 1000 and upward: *mouth, heart, hand, tree, water, plant*. Under each radical the characters are arranged in the order of the number of strokes contained in the phonetic. In most cases the radical under which a given character should be sought is apparent at a glance; the doubtful cases, where the radical is obscured or where the arrangement is somewhat arbitrary, are resolved by means of a key in which these characters are arranged according to the total number of strokes under the radical to which they are assigned. The third and last method of arrangement is according to the sound of the characters. The usual order in works of this class is the following: the characters are divided into four great classes, according to the tone; each tone divided into smaller classes, according to the final sound, and these sometimes further subdivided, according to the initials. The earliest extant dictionary of this class, the "T'ang-yün," published in the eighth century, employs a series of 206 finals. Lieu-p'ing-shui, in the thirteenth century, reduced the number to 107, and his system has since been generally followed. Another dictionary belonging here, the "Pei-wen-yun-fu," is one of the most extensive lexicographical works in any language. It was prepared under the superintendence of the emperor K'ang-hi, and employed the labors of seventy-six scholars, most of them members of the Imperial Academy, for eight years. It gives by numerous citations the fullest illustration of the usage of the language, and was published in 1711, in 130 thick volumes. A translation was announced by Callery, but only one volume published (Paris, 1844). Of the total number of characters in the language, extravagant statements have often been made. The more complete dictionaries contain from 40,000 to 60,000, of which obsolete and duplicate forms and proper names make up perhaps one-half. The number of really different characters which have the sanction of good usage is not far from 25,000, of which about one-tenth are ideographic, and the remaining nine-tenths composed of an ideographic and phonetic element united. Even in the number last given a large proportion of the characters are of rare occurrence, and a knowledge

of from 5000 to 10,000 is sufficient for almost all the needs of the scholar.

In no language are the differences between the literary and colloquial idioms so great as in Chinese. The number of characters being many times as great as the number of distinct vocables, the former are not subject to the same variety of meaning, and the precautions against ambiguity required in the spoken language are to some extent unnecessary. A sentence may be perfectly definite when written, yet when spoken be altogether unintelligible. In the classical style this conciseness is carried to the extreme limit. It is in general true of the classical books that, while to the eye they are definite, to the ear they convey no meaning. In this ancient style, termed *Ku-wen*, all historical, philosophical, and critical works are still written, and no accomplishment is so highly valued among scholars as the mastery of it. Novels and dramatic compositions, which are regarded as quite inferior classes of literature, are written in the *Kwan-hwa*, in a style but little elevated above the colloquial, and, like it, abounding in compound phrases. The *Wen-chang*, the style of the literary essays, which is also much cultivated, is of a more artificial character than the *Ku-wen*, and less esteemed.

The relation of the *Ku-wen* to the ancient spoken language, whether and how far it represents it, and how far it is the product of a merely literary development, are points upon which scholars are not agreed. That the Chinese have not invented or borrowed a system of alphabetic writing, as so many peoples their inferiors in civilization have done, is the less surprising when we consider that the defects of their system are less sensible in an uninflected language like the Chinese, and that it has undeniable advantages in enabling them to distinguish the great number of words which are identical in sound, but differ in meaning. Still, it is attended with very serious evils, not the least of which is this—that the labor involved in learning and holding in the memory so many arbitrary characters absorbs no small portion of the intellectual energy of the people. Attempts have been made, not without success, to romanize some of the popular idioms, the tones being marked by diacritic signs. Books have been published by missionaries in this character in the Shanghai, Ningpo, Fuchau, and Amoy dialects. To the concise classical style, however, this method is quite inapplicable.

The Chinese characters have undergone in the course of their history great changes of form, and six varieties are now in use. The oldest is the *Chuen*, called by foreigners the *seal* character, used in seals and often also in ornamental inscriptions and title-pages. The *Li-shu*, introduced not long before the Christian era, with the change from the iron style to the brush, and the substitution of silk and linen for wooden tablets and slips of bamboo, differs little, except in a certain heaviness of stroke, from the more modern forms of the characters. It is found in inscriptions and prefaces. This was succeeded by the *Kiai-shu*, or pattern style, which followed on the invention of paper, and is the usual character employed in careful writing, and is occasionally found in printed books. The *Sung-shu*, the common book-character, introduced about the tenth century, differs from the preceding in a greater squareness and angularity of form, better suited to cutting on wooden blocks. Two forms adapted to rapid writing are in use—the *Hing-shu*, or running hand, frequently found in prefaces and inscriptions; and another, still more abbreviated, in which there is left little trace of resemblance to the ordinary square character—the *Ts'au-tzu*, or grass character. In no country is the art of calligraphy so highly esteemed or so sedulously cultivated as in China, and no written character is so well adapted to the display of it.

Of the Chinese language in general we may say, in conclusion, that notwithstanding its poverty of forms, it has been made, solely by the genius of those who use it, superior as an instrument of thought to many, perhaps to most, inflected languages. Whether its capacity of development will prove equal to the further demands to be made upon it is questionable. It has thus far shown a marked indisposition to the incorporation of foreign words, and yet does not seem able to supply from native resources the exact terminology which any considerable advance in scientific knowledge will require.

*Chinese Literature.*—In the history of literature there is hardly to be found another example of so high an antiquity, and none of so great a longevity, as the Chinese—an age which at least reaches, and perhaps exceeds, three thousand years. Neither in language, literature, nor institutions, is the modern period in China separated from the ancient by so wide an interval as elsewhere; an unbroken tradition holds together all. Such is the continuity that to the superficial observer it has the appearance of uniformity. In few countries has the cultivation of letters been so general. In theory, at least, all offices beneath the throne are



not only open to the scholar, but official promotion is made to depend directly on scholarship. The entrance to the various grades is guarded by public competitive examinations, which at each successive step become more rigorous. This system, introduced under the Han dynasty near the commencement of the Christian era, has been adhered to with more or less fidelity under the succeeding dynasties. Under such conditions, with the long history and vast population of China, a literature of immense extent is a natural result. Nor is any great literature so purely national, so little affected by foreign influences, as the Chinese. Buddhism, brought from India in the first century of the Christian era, has created for itself a literature apart, without much disturbing the general course of development. During the past three centuries of intercourse with Western nations their influence upon the literature, except in the department of mathematics, has been hardly felt. The exaggerated reverence paid to the classical models has so strengthened the conservative tendency as to check the growth of originality. Nor have the examinations for degrees, in which the chief requirement for success is familiarity with the classics, been so conducted as to attain the most happy results, either for the government or for the national literature.

There is, however, more of variety both in the history and the literature of China than the commonly received opinion gives to them. The first period of marked activity is that commencing with Confucius (died B. C. 478) and Lao-Tzū, and covering a period of about three centuries. Mencius and many other less celebrated writers belong to this period, which was rudely brought to a close by Shi Hwang-Ti, the founder of the Ts'in dynasty. This ruler, famous also as the builder of the Great Wall, having consolidated into an empire the petty states into which China had been divided, and fearing that the study of the literature would lead to an attempt to restore the old order of things, ordered (B. C. 212) the destruction of all books except those on medicine, divination, and husbandry, and the records of his own dynasty. Many scholars were put to death for the crime of hiding books or for the freedom of their utterances. This edict remained in force only twenty-two years, the Ts'in dynasty having been soon succeeded by the Han, under which strenuous efforts were made to recover the lost books. The catalogue of the library thus formed, which is found in the history of the Han dynasty, enumerates more than 13,000 volumes by 600 different authors. This collection perished in the burning of the imperial palace at the close of the dynasty, and similar collections made under succeeding dynasties met a like fate. Including the burning of the books by Shi Hwang-Ti, five great catastrophes of this kind are enumerated by Chinese historians, the last in the sixth century.

The period of the T'ang dynasty (A. D. 618-905) was the golden age of Chinese poetry; that of the Sung (960-1279) was the era of philosophical speculation and of criticism; the Yuen (Mongol) dynasty (1280-1367) was the most flourishing period of the drama, and produced also some of the best novels; the Ming and the reigning Manchoo dynasties have been less distinguished for the originality of their productions than for works of an encyclopædic character, digests of the older literature. Printing from wooden blocks was invented before the close of the sixth century, but did not come into general use until the tenth. Movable types were employed as early as A. D. 1040, four centuries before the invention was known in Europe, without, however, displacing wooden blocks, which have remained in general use. During the present dynasty two large collections, of several thousand volumes each, have been printed by the government—one with copper, the other with wooden movable types. Chinese literature is abundantly supplied with works in bibliography and literary history, which for many centuries have been favorite subjects of study. One of the most admirable bibliographies to be found in any language is the catalogue of the imperial library, published in 1790 in 200 books. It contains notices of 10,500 works (a single one of which, the encyclopædia of the Ming, is composed of 22,877 books), giving the author, the history, and the contents of each, together with an estimate, almost uniformly just, of its merits. The plan of arrangement, which dates from the T'ang dynasty, is in four divisions—viz., classics, history, philosophy, belles lettres; novels and the drama are excluded. In the several dynastic histories an important section is devoted to the literature of the period. An index expurgatorius of works prohibited on account of their moral or political tendency has been published by the present dynasty. It contains many thousand volumes, mostly written about the close of the Ming dynasty.

The most important contributions by European scholars to this subject are: WYLLIE, "Notes on Chinese Literature," Shanghai, 1867; SCHORR, "Entwurf einer Beschreibung der chinesischen litteratur" ("Abhand. der Berlin. Akad.,"

1853); BAZIN, "Le Siècle des Youén" ("Journal Asiatique," 1850-52). The last treats of the literature of the Mongol dynasty only.

The term *king* or "classic" is used in a narrower and a wider sense. It belongs *par excellence* to the "Five King," but very commonly includes also the "Four Books," and is not unfrequently used in a still wider sense. Among the "Five King" the first place is accorded to the "Yih," partly for its antiquity and partly for its enigmatical character. The proper text consists of eight trigrams, made up of horizontal lines, whole and broken, afterwards increased by combination to sixty-four hexagrams. With these are incorporated commentaries by Wên-Wang, the ancestor of the Chau dynasty, by his son Chau-Kung and by Confucius, which constitute the only intelligible part of the work. These mystical figures, ascribed to the ancient sage Fuh-Hi, are supposed to embody the most profound moral and political wisdom. They are much used in divination, and on this account the work is said to have been excepted from the general destruction of books under Shi Hwang-Ti. Next in rank is the "Shu King," a collection of historical documents relating to the Yu, Hsia, Shang, and Chau dynasties, and covering the period, according to the received chronology, from the middle of the twenty-fourth century down to B. C. 721. The compilation is ascribed to Confucius, and is said to have comprised originally 100 chapters, but after the time of Shi Hwang-Ti, who made special efforts to destroy all copies of the "Shu," only fifty-eight chapters could be found. It was recovered in two portions, the genuineness of one of which is much disputed. The "Shu" is largely occupied with discourses on government put in the mouths of the ancient sovereigns, the historical matter being quite subordinate. The third classic is the "Shi King," or "Book of Odes," which contains 305 pieces (originally 311, but of six only the titles are preserved), selected by Confucius as the most worthy of preservation out of nearly 4000. They are divided into four classes—"K'woh-fung," or "Manners of the States," gathered for presentation to the emperor in his visits to the feudal princes; "Siao-ya" and "Ta-ya," "Lesser and Greater Eulogiums," which bestow praise or blame upon the rulers and high officers; and "Sung," hymns of praise sung at the funeral rites of emperors and kings. The poetical merit of these pieces is very unequal, but is in general superior to that of later productions. They belong, with few exceptions, to the Chau dynasty, and for the light which they throw on the history and customs of the time are of great value. Biot has drawn from them the materials for a valuable memoir published in the "Journal Asiatique" for 1843. The fourth place among the classics is occupied by the Rituals, three in number. The "Li-ki," which is designated by imperial authority as one of the "Five Classics," is a compilation made in the first century B. C. out of the older Rituals. Two of these are preserved. One, the "Chau-li" ("Chow Ritual"), is supposed to have been written early in the Chau dynasty, and gives a detailed account of the various offices in the state, and the duties belonging to each. In it are found the models of the six administrative boards of the Chinese government. The "I-li" ("Decorum Ritual"), which is perhaps of equal antiquity, is of a more domestic character—a code of etiquette giving rules for the guidance of individual conduct under all circumstances. The last of the "Five Classics" is the "Ch'un Ts'u" ("Spring and Autumn Annals"), the only one of which the authorship can be properly ascribed to Confucius, his labors upon the others being merely those of an editor. It is a chronicle of events from 720 to 480 B. C., written in continuation of the "Shu King." In it are recorded thirty-seven eclipses of the sun (the earliest 720 B. C.), which, with few exceptions, have been proved by calculation correct. The "Four Books" (i. e., the "Books of the Four Philosophers") are next in rank. Two of them, the "Ta Hioh" and the "Chung Yung," formed parts of the "Li-ki" ("Book of Rites"), but were detached and arranged in the present order by Chu Hi, the great critic of the twelfth century. The "Ta Hioh" ("Great Learning") is a discourse on the principles of government, in eleven chapters, the first containing the words of Confucius, and the remaining ten a commentary on them, commonly ascribed to his disciple, Tsêng Ts'an. The "Chung Yung" ("Invariable Mean") is a philosophical treatise attributed to K'ung Keih, the grandson of Confucius, in which the observance of the right mean is set forth as the highest wisdom and virtue. The "Lun Yu" ("Miscellaneous Conversations") of Confucius and his disciples is a collection of mostly disconnected sayings embodying the substance of his teaching, which was altogether of a practical character, on ethics, government, ceremonies, and the like. The last and most extensive of the "Four Books" contains the works of Mencius, who now ranks second only to Confucius in the general esteem, though not until the twelfth century were his writings defi-

nitely admitted to a place among the classics. One of the fundamental doctrines of his philosophy is the inherent goodness of human nature. The "Five King" and "Four Books" have all, with the exception of the "Ch'un Ts'eu," been translated into one or more of the European languages. Dr. Legge has undertaken an edition, now well advanced towards completion, of the whole in the original text, with English translation, commentary, and extensive introduction (vols. i, ii, "Four Books," vol. iii, "Shu King," vol. iv, "Shi King," Hongkong, 1861-72). An arrangement of the classics made in the T'ang dynasty enumerates thirteen—viz., besides the foregoing the two Rituals, "Chau-li" and "I-li," two additional recensions of the "Ch'un Ts'eu," and the "Hiau King," or classic of Filial Piety. The last purports to be a conversation between Confucius and his disciple Ts'eng Ts'an, and, though highly esteemed, entire confidence is not felt in its genuineness. Many other works bear the title of *king* ("classic"); nor is it confined to the orthodox school, but applied also to the canonical books of the Taoist and Buddhist faiths, and even to works of a more miscellaneous character, such as important technical writings. Thus we have the "Ch'a King" ("Tea Classic"), on the culture of the tea-plant, and the "Shan-hai King" ("Hill and River Classic"), an ancient geographical work from which many poetical allusions are borrowed.

The historical works, which are very voluminous, fall mostly into three classes. First in importance are the histories of the several dynasties, the work of official historiographers, and constructed mostly on a uniform plan. The variety of subjects treated of, each in a distinct section, gives them an encyclopædic character. The order, varying somewhat in the separate works, is in general the following: first, the personal history of the successive emperors of the dynasty, followed by a series of memoirs on chronology, rites, music, jurisprudence, political economy, state sacrifices, astronomy, influence of the five elements, geography, and literature, closing with biographies of the eminent men of the dynasty, and historical and geographical notices of foreign nations. The series as at present established consists of twenty-four histories, comprising 3264 books. They are of very unequal merit; some of them the work of single authors, others prepared by a board of scholars. At the head of the list stands the "Shi-ki" of Szu-ma T'sien of the Han dynasty, which reaches from the earliest period down to B. C. 122, and has served as a model for the subsequent histories. Not until the dynasty is ended, and has given place to another, can the official history be published. There is, however, a summary of events under the present dynasty by a private author, entitled "Tung-hwa-luh," long circulated in manuscript, and at length, after a considerable portion had been expunged, printed. The history is brought down to 1818. The second class of histories follows a chronological order. The oldest work of this class, next to the "Ch'un Ts'eu" of Confucius, is the "Bamboo Record," found A. D. 279 in the tomb of one of the princes of Wei. It reaches to B. C. 298. There is some reason to think that the original has been lost, and that the work which now passes under the title, and which is printed with a translation in the prolegomena of Dr. Legge's "Shoo King," is a forgery. The most celebrated general history on this plan is the "Tzu-chih-t'ung-kien" of Szu-ma Kwang, a writer of the eleventh century. It was revised in the next century under the direction of Chu Hi, and published with the title "Tung-kien-kang-muh." Continuations were added in the following dynasties. De Mailla translated it into French (Paris, 1777-83, 12 vols. 4to). The abridgment of the above work, entitled "Kang-kien-i-chi-luh" ("History Made Easy"), is one of the most useful compendiums. Another class of works, called "Complete Records," follows neither the one nor the other of the above methods, but gives with more freedom of arrangement a general survey of the subject treated.

In biographies the literature is unusually rich. Besides the space accorded to them in the dynastic histories and in statistical works, separate biographies, many of them of a collective character, abound. The "T'ang-ts'ai-tzu-chuen" is a collection of 397 literary biographies of the T'ang and the succeeding five short dynasties, by Sin Wen-fang of the Yuen. It was long given up for lost in China, and was recovered from Japan. The "Kau-seng-chuen" of the Liang dynasty, with its continuations, contains biographies of more than a thousand Buddhist priests.

The geographical works are hardly surpassed in extent by those of any country. There are works in the geography of the whole empire, such as the "Ta-ts'ing-yih-t'ung-chi," published under the present dynasty in 500 books, which give under each province the topography, population, taxes, etc.; under each prefecture and department, the antiquities, public works, eminent and notorious characters born there, productions of the soil, and a variety of other details. In addition, every province, every prefecture,

every department, nearly every district, and frequently a town or famous locality within a district, has its separate description, amounting in all to thousands of volumes. Some of these works are of considerable antiquity, and in successive editions have been gradually enlarged. Of the history and geography of Eastern Asia, beyond the limits of the empire, Chinese literature contains many valuable notices. The accounts of the journeys of Buddhist pilgrims to India between the fourth and the tenth centuries are the most important sources of information for the history of Buddhism in India during that period that we possess. Fah-Hian (A. D. 400-415) travelled overland to India, thence to Ceylon, returning by water to China. His account, "Fuh-kwo-ki," has been translated into French by Rémusat (Paris, 1836), and into English by Beal (London, 1869). Yuen-Chwang during sixteen years (629-645) traversed India in every direction. His life has been translated by Julien ("Vie de Houen-Tsang," Paris, 1853), as has also the "Si-yih-ki," which contains his itinerary, accompanied by copious extracts from Sanscrit works, now lost, concerning the kingdoms of India ("Mémoires sur les Contrées Occidentales," Paris, 1857, 2 vols., 8vo).

The three principal philosophical and religious sects, the Confucianists, Taoists, and Buddhists, have each an extensive literature. Of the orthodox school the most celebrated among the near successors of Confucius and Mencius was Sün-tzu, who held, in opposition to Mencius, to the original depravity of human nature. In the eleventh and twelfth centuries, under the Sung dynasty, Chau-tzu, and especially Chu Hi, gave a new impulse, and in some particulars a new direction, to philosophical speculation. The authority of Chu Hi, who was equally eminent as a commentator of the classics and in other departments of literature, has remained paramount to the present day, though under the present dynasty there is some disposition to rebel against it. The "Sing-li-ta-ch'uen-shu," published in 1415, is a collection of the principal cosmological writings of his school. Lao-tzu, the founder of the Taoist school, was a contemporary of Confucius. His philosophy is contained in the "Tao-t'ê King" (translated by Julien, Paris, 1842), one of the most sententious and profound books in the language. The most popular of the writings of this school is the "Tai-shang-kan-ying-pien" (translated by Julien under the title "Le Livre des Récompenses et des Peines," Paris, 1835), which consists of about a hundred short maxims, accompanied by illustrative narratives. Taoism has long since degenerated into superstitious practices, its followers being devoted to magic, alchemy, and the like. Buddhism was introduced from India in the first century of our era. The earliest translation from the Sanscrit, the "Sutra of forty-two sections," was made A. D. 67, and for several centuries there was constant activity in this work. The catalogue of Chi-Shing, published in 730, gives a list of 2278 separate works which had been translated up to that date. These constitute the more important part of the literature of Chinese Buddhism, though in the fifth and sixth centuries original works began to appear, and have since greatly multiplied.

In the history of Chinese poetry there are two distinctly marked periods. In the earlier, previous to the T'ang dynasty, the structure was less artificial and the rhythm freer. In the "Shi King" the verses are mostly of four syllables; the rhyme is often imperfect, and sometimes altogether wanting. In the T'ang period a more rigid consecution of tones was introduced, and verses of five and seven syllables became the favorites. The tones for rhythmical purposes are divided into two classes—the *p'ing* or "even" tone constituting one, while the other three tones are considered "uneven." In every verse the first, third, and fifth syllables are indifferent with respect to tone; the second, fourth, and sixth must alternate, so that the order is either "even," "uneven," "even," or "uneven," "even," "uneven."

The weakest side of Chinese literature is the scientific. It has a tolerably complete system of arithmetic, older than the Christian era, a system of algebra which dates from the thirteenth century, but no theoretical astronomy worthy of the name, except what is borrowed from the West. For the regulation of the calendar, and for astrological purposes, observations of a simple character were very early made, and numerous eclipses recorded. During the Ming dynasty mathematical knowledge had greatly declined, and the first Jesuit missionaries recommended themselves to the imperial favor chiefly by their acquirements in this science. The mathematical works since published are mainly based on European methods. Medical writers are numerous, and some of them very ancient, but the science, notwithstanding its long history, has made little progress. The chief work on *materia medica* is the "Pun-Ts'au," in fifty-two books, compiled by Li Shi-chin of the Ming dynasty. He made extracts from more than 800 earlier writers, and gives 1892 medicaments, selected and original.

ADDISON VAN NAME, *Lib. of Yale Coll.*

**Chinese White**, a name sometimes given to the white oxide of zinc, used as a pigment as a substitute for white lead. It is not liable to be changed much by atmospheric action.

**Ching-Hai**, a fortified seaport-town of China, in the province of Che-Kiang, at the mouth of the Takia River, 9 miles N. E. of Ning-Po. It has a strong citadel on a high and steep rock, and is 3 miles in circumference. The British defeated the Chinese here in Oct., 1841.

**Ching-Kiang-Foo**, written also **Tchang-Kiang**, a fortified city of China, province of Kiang-Soo, on the right bank of the Yang-Tse-Kiang, near its junction with the Imperial Canal, and about 42 miles E. of Nanking. It was a populous and important commercial city before it was taken by the Tae-Pings in 1859. It was captured by the British in July, 1842. Pop. estimated at 140,000.

**Chingleput**, or **The Jaghire**, a maritime district of India, in the province of Madras, has an area of 2993 square miles. It is bounded on the E. by the Indian Ocean, and is adjacent to Madras. The chief river is the Palaur. The soil is poor. Capital, Chingleput. Pop. in 1871, 940,744.

**Chingleput** (anc. *Singalapetta*), a town of India, in the above district, 36 miles S. W. of Madras, has a large citadel or fort. It is accessible to an enemy only on the S., being protected on the other side by a large tank.

**Chin-In-dia**, or **Farther India**, a name given by the celebrated geographer, Malte-Brun, to the region between China and Hindostan, also often called the Peninsula beyond the Ganges. It comprises Siam, the Burman empire, Anam, Laos, Malacca, etc. (See **INDO-CHINA**.)

**Chinon**, or **Chinnon**, a town of France, department of Indre-et-Loire, on the river Vienne, 25 miles S. W. of Tours. It has remains of a large castle, which was the residence of several kings of England. Here Henry II. of England died, and here Rabelais was born. Charles VII. of France resided here when Joan of Arc presented herself to him. Pop. in 1881, 6096.

**Chinook' Indians**, a collection or race of aborigines, consisting of several tribes or bands, formerly inhabiting the banks of the Lower Columbia in Washington Territory and Oregon. They were fish-eaters, and spoke a peculiar and very difficult language; so that the traders and trappers invented the "Chinook jargon," a *lingua franca* designed to facilitate intercourse with them. Vocabularies of this jargon and the Chinook language were prepared by the late George Gibbs (1863). Relics of this race still exist, the Chinooks proper, Clatsops, etc.

**Chin'quapin**, a dwarf species of chestnut (*Castanea pumila*) of the Atlantic U. S. from Maryland to Texas, bearing a small but sweet edible nut.

**Chintz**, a highly-glazed printed muslin or calico, with a pattern in many colors on a white or light-colored ground. It is chiefly used for bed-hangings or curtains, for covering furniture, and other purposes where gay or rich colors are desirable, and where there is much exposure to dust, which does not adhere to its surface.

**Chio**. See **SCIO**.

**Chio'ggia** (anc. *Fossa Clodia*), a fortified seaport-town of Italy, in the province of Udine, on an island of the Adriatic, 14 miles S. of Venice. It is built on piles like Venice, and is connected with the mainland by a stone bridge of forty-three arches. It has a fine main street lined with porticoes, a cathedral, several high schools, a theatre, and a harbor protected by two forts. Here are shipbuilding-yards, salt-works, and fisheries. Pop. in 1881, 28,015.

**Chion'ides**, a Greek comic poet of the old comedy, who began to exhibit, according to Suidas, in B. C. 487. Aristotle states that he was much later than Epicharmus, and this would place him some years after the date assigned above. Though not the first in time, yet from the more careful and artistic preparation of his pieces he was regarded as the leader of the old Attic comedy. The titles of three plays are preserved, and the fragments are collected in MEINEKE, "Fragm. Vet. Com. Græc.," vol. ii., pp. 5-9.

HENRY DRISLER.

**Chionididæ**. See **SHEATH-BILL**.

**Chion' of Heraclea**, on the Pontus, a pupil of Plato, sought to free his native city by slaying the tyrant Clearchus (B. C. 353). He, with his associates, was slain by the friends of Clearchus, and the city fell under a worse tyranny than before. There are seventeen letters extant under the name of Chion, which are, however, the production of a later age. They have been edited by Coberus, Leipsic, 1765, and by Orelli in his edition of Memnon, Leipsic, 1816.

HENRY DRISLER.

**Chios**. See **SCIO**.

**Chipica'ni**, a peak of the Bolivian Andes. Height, 19,740 feet.

**Chip'man** (**DANIEL**), LL.D., born in Salisbury, Conn., Nov. 15, 1765, graduated at Dartmouth in 1788, and soon became distinguished as a lawyer and an author. He was a member of Congress from Vermont (1815-17), and was prominent in the politics of that State. He published a valuable work on the "Law of Contracts" (1822), "Reports of Cases in the Supreme Court of Vermont" (1824), and other works. Died April 23, 1850.

**Chipman** (**NATHANIEL**), LL.D., an American soldier and jurist, a brother of the preceding, was born at Salisbury, Conn., Nov. 15, 1752, graduated at Yale in 1777. He was an officer of the Revolutionary army, but was admitted to the bar in 1779. He was chief-justice of Vermont for several years, judge of the U. S. district court for Vermont (1791-93), and U. S. Senator 1797-1803. His works on the laws of Vermont are highly commended. He published "Principles of Government" (1793) and other works. Died Feb. 15, 1843.

**Chipman** (**WARD**), LL.D., a jurist of New Brunswick, born July 10, 1787, graduated at Harvard in 1804. He became chief-justice of the supreme court of the province in 1834. Died Dec. 26, 1851.

**Chip'munk**, a popular name for the *Tamias striatus*,



Chipmunk.

or striped squirrel of the U. S., especially common in the North. It is five or six inches long, with a tail of four and a half inches.

**Chip'pawa**, a post-village and port of entry of Ontario, Dominion of Canada, Welland co., on the Niagara River, about 3 miles above Niagara Falls. This village is memorable as the scene of an important victory of a portion of the American army under Maj.-Gen. Joseph Brown, over a superior British force under Maj.-Gen. Rial, July 5, 1814. A re-invasion of Canada having been determined upon, Gen. Brown had, according to instructions, assembled at Buffalo, N. Y., a division consisting of two brigades of regulars, a brigade of volunteers, and a few Indians. The regulars were commanded by Brig.-Gens. Winfield Scott and Ripley, the volunteers and Indians by Gen. P. B. Porter; there was also a corps of artillery under Maj. Hindman; in all about 3500. In accordance with orders of Gen. Brown, issued on the 2d of July, Scott's brigade, with Hindman's artillery corps, passed the Niagara on Sunday morning, the 3d, landing about a mile below, while Gen. Ripley, at a later hour, landed about the same distance above Fort Erie. Gen. Scott led, and the British commandant being completely surprised, surrendered with scarcely any resistance at 6 A. M. Gen. Brown was not slow in securing the advantages which might be derived from the capture of Fort Erie, for he heard that Gen. Rial, who was in command on the frontier, was moving toward that point. A garrison was placed in the fort, and Gen. Scott was ordered to advance on the morning of the 4th with his brigade and Towson's artillery toward Chippawa. The enemy's outposts were soon met and driven in; a charge of the Nineteenth Dragoons was also repelled by a single company. The enemy being found strongly posted behind Chippawa Bridge, Gen. Scott took up a well-selected position for the night, where he was joined by Gen. Brown and the main body of his army. The British army lay behind Chippawa Creek, across which was a bridge; the Americans occupied a similar position at Street's Creek, a mile and a half farther up. Between those two creeks is a plain, which was the battle-ground, behind it a forest, and in front the Niagara. Skirmishing commenced soon after daybreak, but nothing serious occurred until about 4 P. M., when Gen. Porter was ordered to advance rapidly under,

cover of the adjoining wood, and throw himself between the British skirmishers and their main body. Porter, advancing as ordered, soon fell in with a body of the light troops of the enemy, which he routed, and was pursuing when, coming out of the wood, he found himself in front of the whole British army drawn up in line of battle. Scott was now ordered to cross, with his brigade and Towson's artillery, the bridge in his front, and attack the enemy's left. The order was promptly executed by Scott, and his command were soon closely engaged with the enemy. Porter's command had given way, nor could he, though displaying great gallantry, stay their flight. Scott's brigade becoming much exposed by this retreat, a portion of Ripley's brigade was ordered to fall upon the enemy's right and rear; but such was the impetuosity of the attack of Scott and his gallant troops that before Ripley became engaged the enemy's line was broken, and driven in confusion to their intrenchments behind the creek, destroying the bridge behind them. The credit of this decisive conflict between our inexperienced troops and a superior number of veteran European soldiers is mainly due to Gen. Scott, who by his skill and gallantry secured this important victory, Gen. Brown not being present till the battle had been decided. The number actually engaged on the American side was 1900; the British force numbered 2100. Our loss in killed and wounded was 328; the British loss was reported at 505.

**Chippewa** [native, *Ojibway* or *Ojibwea*], a river of Wisconsin, rises in Ashland county, flows nearly south-westward through Chippewa and other counties, and enters the Mississippi River at the foot of Lake Pepin, 6 miles above Wabashaw. Entire length, about 220 miles. It traverses extensive forests of pine.

**Chippewa Falls**, city and R. R. junction, capital of Chippewa co., Wis. (see map of Wisconsin, ref. 3-C, for location of county), on the Chippewa River, about 88 miles E. of St. Paul, Minn. It has water-power and several mills, and a large trade in lumber. Pop. in 1870, 2507; in 1880, 3982.

**Chippewa Indians, or Ojibways**, a tribe of North American aborigines who live in bands in Michigan, Wisconsin, Minnesota, and on both sides of the basin of Lake Superior. They belonged to the Algonkin family, as is shown by their language and by their customs and manners. They first came in contact with the Europeans in 1640, at which time they were at war with the Iroquois, the Foxes, and the Sioux, driving the last-mentioned tribe from the head-waters of the Mississippi and from the Red River of the North. When the French discovered them, they were settled at the Sault de St. Marie. The French, who by their kindness, sociability, and religious influence always won the affection and respect of the Indian tribes with whom they came in contact, soon made an alliance with the Chippewas, and established missionaries among them. After that time the Chippewas continued the firm friends of the French as long as the French dominion in America lasted. In 1712 they aided them in repelling an attack of the Foxes on Detroit, and in 1763 they took part in the conspiracy of Pontiac for the purpose of driving the English back beyond the Alleghany Mountains. In the war of the Revolution they sided with the British, and afterward, having joined the Miamis, they fought against Wayne, but were defeated, and subscribed in 1795 to the treaty of Greenville, according to which all hostilities between the U. S. and the Indian tribes should cease and the boundaries between their territories be fixed. In 1812, however, they again took sides with the British; but in 1816 they were compelled to make peace, and in 1817 they surrendered all their lands in Ohio. They were at that time still in possession of a vast territory stretching along Lake Superior from Mackinaw to the Mississippi, but since 1825 they have gradually sold most of their land to the U. S. for annuities. Their religion is a simple belief in a good spirit and an evil spirit, but various Christian denominations have missionaries among them. Their history has been written by George Copway, a native Chippewa (Boston, 1851), and by Peter Jones, also a native Chippewa (London, 1861).

**Chipping Bird, or Chipping Sparrow**, a common little North American bird (*Spizella socialis*, Bonap.). It is between five and six inches long, whitish underneath, crown chestnut, back and sides ashen, with streaks of white and black. Its song consists of six or seven notes rapidly repeated.

**Chiquichi'qui Palm, or Piassa'ba** (*Leopoldinia Piassaba*), one of the palms which yield the piassaba fibre, used for making coarse brushes and brooms for sweeping streets, for cables, etc. It grows on the banks of the rivers of Venezuela and the north of Brazil, and has very large, regularly pinnate leaves, much used for thatching. The commercial fibre is obtained from the marginal processes of the leaf-stalks, which split into fine fibres, hang down five or six feet, and entirely conceal the stem. It has long been used for cables on the Amazon, and has now become an important article of commerce. The Portuguese government had, before the independence of Brazil, a factory on the Rio Negro for the manufacture of piassaba cables; the export of the raw fibre from Para to England began about 1860.

**Chiquimula**, the easternmost department of Guatemala, Central America, bordering on the Caribbean Sea, between the Bay of Honduras on the N. and the State of San Salvador on the S. Area, 4000 square miles. Pop. 52,417. Capital, Chiquimula de la Sierra, with 3744 inhabitants.

**Chirac** (PIERRE), born at Aveyron 1650, died in Paris 1732, was professor of medicine at Montpellier and body physician to the regent, and wrote a famous "Traité des fièvres," Paris, 1742.

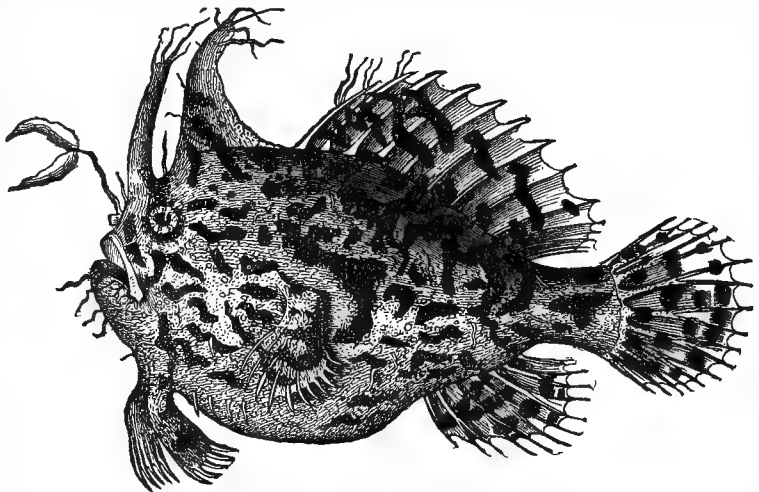
**Chiriqui**, the westernmost province of Panama, in Central America. Area, 500 square miles. Pop. 36,783. Capital, David, beautifully situated, with 7906 inhabitants.

**Chiriqui, Lagu'na de, or Bahi'a del Almirante**, a bay of Costa Rica, nearly enclosed by a jutting headland and islands at its mouth. The W. entrance, Boca del Dragon ("Dragon's Mouth"), affords passage for the largest ships, and the bay within is a secure harbor. Lat. 90° N., lon. 32° 30' W. From ancient tombs in this region much gold has been of late obtained.

**Chiris'ophus**, a Lacedæmonian officer who joined Cyrus the Younger in his expedition against Artaxerxes (B. C. 401) at Issus, with 700 heavy-armed men. He first appeared prominently after the death of Clearchus, when he was, at the suggestion of Xenophon, appointed to lead the van of the retreating Greeks. After reaching Trapezus, Chirisophus attempted to secure vessels for the Greeks, but was unsuccessful. At Sinope, through Xenophon's refusal of the office, he was chosen commander of the Greek forces, but six or seven days after, while at Heraclea, the army was broken up into three parts, which set out separately. Chirisophus died soon after at Calpe.

HENRY DRISLER.

**Chironectes** [Gr. *χείρ*, "hand," and *νίχω*, to "swim"], a genus comprising numerous small marine fishes of the



Chironectes Histro.

family Lophiidae, remarkable for grotesque forms. The mouse-fish (*Chironectes gibbus*) of the U. S. Atlantic coast is a familiar example. The *Chironectes histrio* of the Brazilian coast is larger. (See also CHEIRONECTES.)

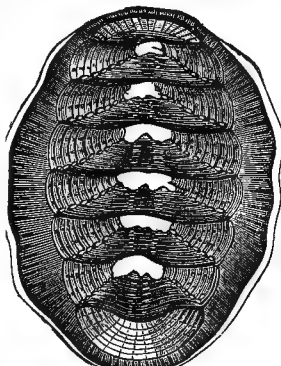
**Chironectidæ.** See TOAD-FISH.

**Chis'elhurst**, a parish of England, in Kent, 11 miles S. E. of London. The emperor Napoleon III. fixed his residence at Chiselhurst early in 1871, after he was released from captivity by the emperor of Germany, and here, Jan. 9, 1873, he died.

**Chis'wick**, a town of England, in the county of Middlesex, on the Thames. It contains the gardens of the London Horticultural Society. In Chiswick House, a villa belonging to the duke of Devonshire, Fox died in 1806, and Canning in 1827. Hogarth lies buried in the churchyard. Pop. in 1881, 15,975.

**Chi'tin** [from the Gr. *χρῶν*, a "tunic"], in chemistry, the name of the substance which forms the skeleton of all insects, as well as of some crustaceans, mollusks, and other inferior animals. In insects it constitutes the external skeleton, the scales, and the tracheæ, and penetrates into the most remote portions; one of the layers of the intestinal canal consists of chitin. We can make preparations of these parts by treating insects with a solution of potash, which dissolves all but the chitin; in this way we can microscopically examine the most delicate parts. It is a white, amorphous body, which usually retains the form of the tissue from which it is prepared. Its composition is represented by the formula  $C_8H_{15}NO_6$ . The best method of obtaining chitin is by successively boiling the elytra of the cockchafer with water, alcohol, ether, acetic acid, and alkalies. Treated with hot dilute sulphuric acid, it is converted into glucose and lactamide. (See GLUCOSIDES.)

**Chi'ton**, a genus regarded as the type of the family Chitonidæ, gasteropodous mollusks, near kindred of the limpets. The shell is composed of eight transverse calcareous pieces, overlapping each other, and strongly attached to the mantle, which is leathery and fibrous. Most have the power of rolling themselves up into a ball. The oval foot extends the whole length. More than 200 species are known; they occur in all climates, most abundantly on rocks at low water, but some of them at great depths. All the species found on American coasts are small, but some others grow to three or four inches in length.



Chiton Chilensis.

**Chitore**, a town and fortress of India, in the province of Rajpootana, 64 miles E. N. E. from Odeypoor. The fortress consists of a rock smoothly scarped to a height of from 80 to 190 feet by nature, surmounted by a rude bastioned wall 12 miles in its entire circuit. The enclosure is narrow and irregular, and contains temples and palaces.

**Chit'tagong**, a district of British India, on the Bay of Bengal, in the presidency of Bengal, of which it is the S. E. extremity. Area, 9735 square miles. A great part of the country is mountainous and covered with forests. The soil is fertile, but little cultivated. Towns are only found on the sea-coast. The population is more than half Mohammedan. Pop. 2,025,645.

**Chitteldroog'** (anc. *Sitala Durga*, "the spotted castle"), a town and fortress of Hindostan, in Mysore, 128 miles N. N. W. of Seringapatam. Here is a rock-fortress which is one of the strongest and most remarkable in India. It is occupied by a British garrison.

**Chittenango Springs**, or **White Sulphur Springs**, in Sullivan township, Madison co., N. Y., is a saline and sulphur spring, with accommodations for receiving visitors, and is highly recommended for many cases of disease.

**Chittenden** (MARTIN), a son of the following, born in Salisbury, Conn., Mar. 12, 1769, graduated at Dartmouth in 1789. He was for several years a judge in the courts of Vermont, a member of Congress from that State (1803-13), and governor (1813-15). Died Sept. 5, 1841.

**Chittenden** (THOMAS), an American statesman, born at East Guilford, Conn., Jan. 6, 1730. He was one of the founders of the State of Vermont, of which he was chosen first governor in 1778. He was several times re-elected. Died Aug. 24, 1797.

**Chit'ty** (JOSEPH), an English writer on law, was born in 1776, and called to the bar in 1816. He published, besides other legal works, "Pleadings and Parties to Actions" (1808), a "Practical Treatise on the Criminal

Law" (1818), a "Treatise on Medical Jurisprudence" (1834), and "General Practice of the Law in all its Departments" (3d ed., 1837-42), which are highly commended. Died in 1841.

**Chi'u'sa-Sclafa'ni**, a town of Sicily, in the province of Palermo, 30 miles S. S. W. of Palermo, was founded about 1320. Agates are found near it. Pop. 6592.

**Chiusi**, a town of Italy, in the province of Siena, is the residence of a bishop and has a large cathedral. It is the *Clusium* of the ancients, and was one of the twelve cities of the Etruscan confederation, the headquarters of Porsena. Its museum contains a very interesting collection of Etruscan bronzes, mirrors, vases, funeral urns, etc., found in the vicinity. Pop. 6460.

**Chiv'alry** [Fr. *chevalerie*, from *cheval* (Lat. *caballus*), a "horse"], a term applied to the system or dignity of knighthood, but originally denoting a body or assembly of knights or horsemen. The word has, in fact, the same etymology as *cavalry*, and in the Italian and Spanish languages the same term is used for both. Chivalry may be more fully defined as a peculiar institution originating in the Middle Ages, and including with the rank and dignity of knighthood all those customs, manners, and sentiments which were deemed appropriate to a noble and accomplished knight. Its origin is to be traced to the peculiar customs and sentiments of the Teutonic nations (in nothing, perhaps, more remarkable than for the respect which they evinced for the female sex), modified to some extent by the spirit of Christianity. It is undoubtedly closely connected with the feudal system. It has been observed that while feudality presents the political side of society in the Middle Ages, chivalry exhibits its moral and social side. Whatever may have been the follies and abuses which too often accompanied it, the institution of chivalry undoubtedly had its origin in a generous feeling, which prompted humane and brave men to provide for the protection of the defenceless. For this purpose courage was indispensable; and as women in that rude and semi-barbarous age especially needed protection, chastity and a respect for the sex bordering on adoration came to be regarded as among the cardinal virtues of a true knight. To these higher qualities were necessarily added others of a different character, growing out of the feudal system, and especially the relation between the vassal and his lord. If the conduct of those educated and trained under the influence of chivalry too often presented a glaring contrast with the ideal purity of its social and moral code, it does not prove that chivalry had not a pure and noble origin; it only proves how much easier it is to commend and admire virtue than to practise it. The history of mankind shows but too clearly how seldom the precepts of a high and noble philosophy or the principles of a pure religion are exhibited in the lives and conduct of its votaries. Yet in the case of chivalry, as in that of Christianity, the influence of its teachings has surely, though very slowly, it must be confessed, effected an important change in the sentiments and practices of society in many respects.

J. THOMAS.

**Chivalry, The Court of**, was established by Edward III. and fully defined by 13 Richard II. stat. I. The earl-marshal and the lord high constable were joint judges. When the earl-marshal sat alone, the court was only a court of honour; but when both judges sat, it was also a criminal court.

**Chivasso**, a town of Italy, in the province of Turin, stands on the left bank of the Po, near the influx of the Orco. It was at one time considered the key to Piedmont, but its fortifications were destroyed in 1804 by the French, and it has now no military importance at all, though it has still a garrison of some regiments. It carries on some trade in grain and wool. Pop. 7800.

**Chives**, or **Cives** (*Allium Schoenoprasum*), a plant of the same genus with the onion, a perennial, six inches to one foot in height, with very small, flat, clustered bulbs. The leaves are tubular and radical; the flower-stem is terminated by a cluster of bluish-red flowers. This plant grows wild in Europe, Asia, and Western North America. Chives are sometimes cultivated in kitchen-gardens, and are used for flavoring soups and dishes. Their properties are very similar to those of the onion. The part used is the young leaves. There are several varieties.

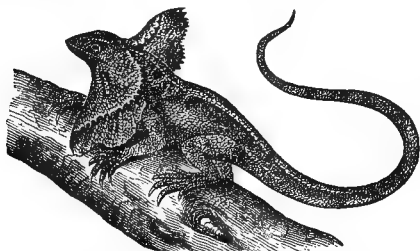
**Chizerots and Burins**, races in France who are despised, living in the arrondissement of Bourg-en-Bresse, in the department of Ain. They are believed to be descended from the Saracens. Although industrious and prosperous, they, like the Cagots, are held in the utmost detestation by their neighbors. They are looked upon as covetous and malicious; they marry among themselves. From time im-



memorial they have been field-laborers, cattle-dealers, butchers, etc. Many of them are very good-looking. The young women are handsome, with large black eyes. Many of these people are well-to-do business-men. (See MICHEL, "Histoire des Races Maudites," 2 vols., 1847.)

**Chladni** (ERNST FLORENS FRIEDRICH), born at Wittenberg, Germany, Nov. 30, 1756, was the founder of the science of acoustics. He devoted much time to the perfecting of the theory of sound, and published, besides other works, "Discoveries on the Theory of Sound" (1787), a "Treatise on Acoustics" (1802), and a "Treatise on Fiery Meteors" (1819). Died April 3, 1827.

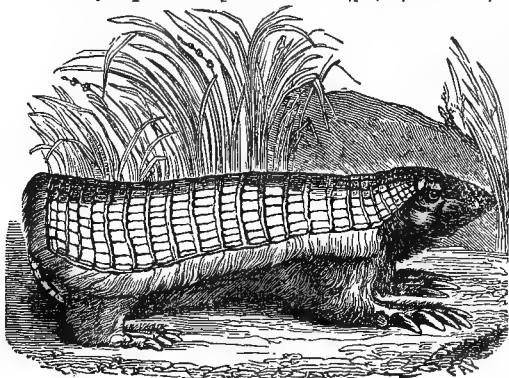
**Chlamydosaurus** [from the Gr. *χλαμύς* (gon. *χλαμύ-*



Chlamydosaurus.

*δός*), a "cloak" or "mantle," and *σαύρος*, a "lizard"], often called the "frilled lizard," a singular genus of reptiles, bearing on its neck a large plaited frill, of which the best known species is the *Chlamydosaurus Kingii*, a native of Australia. The general color of the chlamydosaurus is yellow-brown mottled with black, and it is remarkable that the tongue and the inside of the mouth are also yellow. The frill forming so conspicuous an ornament to this creature is covered with scales and toothed on the edge. During the early stage of the animal's life this appendage does not reach even the base of the fore legs, but when the animal has attained maturity it extends considerably beyond them. The chlamydosaurus is very courageous, and when provoked it erects the frill, and by showing its teeth presents a formidable aspect. When at rest its frill lies back in plaits upon the body. This lizard measures at full growth nearly a yard in total length.

**Chlamydophorus** [from the Gr. *χλαμύς*, a "cloak,"



Chlamydophorus.

and *φέρω*, to "carry"], a small edentate quadruped of Chili and the Argentine Republic, nearly related to the armadillo, but resembling the common mole in size and habits. It is remarkable for being covered with a shell of square plates on the head, neck, and back, with another similar shell on the posterior extremity. Its internal skeleton resembles that of birds. Its tail is carried under its belly. There are two known species, of which one is the *Chlamydophorus truncatus*, called *pichiciago* by the natives.

**Chlamys** [Gr. *χλαμύς*], a woollen outer garment of the Greeks, differing from the usual *amictus* of the men, the *ιμάτιον*, in being finer, gay in color, and oblong instead of square. It was fastened round the neck by a brooch (*fibula*), and hung down the back to the calf, or over the left shoulder, covering the left arm.

**Chloral**, a name composed of the first syllable of *chlorine* and the first syllable of *alcohol*, designating a liquid composed of chlorine, carbon, hydrogen, and oxygen, obtained by the action of chlorine on absolute alcohol. Its formula is  $\text{CCl}_3\text{CHO}$ . Chemically considered, chloral is acetic aldehyde in which the  $\text{H}_3$  is replaced by  $\text{Cl}_3$ . Bro-

mine acts similarly on alcohol, producing bromal,  $\text{CBr}_3\text{CHO}$ . When kept for a time it becomes solid, but is not changed in composition, and may be restored to its original form by heat. With water it forms a solid hydrate known as chloral hydrate or hydrate of chloral, which is now much used in medicine as a hypnotic. It enters the circulation, and is, by the alkalies contained in the blood, converted into formic acid and chloroform. The chloroform doubtless is the principal source of the hypnotic effect of the medicine. The dose is from twenty to forty grains to an adult. Much larger doses have been given with no bad results, but well-authenticated fatal cases of chloral poisoning indicate the necessity of caution in its use. The sleep produced by hydrate of chloral is wonderfully sweet and refreshing to most patients. Hydrate of chloral sometimes increases hysterical symptoms, and unless well diluted is irritant to the stomach. It is peculiarly valuable in tetanus. Given in large doses, it powerfully diminishes reflex action, and is a physiological antidote in poisoning by strychnia. Croton chloral is a by-product in the manufacture of chloral. It possesses similar properties, unites with water to form a hydrate, and is used in medicine as a hypnotic. (See HYDRATE OF CROTON CHLORAL.)

**Chlorantha'ceæ** [from *Chloranthus*, one of the genera], a natural order of exogenous plants nearly allied to pepper. They are herbaceous and half-shrubby, have jointed stems, opposite, simple leaves, with minute stipules between them. The flower has no calyx or corolla; the fruit is a drupe or 1-seeded berry. The order comprises but few known species, some of which are natives of China and Japan, and some are tropical. They are generally aromatic, and have important stimulating properties. The *Chloranthus officinalis* is prized in Java as a remedy for fever. The leaves and berries of the *Chloranthus inconspicuus* are used by the Chinese to flavor tea.

**Chlorate**, a compound formed by the action of chloric acid on a salifiable base. The best known of these salts is chlorate of potash ( $\text{KClO}_3$ ), which, mixed with combustibles, such as sulphur and charcoal, forms highly explosive compounds which ignite by a blow or friction. It is also a useful medicine. (See CHLORIC ACID.)

**Chlorhydric Acid**. (See HYDROCHLORIC ACID, by HENRY WURTZ, A. M., Ph. D.)

**Chloric Acid** ( $\text{HClO}_3$ ) forms with potash the white crystalline salt called potassium chlorate or chlorate of potash. (See CHLORATE.) This acid is a syrupy liquid, setting fire to dry organic substances with which it comes in contact.

**Chloride** [Fr. *chlorure*], a compound of chlorine with some other substance. Common salt is a chloride of sodium, and calomel is a chloride of mercury. (See CHLORINE.)

**Chlorine** [from the Gr. *χλωρός*, "pale green"], a non-metallic gaseous chemical element, discovered by Scheele in 1774, and named by him "dephlogisticated marine air." Soon after, from a mistaken view of its nature, it received the name of "oxymuriatic acid." In 1810, Davy proved it to be an elementary body, and gave it the name which it now bears. It occurs very largely as the chloride of sodium, common salt, in the vegetable, animal, and mineral kingdoms. In ordinary conditions it is a gas which may be easily obtained by moistening bleaching-powder with dilute sulphuric acid. It is a yellowish-green gas with a suffocating odor, is not combustible, and is a feeble supporter of ordinary combustion. A lighted candle placed in it burns with a smoky flame, the hydrogen of the oil alone burning. Antimony, copper, and arsenic, in fine division or in thin leaves, at once become red hot and burn when introduced into chlorine. Paper soaked in turpentine likewise bursts into flame. Chlorine is a perissad (a monad), having the symbol  $\text{Cl}$ , and the equivalent 35.5. It is very heavy, its specific gravity being 2470 (air = 1000). Two volumes of chlorine in one of water yield a solution resembling the gas in color, odor, and other properties. Chlorine is a bleacher of cotton and linen, and a powerful disinfectant. It can be condensed by pressure and cold into a transparent greenish-yellow limpid liquid, with a specific gravity of 1330, which also possesses bleaching properties and a powerful odor. Chlorine in very minute quantity produces a sensation of warmth in the respiratory passages, increasing the expectoration; in large quantities it causes spasm of the glottis, violent cough, and a feeling of suffocation. Its inhalation is liable to be followed by dangerous disease of the air-passages. The antidotes to the effects of chlorine in the lungs are the inhalation of the vapor of water, alcohol, ether, or chloroform. Chlorine unites with many substances to form a class of compounds known as chlorides.

**Chlorite** [from the Gr. *χλωρός*, "green"], an abundant green mineral composed of silica, alumina, magnesia, and protoxide of iron in variable proportions. It is rather



soft, and is easily broken. It rarely occurs crystallized in hexagonal crystals, and sometimes foliated like talc, from which it is readily distinguished by yielding water in a closed tube.

**Chlorite Schist**, or **Chlorite Slate**, a green slaty rock in which chlorite is abundant in foliated plates, usually blended with minute grains of quartz, and sometimes with felspar and mica. It is one of the metamorphic rocks, and is often found graduating into mica schist or clay-slate.

**Chlorocarbonic Acid** ( $\text{COCl}_2$ ), a compound formed by exposing a mixture of chlorine and carbonous oxide to the action of light. It is also called phosgene gas and carbonyl chloride.

**Chloroform** [a term derived from the first syllable of *chlorine* and the first syllable of *formyl*], ( $\text{CHCl}_3$ ), was long known to chemists before it was discovered to have valuable properties; but the power which it possesses of producing anesthesia has led to the preparation of chloroform on an extensive scale. It is also a useful chemical reagent. To four parts of bleaching-powder sufficient water is added to make a thin paste, to this is added one part of spirits of wine; the whole is introduced into a retort, which must not be more than half filled. Heat being applied, chloroform, water, and a little alcohol distil over. As the chloroform is heavier than water, two layers of liquid are obtained, the upper water and alcohol, and the lower chloroform. The upper liquid is poured off, the chloroform agitated with fused carbonate of potash, sulphuric acid, and alcohol, which abstract the remaining traces of water, and on subsequent redistillation the chloroform is obtained pure. It may be prepared by several other methods.

It is a remarkably limpid, volatile, mobile, colorless liquid, which has a characteristic odor and an agreeable sweetish taste. It has a specific gravity of 1.48, that of water being 1, and boils at  $142^\circ\text{F}$ . It has been regarded as a terchloride of formyl, and also as a chloride of methenyl. It is analogous to bromoform, iodoform, and nitroform. It is not inflammable in the ordinary sense, but when thrown on hot coals it burns with a green flame, evolving much smoke. It is slightly soluble in water, readily in alcohol and ether. It dissolves camphor, amber, resins, wax, caoutchouc, iodine, and bromine, as well as many alkaloids. The employment of chloroform as an anæsthetic has already been considered under *ANÆSTHESIA*; but it may be here observed that numerous cases of death from its use have occurred, even when administered by skilful physicians. It is sometimes administered by the stomach as an anodyne; and when applied to the surface of the body is a powerful blistering agent, very useful as a derivative.

**Chlorophane** [from the Gr. *χλωρός*, "green," and *φαίνωμαι*, to "appear"], a name given to those varieties of fluor spar which when heated shine with a beautiful emerald-green, phosphorescent light.

**Chlorophyl** [from the Gr. *χλωρός*, "green," and *φύλλον*, a "leaf"], the green coloring-matter of the leaves of plants. It is soluble in alcohol, but insoluble in water, and is somewhat similar to wax. Light is indispensable to its formation, and hence arises the phenomenon of blanching which occurs when plants are deprived of light. It is also called endochrome, especially in the lowest orders of plants.

**Chlorosis** [from the Gr. *χλωρός*, "pale green"], a disease almost peculiar to young women and girls, and usually associated with other troubles peculiar to that time of life. It takes its name from a greenish-yellow tint of the skin which some patients exhibit. There is also great pallor and debility, often disturbance of the heart's action, breathlessness, and a variously perverted and capricious appetite. The disease is characterized by a deficiency of the cell-elements of the blood. Most cases are readily curable by the use of exercise, good air, proper food and clothing, and, above all, by the administration of iron, which is almost a specific in this disease.

Chlorosis is also the name of the "yellows," a disease which attacks plants and trees, especially the peach tree. A deficiency of chlorophyl causes a blanched and yellow appearance. Damp soil, wet weather, and insufficient culture and manuring are assigned as causes, but widespread climatic influences of a character which is little understood appear to be the principal cause of this destructive malady. No treatment except underground drainage and good culture promises any benefit.

**Chloroxylon** [from the Gr. *χλωρός*, "green," and *ξύλον*, "wood"], a genus of plants of the order Cedrelaceæ, its fruit having only three cells and splitting into three parts. *Chloroxylon Swietenia* is the satin-wood of India, a tree which grows about sixty feet high. The satin-wood is exported, and is used by cabinet-makers and brushmakers.

**Choate** (RUFUS), LL.D., one of the most eminent advocates and orators that America has produced, was born in Essex, Mass., the 1st of Oct., 1799. Both his parents were distinguished for quickness of intellect, as well as weight of character. He entered Dartmouth in 1815. After taking his degrees, he remained in the college as tutor for one year. He commenced the study of law at Cambridge, and subsequently studied under the distinguished orator and lawyer, Mr. Wirt, then U. S. attorney-general at Washington. He began the practice of law in his native State at Danvers, whence he removed to Salem and afterwards to Boston. While at Salem he was elected to Congress (1832), and later (1841) he was chosen Senator as successor to Mr. Webster, who had been appointed secretary of state under President Harrison. After Webster's death Mr. Choate was the acknowledged leader of the Massachusetts bar, and was regarded by the younger members of the profession with a love equal to their reverence. His health having failed, in 1858 he retired from business, and a sea-voyage having been recommended by his physicians, he embarked for Europe in 1859, but he was unable to proceed farther than Halifax, where he died on the 13th of July.

As an orator Mr. Choate's powers were of the rarest order. He was not merely eloquent when he spoke on themes that were calculated of themselves to touch the feelings or stir the passions of his audience, but his genius enabled him to interest and fascinate his hearers even while discussing the driest and most unpromising subjects. Mr. Choate's superior foresight made him dread more than many others the dangers that threatened his country. And it may be that his anxiety to conciliate the South, whence the principal danger was to be apprehended, was carried too far; his conduct in this respect certainly gave serious offence to many who were jealous of the rights and dignity of the North. But there can be no reasonable doubt that had he lived till the breaking out of the civil war he would have been found no less true to his country than many others who, after having long earnestly advocated in vain a policy of conciliation towards the South, proved themselves among the most determined and most devoted supporters of the Union. (See "Works of Rufus Choate, with a Memoir of his Life," by S. G. BROWN, 1862.)

**Choate** (RUFUS), son of the preceding, born in Salem, Mass., in 1834, graduated at Amherst College in 1855, and was admitted to the bar in 1861. On the outbreak of the recent civil war he entered the service as lieutenant of Massachusetts volunteers, participating in the battles of Winchester, Cedar Mountain, Antietam, etc., and was promoted to be captain for good conduct. Resigned in 1862 on account of failing health. Died Jan. 15, 1866.

**Cho-card**, or **Choquard** (*Pyrrhocorax*), a bird of the family Corvidæ, differing from the chough in having a shorter bill, but resembling it in its habits. The only European species is the alpine chocard, called alpine chough and alpine crow. It is about the size of a jackdaw, of brilliant black, with yellowish bill and red feet.

**Choc'olate** [Fr. *chocolat*; from the Mexican name *chocolatl* (from *choco*, "cacao," and *latl*, "water")], a dried paste made from the seeds of *Theobroma cacao*, mixed with sugar and spices, as cinnamon, cloves, cardamom, vanilla, etc. The paste is poured into moulds to cool and harden. Chocolate, when used as a beverage, is dissolved in hot water or milk. Sometimes the yolk of an egg is added, and sometimes it is dissolved in soup or wine. It is also employed in making certain liqueurs, and is extensively employed in confectionery. In a pure state it is very nourishing. Good chocolate is smooth, firm, soluble, aromatic, not viscid after having been boiled and cooled, but oily on the surface, and leaves no sediment. Chocolate is often adulterated with rice-meal, oatmeal, flour, potato-starch, roasted hazel-nuts, or almonds. The Mexicans, from time immemorial, were accustomed to prepare a beverage from roasted cacao, mixed with maize-meal and spices. The Spaniards introduced it into Europe in 1520, and it is now very extensively used in Spain, Italy, and South America.

**Choctaws, The**, a peaceful, agricultural Indian tribe, occupied originally parts of Mississippi, Alabama, and Louisiana. In the last-mentioned State alone they had forty villages and could raise 2500 warriors. In the war of the Revolution they sided with the English, but in 1812 they proved true to the U. S. In 1800 they began to move westward; in 1803 more than 500 families had gone beyond the Mississippi; in 1820 they ceded one part of their land, and in 1830 the rest, for a domain in the Indian Territory. In 1861 they numbered about 25,000; they had 5000 negro slaves, and formed a community very prosperous in every respect. But they were allured into an alliance with the Confederates in the civil war, and from the calamities which then befel them they never re-

covered. Not only was slavery abolished and part of their land forfeited for the benefit of the freedmen, but their number was greatly reduced and the larger part of their property was destroyed. They are now settled in the Indian Territory, on the S. side of the Arkansas River. They cultivate the soil, are partially civilized, and are governed by written laws. They are politically connected with the Chickasaws, who live near them, and are represented in the same general council. They have numerous public schools and 3 large academies, one managed by the M. E. Church South and the other two by the Presb. Missionary Board. There is a good grammar of the Choctaw language by Rev. C. Byington (Philadelphia, 1870).

**Chodowie'cki**, a distinguished German engraver and painter, born Oct. 16, 1726, who lived in Berlin, and engraved as many as 3000 plates, most of them small, in a manner original and graceful. Died Feb. 7, 1801. Wilhelm Engelmann has published a catalogue of his works (Leipsic, 1857; sup. 1860).

**Chœrilus** [Gr. Χοείριλος], an Athenian tragic poet who flourished about 500 B. C. He was a competitor of Æschylus in a tragic contest, and gained prizes for thirteen of his dramas. None of his works are extant. He is supposed to have been the first author of written tragedies.

**Chœrilus of Iasus**, an inferior poet, was an attendant of Alexander on his march to the East, and sought to flatter him by his verses. To him, according to the scholiast on Horace, Alexander said, "He would rather be the Thersites of Homer than the Alexander of Chœrilus." The scholiast adds that Alexander agreed with him to give him a gold piece for every good verse, but a blow for every bad one, and that Chœrilus received only seven gold pieces in all, but was killed by the blows for his numerous bad verses. This author is treated of by Nâke in his work on Chœrilus of Samos.

HENRY DRISLER.

**Chœrilus (or Chœril'us) of Samos**, born about B. C. 470, though Suidas places him somewhat earlier, was the author of an epic poem the exact title of which is not known, but which treated of the wars of the Greeks with Darius and Xerxes. Suidas attributes his taste for literature to his intercourse with Herodotus, who had formed an attachment to him. He afterwards found a shelter at the court of Archelaus, king of Macedonia, where he died, not later than B. C. 399. Chœrilus departed from the usage of the earlier epic poets in taking for the subject of his poem a contemporary historical event. Fragments are preserved in the writings of Aristotle, Ephorus, Josephus, etc. These have been collected into a volume with a dissertation on the life and poetry of Chœrilus, by Nâke, Leipsic, 1817.

HENRY DRISLER.

**Choir** [Lat. *chorus*; Fr. *chœur*], a company of singers in a church; also that part of a church in which the choristers sing. In ordinary language, and even as used by architects, it denotes the entire space which is enclosed for the performance of the principal part of the service. In this sense it includes the choir proper and the presbytery, and corresponds to the chancel in parish churches.

**Choiseul, de** (ÉTIENNE FRANÇOIS), DUC DE CHOISEUL ET D'ANBOISE, a French statesman, born June 18, 1719. He entered the army, gained the rank of lieutenant-general, and was sent as ambassador to Vienna in 1756. Favored by Madame de Pompadour, he became prime minister and favorite of Louis XV. He was considered an able diplomatist, and was popular with the nation, but he was removed from power by the influence of Madame du Barry in 1770. Died May 7, 1785. (See *Mémoires de M. le Duc de Choiseul, écrites par lui-même*, 2 vols., 1790.)

**Choiseul-Gouffier, de** (MARIE GABRIEL FLORENT AUGUSTE), COUNT, a French scholar and traveller, ambassador to Turkey, born Sept. 27, 1752. Having visited Greece and Asia Minor in 1776, he published a "Pictorial Journey in Greece" (1782; new ed. 1841). Died June 20, 1817.

**Choisy-le-Roi**, a town of France, in the department of the Seine, on the Seine and on the Paris and Orleans Railway, 6½ miles S. of Paris. It has manufactures of porcelain, glass, chemicals, etc. Pop. in 1881, 6978.

**Choke-Cherry**, the *Prunus Virginiana* and its fruit, a species of bird-cherry, a native of North America, having small fruit in racemes; the fruit is rather agreeable, but astringent. The bark is used as a febrifuge and tonic, under the name of wild-cherry bark; and by distilling with water a volatile oil is obtained from it, associated with hydrocyanic acid.

**Choke Damp.** See CARBONIC ACID.

**Cho'king**, the obstruction of the pharynx or œsophagus, or more rarely of the larynx or trachea, by masses of

food or other foreign bodies. Choking by obstruction of the pharynx or œsophagus is sometimes relieved by the operation of an emetic, sometimes by the use of gullet-forceps, of which there are many varieties, or by other appropriate instruments. Œsophagotomy, or cutting, has been resorted to, but this is one of the most formidable operations of surgery, and is not often necessary. When foreign bodies lodge in the larynx, aphonia, or loss of speech, is one of the symptoms. If the substance is in the windpipe or bronchi, the surgeon may often detect its presence by auscultation. The symptoms caused by foreign bodies in the œsophagus are often surprisingly like those which occur when similar bodies lodge in the air-passages. These symptoms are various; there may be spasmodic coughing, redness of the face, ineffectual attempts to swallow, and great discharge of saliva, and generally there is great difficulty of breathing. Surgical aid should always be called.

**Chol'era** [Gr., probably from *χολή*, "bile"], a disease characterized by purging and vomiting, followed by great prostration, and in many cases by fatal collapse. Comparatively mild cases occur with frequency even in temperate latitudes, and are known as sporadic cholera or cholera morbus; and such cases, though very distressing, are seldom fatal, while the more severe or epidemic form (known as Asiatic cholera) appears to arise in India, where it is endemic, and to be carried by ships, caravans, religious pilgrimages, etc., westward to Egypt, Persia, and Arabia, and thence to Europe and around the world by the regular channels of commerce. The disease is probably of miasmatic origin, and local conditions may favor or check its local development; but whether the disease ought to be called contagious or not is one of the most warmly disputed points in medicine. It is certain that habitual personal contact with the sick is often not followed by the disease. It is held by many that the disease is propagated by drinking water; by others, that its germs are taken up from the air the patient breathes. It is regarded by many as certain that the disease is largely propagated from the stools or alvine discharges of the sick; and all such discharges should be treated with powerful disinfectants, and deposited, if possible, in places not frequented by those who are well; and especial care should be taken not to let them be thrown into vaults and privies in common use. As to whether personal quarantines and cordons do any good in preventing the spread of cholera, the most diverse opinions are held, some writers strongly affirming, and others as strongly denying, their usefulness.

Without describing the various stages of the fatal disease—the premonitory painless diarrhoea, the alarming and profuse purgation which follows, carrying off the fluids of the body, the profound collapse, the reaction, with the dangerous febrile condition which may follow—it is enough to say that treatment should be chiefly preventive. No diarrhoea in a cholera season should be neglected. Opium will usually control the precursory diarrhoea. During the active stage of the disease cold compresses to the bowels are sometimes useful. The administration of diffusive stimulants in small doses during the stage of collapse should be persisted in. Friction by the hand may relieve the spasm of the muscles. Great care should be taken for a long time lest a relapse should occur. The food of convalescents should be of the very lightest and blandest character for some days.

REVISED BY WILLARD PARKER.

**Chol'era Infan'tum, or Acute Intes'tinal Catarrh'.** This intense and dangerous form of infant diarrhoea is mostly found in hot climates, the hot season, and close air; more amongst the poor than the rich. It is by no means confined to the U. S.; on the contrary, it is very frequent in Europe, and just as frequent in the first summer of the infant as in the second. It has no direct relation to dentition, which is illogically accused of being the cause of so many diseases of infancy, and results but rarely from exposure or from mental emotions of either infant or mother (wet-nurse). The usual cause is improper feeding in hot weather. The former is a direct injury; the latter, by debilitating the nervous system and lowering the functions of all the digestive organs, diminishes the general strength and power of endurance. Nursing infants are but seldom affected; many infants will recover from an attack by being returned to the mother's or nurse's breast. Still, an improper condition of breast-milk (an undue proportion of water, or fat, or caseine, or the admixture of medicinal agents taken by the mother or nurse, or a change produced by mental emotions in the latter) is known to be injurious. Weaned infants, however, and such as are brought up on artificial food, are mostly attacked. Artificial food is seldom identical, in its nutritive value, with mother's milk. Cow's milk contains less sugar and more butter and caseine than mother's milk, and requires cook-

ing and skimming before being diluted with water (better still, barley water). Vegetable food is dangerous unless carefully selected and prepared. Thus it is that the first passages in cholera infantum contain undigested food of all sorts, particularly lumps of coagulated milk, which is also brought up by vomiting. Afterwards the passages are very thin, watery, of an acid or fetid smell, very copious and frequent; vomiting accompanies this diarrhoea, more or less. Moaning and crying are soon replaced by debility, and even complete collapse; the body is rapidly deprived of a large portion of the water contained in it, and emaciates; the eyes lie deep in the orbits; the sutures and fontanelles of the skull sink; the skin becomes dry, the feet and hands cold, while the temperature of the trunk is rising; the face looks shrunk and senile; the pulse becomes weak and frequent, the voice feeble, the expression of eyes and face listless, and sopor or coma or convulsions set in. Death is a frequent result. The principal preventive consists in supplying the well infant with proper artificial food when no breast-milk is available, and at regular times, and in attending to its general health. When the disease has made its appearance the principal means of checking it are the following: during the first few (3-6-8) hours no food or drink ought to be given. The irritated stomach must be kept at rest; vomiting will cease on that condition only. After that time give a teaspoonful of ice-water or a small piece of ice (size of a bean), with or without a few drops of brandy, every five or ten minutes, as long as the tendency to vomit persists. When feeding is to be recommenced, avoid milk (except breast-milk) in whatever form. Barley-water, oatmeal gruel (strained), in tea or tablespoonful doses, now and then, with the white of eggs (1-3 in twenty-four hours), will readily be taken and well digested. Many cases will get well with this dietetical treatment. At the same time the air must be kept as cool and fresh as possible, day and night. The infant will recover faster out of than in doors. The medicinal treatment, which is, under all circumstances, the domain of a physician, varies according to the nature of the case. Mercurial remedies (calomel) can be avoided. Subnitrate of bismuth, with opium in small doses, and preparations of chalk, nitrate of silver, astringents, such as tannic or gallic acids, catechu, are frequently resorted to, the latter principally in cases which threaten to become chronic. A. JACOBI.

**Choles'terin** [from the Gr. *χολή*, "bile," and *στέαρ*, "fat"], one of the lipoids, or non-saponifiable fats, was originally discovered in gall-stones, but is an ordinary constituent (in very minute quantity) of bile, blood, the tissue of the brain, and of pus and other morbid fluid products. It is generally thought to be a product of dissimilation, and is hence considered an excrementitious substance. It separates from its solutions in glistening pearly scales, which, when examined under the microscope, appear as very thin rhombic tablets. Different formulæ have been assigned for its composition, the one generally accepted being  $C_{26}H_{44}O$ . It is not always easy of detection, but it may be readily distinguished from all similar substances by its rhombic tablets.

**Cholet**, a town of France, department of Maine-et-Loire, on the river Maine, 32 miles S. S. W. of Angers. It is well built, and has manufactures of fine woollen and mixed fabrics. Pop. in 1881, 15,916.

**Cholmondeley**, chum'ly, MARQUESSES OF, and Earls Rocksavage (United Kingdom, 1815), Earls Cholmondeley (1706), Viscounts Malpas (1706), Barons Cholmondeley (England, 1689), Barons Newburgh (Great Britain, 1716), Viscounts Cholmondeley (1661), Barons Newburgh (Ireland, 1714), and baronets (1611).—WILLIAM HENRY HUGH CHOLMONDELEY, third marquess, joint hereditary lord grand chamberlain of England, born Aug. 31, 1800, was member of Parliament for South Hants 1852-57, and succeeded his brother May 8, 1870.

**Cholu'la**, a decayed town of Mexico, in the state of Puebla, is situated on the table-land of Anahuac, about 70 miles E. S. E. of Mexico. Elevation above the sea, 6912 feet. According to Cortez, it contained 20,000 houses in the first part of the sixteenth century, and about 400 temples. The present population is about 5000. Here is a remarkable ancient pyramid of clay and brick, which is 164 feet high, with a base each side of which measures 1440 feet. It is supposed that this was erected by the aborigines or ancient Mexicans. Humboldt reported that he found 16,000 inhabitants, but it has greatly decreased since.

**Chone'tes** [from the Gr. *χώνη*, "cup" or "funnel-shaped cavity"], a genus of fossil brachiopodous molluscs nearly allied to the genus *Producta*. It is characterized by a transversely oblong shell, and by having the long

margin of the ventral valve armed with a series of tubular spines. More than twenty-eight species have been found in the paleozoic formations. They are found in Europe and America.

**Chopin** (FRÉDÉRIC FRANÇOIS), a Polish pianist and composer, born near Warsaw Mar. 1, 1809, removed to Paris about 1832. He composed concertos, waltzes, nocturnes, preludes, and mazurkas which display a poetic fancy and abound in subtle ideas, with graceful harmonic effects. His compositions are strikingly peculiar in melody, rhythm, and harmony, and possess a delicate though powerful charm. He was one of the first of pianists, and his playing, like his music, was marked with a strange and ravishing grace. Died in Paris Oct. 17, 1849. In 1869 a monument was erected to him at Warsaw. (See LISZT, "Chopin," 1852; BARBEDETTE, "Chopin," 1869.)

**Chopine**, or **Chiopine**, chop-een' [Sp. *chapin*; probably from the It. *scappino*, a "sock"], a high clog or slipper. Chopines were probably of Eastern origin, but were introduced into England from Venice during the reign of Elizabeth. They were worn by ladies, and were usually made of wood covered with leather, often of various colors, and frequently painted and gilded. Some of them were as much as half a yard high; and in Venice, where they were universally worn, their height distinguished the quality of the lady.

**Chop'tank**, a river which rises in Kent co., Del., and flows south-westward into Maryland. It expands into an estuary, forming the boundary between Talbot and Dorchester counties, and communicates with Chesapeake Bay. Length, nearly 100 miles. Sloops can ascend it about fifty miles.

**Chora'gus**, or **Chore'gus** [Attic Gr. *χορηγός*], a person at Athens who, on behalf of his tribe, supported the chorus, and who, in competition with the other tribes, exhibited musical or theatrical performances. The choragus who surpassed his competitors received a tripod for a prize, but he had the expense of consecrating it and of building the monument on which it was placed. (See CHORUS.)

**Chora'le** [Low Lat., from *chorus*, a "choir"], or **Cho'ral**, a melody to which hymns or psalms are sung in public worship by the congregation in unison. The melody of the chorale moves in slow and strictly-measured progression, and is of a character that disposes the mind to devotion. The term chorale is now applied only to the music of the Protestant churches, but choral melodies still in use can be traced with certainty to the early centuries of Christianity. The pure, simple chorale has in a great degree been cast aside.

**Chord** [Fr. *corde*, from the Gr. *χορδή*, a "string"], in geometry, is the straight line which joins the two extremities of the arc of a curve; so called because while the arc resembles the bow (*arcus*), the chord may be likened to the bow-string. The chord of a circular arc may be found by multiplying the radius by twice the sine of half the angle which the arc subtends. The use of chords in trigonometry is mostly superseded by the use of sines, which are much more convenient.

Since two circles can cut each other in only two points, they can have only one common chord. But by the transcendental "principle of continuity," to which modern geometry owes so much, the circle may be considered as a curve of the second order, and as such two circles may be said to have four points of intersection, two of which are, however, always imaginary. These imaginary points are called "circular points at infinity." This view also gives the two circles six common chords, instead of one. Four of these chords are imaginary, and the fifth is infinitely distant; while the sixth (and most obvious) chord may or may not cut the two circles in real points. This last chord is often called the RADICAL AXIS (which see), and has many remarkable properties.

**Chord**, in music. See CONSONANCE.

**Chore'a** [Gr. *χορεία*, a "dance"], or **St. Vitus's Dance**, a disease characterized by irregular, involuntary, and often grotesque muscular action, without appreciable organic change in any tissue, and generally without pain or any known derangement of mental action or of sensation. It is most common in children after the second dentition and before puberty; much more common in girls than in boys; sometimes attacks pregnant women and other adults, though some cases once called adult chorea would now be recognized as locomotor ataxy, a very different disease. Choreia is sometimes hereditary, sometimes epidemic. Many writers have classed the dancing mania (the original "St. Vitus's dance"), tarantism, and the strange excesses of certain religionists (derivatives, French prophets, "jumpers," and "convulsionists") all as varieties of chorea. Stammering has been called a chorea of the vocal organs. The

disease is sometimes associated with rheumatism and with anæmia. Such complications should receive special treatment. The metallic tonics are generally useful, and so are systematic gymnastics, life in the open air, and a kind and unobtrusive discipline, which shall teach the young patient the power of the will over the movements of the body.

**Chor'ley**, a town of England, in Lancashire, on a hill and on the river Chor, 20 miles N. W. of Manchester. It is connected by a railway with Preston and Bolton. It has an ancient parish church in the Norman style, and a handsome Gothic church. The place owes its prosperity to various manufactures of cotton yarn, muslin, jaconet, calico, and gingham. Mines of coal and lead and quarries of slate are worked in the vicinity. Pop. in 1881, 19,472.

**Cho'roid Coat** [from the Gr. *χοριον*, "skin," and *εidos*, "appearance"], the second of the tunics of the eye, covering the posterior five-sixths of the eyeball, and coming as far forward as the edge of the cornea. In front it is continued by the ciliary processes and the iris. It joins the sclerotic by means of the ciliary ligament and muscle. It is highly vascular, and is pigmentary, being of a kind of chocolate color. It is in three layers. The outermost is connected to the sclerotic by the *membrana fusca*. This coat consists principally of the vorticeous veins, with pigment-cells. The middle layer (*tunica Ruyechiana*) consists of capillaries. The inner layer consists of tessellated epithelium, charged with pigment. This layer is lined by the retina. The choroid coat is liable to an inflammatory disease known as choroiditis.

**Cho'rus** [Gr. *χορός*; Lat. *chorus*], a Latin word by which is understood the union of musicians for the performance of a musical work. In modern music a combination of voices or instruments is called a chorus. A vocal chorus is mixed or complete where it consists of all or part of the four principal voices. There are also choruses for male and female voices. An instrumental chorus is the name applied especially to a combination of wind instruments. A musical passage thus unitedly rendered is termed also a chorus. In operas and the oratorio it is of the greatest importance. In the immense musical festivals or jubilees recently held in different parts of Europe and America the choruses have comprised many thousand voices.

The chorus of the ancient drama is not, as is often insinuated, an element of special æsthetic excellence, but a mark of its historical origin from the worship of Dionysos, which it never succeeded in getting rid of. In the olden times solemn narratives of the exploits of the god were recited between the hymns sung in his honor, and this character of being a recital of an epic interspersed with the singing of lyrical poems the ancient drama never fully outgrew. The hymns were sung by the chorus; the epic was recited by the actors. The chorus never—or, at least, very seldom—entered the stage. Its place was in the orchestra, in the centre of which stood the altar of Dionysos, on which a sacrifice was offered before the representation began. Around that altar the chorus was dancing to the flute while singing its songs. Its connection with that which took place on the stage was often very loose—a kind of running commentary; it very seldom took an active part in the dramatic development of the plot. Its members were citizens of good reputation. The expenses of their training and outfit were defrayed by some rich man, the *choragus*. Their leader bore the name of *coryphæus*. When the chorus did its part well, not only the *coryphæus*, but also the *choragus*, was crowned and applauded.

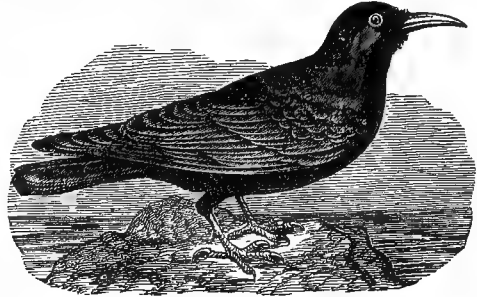
**Chose in Action**, in law, a thing in action. This is a term used to express all rights enforceable by action in a court of justice. Blackstone, in his "Commentaries," confines it to rights growing out of contracts. Modern usage extends it to claims arising from torts or wrongs. (See CONTRACTS, TORTS, ASSIGNMENT, CHATTEL, etc.)

**Cho'tyn, Kho'tin, or Choc'zim**, a fortified town of Southern Russia, in Bessarabia, on the Dniester, 45 miles S. W. of Kamieniec. It is an important military post, which formerly belonged to the Turks, from whom it was taken by the Russians in 1739. Pop. in 1882, 15,782.

**Chouans**, a name of the French royalists of Brittany who revolted against the French Convention in 1792. Chouan, which signifies an "owl," was the nickname of Jean Cottereau, who was the leader of the insurgents, and had previously been a smuggler. This insurrection was called *La Chouannerie*. Cottereau gained some success in guerilla warfare, and eventually united his troops with the Vendéens. They were defeated at Le Mans in Dec., 1793. Cottereau was killed in a fight in July, 1794. New movements of the Chouans took place in 1799, and again in 1814 and 1815, but they were easily suppressed.

**Choug**, chûf [etymology uncertain], (*Fregilus*), a bird

of the crow family, approaching the character of the starling, but resembling the crow in having its nostrils covered with bristles. The beak is long, strong, arched, and pointed.



Chough.

The tail is slightly rounded. The Cornish chough, or red-legged crow (*Fregilus graculus*), inhabits many parts of Europe and Asia and the north of Africa, dwelling on high cliffs. Its long claws enable it to cling to a rock, but it seems unwilling to set its feet on turf. It lives in societies like the rook. It feeds on insects, berries, grubs, and grain. It is easily tamed, and exhibits in the highest degree the disposition which characterizes others of the crow family. Other species of chough are natives of Australia, Java, etc. The alpine chough is a CHOCARD (which see).

**Choules** (JOHN OVERTON), D. D., born at Bristol, England, Feb. 5, 1801, studied theology at Bristol College (England). He arrived in America in 1824, and engaged immediately in teaching, for which he seems to have had unusual adaptation, and to which he devoted himself, to some extent, throughout his life. He was pastor of Baptist churches in New Bedford, Mass., Buffalo, N. Y., Jamaica Plain, Mass., and Newport, R. I., and edited several works, the most important of which was Neal's "History of the Puritans," and published "The Young Americans Abroad" and "A History of Christian Missions." Died in New York Jan. 5, 1886.

**Chouteau** (AUGUSTE and PIERRE), two brothers noted as the founders of the city of St. Louis, Mo. They removed from New Orleans to the site of St. Louis in 1764. Auguste died in 1829, and Pierre in 1849. The latter had a son Pierre (born 1789; died Sept. 8, 1865), an eminent merchant in the fur-trade.

**Chowan'**, a river of North Carolina, is formed by the Meherrin and Nottoway rivers, which unite about 5 miles above Winton. It flows south-eastward, and then southward, forms the boundary between Chowan and Bertie counties, and enters Albemarle Sound at its western end. It is about 50 miles long, and is navigable for sloops.

**Chrestien**, or **Christian de Troyes**, died between 1195 and 1198, a French poet of great celebrity in his own time. A number of his romances ("Tre et Enide," "Perceval le Gallois," "Cliquet, Chevalier de la Table ronde," etc.) are still extant.

**Chrestom'athy** [Gr. *χρηστομαθεια*], according to the etymology, is that which is useful to learn. The Greeks frequently formed commonplace books by collecting the various passages to which in the course of reading they had affixed the mark *χ* (*χρηστός*). Hence books of extracts chosen with a view to utility have received this name.

**Chres'tus of Byzantium**, one of the most distinguished pupils of Herodes Atticus, a contemporary of the emperor Aurelius. He was celebrated for his eloquence, and taught rhetoric with great success, having many distinguished men among his hearers. Of his writings nothing is preserved. Philostratus has given notices of him in his lives of the Sophists.

HENRY DRISLER.

**Chrism** [Gr. *χρίσμα*, from *χρίω*, to "anoint"], the oil which is used in the Greek, Roman Catholic, and Oriental churches in the administration of baptism, confirmation, ordination, extreme unction, etc. There are two kinds of chrism—the one, a mixture of oil and balsam, is used in baptism, confirmation, and ordination; the other, which is mere oil, is used in extreme unction. The chrism of the Eastern Church contains more than forty ingredients.

**Chris'ome** [from the Gr. *χρίσμα*, an "anointing"], the white vesture laid by the priest on the child in former times at baptism, to signify its innocence. It was generally presented by the mother as an offering to the church, but if the child died before the mother was churching after the next child's birth, it was used as a shroud. A chrisome child is a child in chrisome cloth.

**Christ** [Gr. *Χριστός*; Lat. *Christus*], a word which was

at first a title of our Saviour, now in general use as part of his name. It is Greek, signifies *anointed*, and corresponds exactly in meaning and use with the Hebrew word *Messiah*. As kings were anointed on being called to their offices, so the Saviour was anointed (Acts x. 38) "with the Holy Ghost and with power." This anointing signifies a consecration or setting apart for a peculiar work. (For the historical account of Christ, see *JESUS*; for an account of the doctrines held with regard to Christ's nature, see *CHRISTOLOGY*, by PROF. W. G. T. SHEDD, D.D.)

**Christadelphians** ("brothers of Christ"), a religious body of recent origin who are becoming numerous in some parts of the U. S. They attach equal importance to the Old and New Testaments, and believe that the intention of the Creator is to recall to immortal life all who love him in this life, who shall people this world. All who have not caught the immortal principle perish in death. They reject the doctrine of a personal devil. Christ, they believe, is the Son of God, deriving from the Deity moral perfection, but from his mother the common nature of Adam. They ascribe to him the threefold character of prophet, priest, and king. The first office he fulfilled by his life and death on earth; as priest he now mediates before the Deity; and as king he will return to earth and reign from the throne of David over the glorified world.

**Christ'church**, a borough and seaport of England, in Hampshire, on the English Channel, and at the head of the estuary formed by the rivers Avon and Stour, 24 miles S. W. of Southampton. Here is a priory church, one of the most interesting of English ecclesiastical structures, which was partly built on an ancient foundation in the reign of William Rufus. Christchurch has manufactures of springs for watches and clocks, and several breweries. The phenomenon of a double tide occurs here every twelve hours. Pop. 9368.

**Christ Church**, a town of New Zealand, capital of the province of Canterbury, is situated on the banks of the river Avon, 7 miles from the sea. It is connected by railway with Lyttleton, which is its port, and by telegraph with nearly all the leading towns. It is the seat of an Anglican bishop, and has a college. Pop. in 1881, 15,213; with Sydenham and suburbs, 30,970.

**Christ, Pictures of.** The New Testament contains not the slightest hint at the personal appearance of Christ, and the double tradition which soon began to form was evidently based, not on actual knowledge, but on the prophetic descriptions of the Old Testament, the persecuted Church imagining Christ as the suffering Messiah, in accordance with Ps. xxii. and Isa. lii.; the victorious Church as the glorified Messiah, in accordance with Ps. xlv. and the Song of Songs. Of formal descriptions three have come down to us, but none of them has any real value. The first is found in a Latin letter which pretends to have been written by Publius Lentulus, "president of the people of Jerusalem" and a contemporary of Pilate. It was first discovered in a manuscript copy of the works of Anselm, and is certainly not older than the fourth century. A second description is found in the works of John of Damascus ("Ep. ad Theoph. Imp. de venerandis imaginibus") from the eighth century, and a third in the ecclesiastical history of Nicephorus (i. 40) from the fourteenth century. All those descriptions agree in depicting Christ as having florid or reddish hair parted down the middle of the crown, blue eyes, and forked beard. Finally, two portraits of Christ are spoken of. Eusebius tells us ("Hist. Eccl." i. 13) of a correspondence between Christ and King Abgarus of Osroëne, and when repeating this story Moses Choronenis adds ("Hist. Arm." ii. 30-33) that Christ sent his portrait to Abgarus. Unfortunately, both Rome and Genoa claim to be in possession of the genuine portrait. Another portrait of Christ became imprinted on the silken handkerchief of Veronica when she wiped the sweat from his face while he was carrying his cross to Golgotha. That portrait, too, has multiplied, and several cities claim to have the genuine one. (See Mrs. JAMESON AND LADY EASTLAKE, "The History of our Lord in Works of Art," London, 1865.)

**Christening**, a term used as a synonym for baptism. It is disliked by some as favoring the doctrine of baptismal regeneration, being, according to its derivation, expressive of the notion that a person is made a Christian in baptism. But it is usually employed without the intention of conveying any such opinion.

**Christian II.**, king of Denmark, a son of John, was born July 2, 1481. He began to reign in 1513, and married Isabella, a sister of the emperor Charles V., in 1515. In 1520 he invaded Sweden, which he partially conquered. He usurped the throne of Sweden, and abused his power by cruelty, but he was expelled by Gustavus Vasa in 1522.

His Danish subjects also revolted, deposed him, and elected his uncle, Frederick I., in 1523. Christian retired to Flanders, and returned with an army in 1531, but was defeated and kept in prison until his death, Jan. 25, 1559. (See BEHRMANN, "Kong Christiern II., Historie," 1815.)

**Christian IV.**, king of Denmark, born April 12, 1577, was the son and successor of Frederick II., who died in 1588. He became in 1625 the commander of the Protestant armies in the Thirty Years' war against the emperor of Austria. In 1626 he was defeated by the imperialist general Tilly at Lutter. He waged war against Sweden from 1611 to 1613, and again from 1643 to 1645. He was an able ruler, and promoted the prosperity of Denmark. He died Feb. 28, 1648. (See RASMUS NYERUP, "Charakteristik af Kong Christian IV.," 1816.)

**Christian VII.**, king of Denmark, born Jan. 29, 1749, was a son of Frederick V. His mother was Louisa, a daughter of George II. of England. He began to reign in Jan., 1766, and married his cousin Caroline Matilda, a sister of George III. of England, in the same year. His physician, Struensee, obtained the chief power in 1770, and was supported by the favor of the queen, but he was unpopular with the nation. Christian VII. was so feeble and morbid that he was incapable of reigning. He died Mar. 13, 1808, and was succeeded by his son, Frederick VI., who had been regent since 1784.

**Christian VIII.**, king of Denmark, born Sept. 18, 1786, was a cousin of Frederick VI. He was chosen king of Norway in 1814, but being unable to defend it against Bernadotte, who invaded Norway, he abdicated in Oct., 1814. He succeeded Frederick VI. in Denmark in 1839, and died Jan. 20, 1848, leaving the throne to his son, Frederick VII.

**Christian IX.** ascended the Danish throne in 1863 by virtue of a London protocol of 1852, which conferred the right of succession after the extinction of the house of Oldenburg to the house of Glücksburg. As a king he lost Sleswick, Holstein, and Lauenburg—that is, one-third of the kingdom—and governed one year with a budget which was not confirmed by the representatives of the people—that is, he broke the constitution of the state. But, while his reign is a miserable affair—the darkest spot in the history of Denmark—he has managed his family affairs with great success: one of his daughters is empress of Russia; another, princess of Wales; and one of his sons is king of Greece.

**Christian Commission**, or, more fully, **The United States Christian Commission**, a great organization in the Northern U. S. during the late civil war. It was organized Nov. 14, 1861, at New York. Its work was designed to supplement that of the great Sanitary Commission, for while the object of the latter was more especially the care of the sanitary condition of the national armies, the relief of the wounded and sick, etc., the Christian Commission also gave especial attention to the religious needs of the troops, co-operating with the chaplains, while the Sanitary Commission more especially co-operated with the medical officers of the army. At the same time the two societies entered into a generous rivalry in the work of supplying the material wants of the sick and wounded soldiers. The Christian Commission was first proposed by Mr. Vincent Collyer of New York, and originated by a call of the Young Men's Christian Association of New York (Sept. 23, 1861) upon all similar associations in the North to unite in this great undertaking. (See Moss, "Annals of the Christian Commission.")

**Chris'tian Connection** (or simply **Christians**\*), a religious denomination which arose in the U. S. about the beginning of the present century. This body originated in three distinct movements in three of the older denominations of the U. S.: (1) in the "O'Kelly Secession" (1793) from the Methodist Episcopal Church. O'Kelly's followers were at first called "Republican Methodists," but afterwards chose the name of "Christians," and declared the Bible alone to be their rule of faith and church government. (2) Dr. Abner Jones of Hartland, Vt., a Baptist, organized in 1800 a church which disavowed all creeds and sectarianism, and received the Bible as their only rule. They were joined by many ministers and others, chiefly of the Baptist and Freewill Baptist denominations. (3) A body of Presbyterians of Kentucky and Tennessee, who seceded in 1801 from the parent Church, and in 1803 took the name of Christians. The above three bodies were finally united into a "general convention," which meets quadrennially. The churches, however, are independent in church government.

The "General Baptists" of England and Wales hold

\*This name is often pronounced Krist'chan, in order to distinguish it from the common word, Christian.



doctrinal views very similar to those of the Christians, and the two bodies are in fellowship with each other. They invite all believers to their communion. The Christians are opposed to infant baptism, have no creed except the Bible, practise immersion in baptism, and are, as a general rule, Unitarian in their doctrines. They have in the U. S. about 150,000 communicants, and support several colleges and other schools. They are also found in England and her colonies. The denomination called "Campbellites" and "Disciples" also call themselves "Christians." (See DISCIPLES OF CHRIST.)

**Christianity** (ISAAC P.). See APPENDIX.

**Christian Era** [Fr. *ère Chrétienne*], the name of the great era from which all Christian nations compute their time, once supposed to correspond to the date of the birth of Christ. But, according to some of the best authorities, Christ was born on the 5th of April, four years before the commencement of our era (others say on the 25th of December, four or five years before that time). The practice of reckoning time from the (supposed) birth of Christ appears not to have been introduced into the Christian Church until the sixth century, when Dionysius surnamed the Little (*Exiguus*), a monk of Syria, first made use of it about 527 A. D. It was soon after introduced into Italy, and into France in the following century. The first instance recorded of its being employed in England was in 680. But the practice did not become universal throughout Christendom until about the middle of the fifteenth century.

**Christia'nia**, the capital of Norway and of the stift of the same name, is picturesquely situated in a valley and at the head of the navigable Christiania Fiord, about 55 miles from the sea; lat. of observatory, 59° 55' N., lon. 10° 43' E. The environs of the city are beautiful, and visitors who approach it by the fiord pass through magnificent scenery. It contains a cathedral, a citadel, a royal palace, a great arsenal, a town-hall, two theatres, an exchange, an asylum for lunatics, and a university founded in 1811, which has a library of 230,000 volumes. The average number of students is nearly 600. Connected with the university is an astronomical observatory. Here are manufactures of cotton, paper, glass, soap, etc. The chief articles of export are timber, iron, and glass. The harbor and fiord are closed by ice for three or four months in the year. It is a bishop's see, and was founded in 1624 by Christian IV. on the site of the burned royal city of Opslo. P. in 1882, 122,036.

**Christian'ity** [from the Gr. *Χριστιανός*, a "follower of Christ"], a system of religion which comes to us with a claim to be accepted as of divine origin. It professes to be no product of the human intellect, and acknowledges no author but the Being whom it sets before us as the object of worship. It claims to be the only true religion, and is consequently exclusive; that is to say, it admits of no compromise with any other religious system.

As a system it cannot be viewed as distinct from the religion of the Jews and of the patriarchs; it is the same religion adapted to new circumstances; there has been a change of dispensation alone. In studying Christianity we are obliged constantly to revert from the New Testament to the Old, and in some measure to trace the history of this through the preparatory dispensations. Christianity may be regarded as having its foundation in the doctrine of the existence of one God. Man is represented as involved in misery, incapacitated for the service of God, and liable to punishment for sin in a future state. The doctrine of the atonement claims special attention—a doctrine taught in all the sacrifices of the patriarchal and Jewish dispensations, as well as by the words of the Bible. Man being utterly incapable of effecting his own deliverance, God sent his Son to save sinners, to make them holy and partakers of eternal life.

By Unitarians and others who do not accept the above view, atonement or reconciliation with God is made to depend on repentance, while the life and death of Christ are represented as an example to us of obedience, virtue, goodness, and beneficence, under most trying circumstances; in which view the doctrines of a propitiatory sacrifice and imputed righteousness fall to the ground. These doctrines, however, are held by most of those who receive the doctrine of the Trinity and the generally received doctrine as to the incarnation of the Son of God, which is regarded as a glorious example of Divine condescension and a very great exaltation of human nature, while the highest dignity and bliss of which humanity is capable is believed to be attainable only by faith in Jesus Christ. According to this view, the connection between faith and salvation arises from the Divine appointment, which, however, provides for bringing into exercise, in harmony with the intellectual and moral nature of man, most powerful and excellent motives for all that is morally good, the partakers of salvation being thus fitted for the fellowship of God.

The doctrine of divine grace is a part of the system of Christianity on which very important differences of opinion subsist, especially as to the relation of grace to individual men. Such are the differences concerning election, and concerning man's ability or inability to exercise saving faith of himself. But by Christians generally the relation of the believer to Christ, and his faith in Christ, are ascribed to the Holy Ghost or Spirit of God, the third person of the Godhead. (See CALVINISM and ARMINIANISM.)

Salvation is viewed as beginning in regeneration, and as carried on in sanctification, and all its joys as connected with the progress of sanctification in this life or in that which is to come. Faith in Christ cannot be unaccompanied with repentance; though believers are holy in contrast to what they once were, yet there is none in this life free from sin, the tempter of our first parents being still the active enemy of men. Responsibility belongs to human nature; and the doctrine of a judgment to come may be considered as to a certain extent a doctrine of natural religion, as may also that of the immortality of the soul; but the clear and distinct enunciation of these doctrines belongs to the Christian religion.

Of the moral element of Christianity it is sufficient here to state that it is harmonious with the doctrinal part and inseparable from it; that it is founded upon the teachings of the Bible with regard to the moral attributes of God, and is exemplified in the character of Jesus Christ; and that it is divisible into two great parts—one of the love of God, and the other of the love of man.

Among what are termed the means of grace, which form so important a part of the system, the doctrine contained in the Bible first claims attention as the means of conversion and of edification, the instrument by which salvation is begun and carried on. The ordinances of worship, prayer, and sacraments are means of grace, concerning the relative importance of which, as compared with the other means, considerable difference of opinion prevails. The same remark applies also to the combination of Christians into an organized body with its own system of church government and discipline.

The truth of Christianity is supported by many different evidences, independent, but mutually corroborative. It appeals to reason, and demands to have its claims examined. Nor is there any faith where there is not a mental conviction arrived at by reasoning, direct or indirect. (See EVIDENCES OF CHRISTIANITY.)

Christianity is now the dominant religion in all countries of America, in Australia, and in Europe (except in Turkey), and it makes steady progress in Asia and Africa. It is divided into a large number of denominations or sects, which may be classed in three large groups—the Roman Catholic Church, the Oriental churches, and all the other churches. Most or all of the denominations of the third class are sometimes comprised under the name Protestants. In 1872 the aggregate population connected with the various denominations of Christians was estimated at about 380,000,000, in a total population of the globe of about 1,380,000,000. The Roman Catholic Church numbered a population of about 197,000,000, and the Oriental churches about 83,000,000. (See EASTERN CHURCHES, GREEK CHURCH, ROMAN CATHOLIC CHURCH, and the names of various denominations.) J. THOMAS.

**Christian Knowledge, Society of.** See SOCIETY OF CHRISTIAN KNOWLEDGE.

**Christians** (a religious denomination). See CHRISTIAN CONNECTION.

**Christiansand**, a fortified seaport-town of Norway, is near its southern extremity and on the Skager-Rack, about 160 miles S. W. of Christiania. It has a good harbor. Shipbuilding is the principal industry. It is a bishop's see and the capital of a stift. Timber, salmon, etc. are exported hence. Pop. 12,191.

**Christiansburg**, on R. R., capital of Montgomery co., Va. (see map of Virginia, ref. 7—D, for location of county), 86 miles W. of Lynchburg, 2200 feet above the sea-level. It has a female college, an academy, tobacco and shoe factories. Pop. in 1870, 864; in 1880, 766.

**Christians of St. Thomas**, a Christian sect which lives in the southern part of the Malabar coast of India. It claims to be descendants of the converts of the apostle Thomas on his visit to India, but originated from a Nestorian colony, and was in the sixth century in regular communication with the Nestorian Church of western Asia. When the Portuguese landed in India, the Church numbered about 16,000 families, but was in a very poor condition. In 1599 the Jesuits were sent out to it, and the conversion began, by fair means and by foul. A connection with the papal see was also established, but in 1653 most of the converts again broke loose from the Roman Church.



by the Jesuits to unite with the Church of Rome, and at present about three-fourths of their number are Roman Catholics. Of the latter class more than one-half have a Syriac church-service, while the remainder are of the Latin rite. Of those who are not united to the Church of Rome there were in 1859 about 70,000, and ten years later they claimed for themselves 190,000 members, which is undoubtedly in excess of their number. They acknowledge the supremacy of the Jacobite patriarch of Antioch, though they were formerly Nestorians of the patriarchate of Mosul. Our knowledge of the history of this interesting people will probably be always limited, most of their literature having been burned as heretical by order of the synod of Diamper (1599). There was anciently, it would seem, more than one sect among them. According to Mr. Ludlow, they are at present both socially and morally much debased, though they were once the dominant class in Malabar. They are now found principally in Travancore. (See HOUER's "History of Christianity in India," 4 vols., 1839-45.)

**Christ'tianstad'**, a fortified town of Sweden, capital of a len of its own name, is on the river Helge, about 9 miles from its entrance to the Baltic and 267 miles S. W. of Stockholm. It has broad streets and wooden houses. In the vicinity are the immense alum-works at Andrarum (5000 tons annually). It has an arsenal, a barrack, and a fine church; also manufactures of linen and woollen fabrics and gloves. Pop. 9203.

**Chris'tiansted'**, the chief town of the island of St. Croix, in the West Indies, is on the N. E. coast. It has a good harbor, which is defended by a fort. The governor-general of the Danish West Indies resides here. Pop. 6560.

**Chris'tiansund'**, a seaport-town of Norway, on three islands, which enclose its harbor. It is in the district of Romsdal, and 85 miles W. S. W. of Trondhjem. The trade is good, and fishing is largely pursued. Pop. 8251.

**Christian Union Churches.** See APPENDIX.

**Christie** (WILLIAM D.). See APPENDIX.

**Christi'na**, queen of Sweden, born Dec. 6, 1626, was the only surviving child of Gustavus Adolphus. She received a solid and masculine education, and learned Latin, Greek, Hebrew, politics, etc. When her father died, in 1632, she was recognized as his successor, under the regency of Oxenstiern. In 1644 she assumed royal power, and in 1648 concluded the treaty of Westphalia, by which Pomerania was annexed to Sweden. Her mind was strong and her character eccentric. Her subjects wished that she should choose a husband, but she manifested a constant aversion to marriage. Her eccentricity was also exhibited in the extravagant patronage of authors, pedants, artists, and buffoons. In 1650 her cousin, Charles Gustavus, was designated as heir to the throne by the states of Sweden, with the assent of the queen. Impatient of the personal restraint which the etiquette of court imposed on her, she abdicated the throne in June, 1654, while still in the bloom of youth. This act has been variously attributed to levity and magnanimity. She reserved supreme power over her suite and household, embraced the Roman Catholic religion, and became a resident of Rome. She patronized artists, founded an academy at Rome, and meddled with astrology and other chimerical pursuits. In 1657 she caused her grand equerry, Monaldeschi, to be put to death for treason. It is said she wished to recover the crown of Sweden when the king died in 1660, but she did not succeed. Died April 19, 1689. (See LACOMBE, "Histoire de Christine," 1762; ARCHENHOLZ, "Memoirs of the Life of Christina," Stockholm, 4 vols., 1751, in French; H. WOODHEAD, "Memoirs of Christina of Sweden," 1863.)

**Christi'nos**, the name of a political party in Spain during the regency of Queen Maria Christina, embracing the adherents of the queen. They were opposed by the CARLISTS (which see).

**Chris'tison** (Sir ROBERT), a Scotch physician, professor of materia medica in the University of Edinburgh, born July 18, 1797, studied in Paris with Orfila. He wrote, among other works, a "Treatise on Poisons" (1829), a standard authority. He was made a baronet in Nov., 1871. D. Jan., 1882.

**Christ'lieb** (THEODOR), D. D., was born in Württemberg in 1833, studied at Tübingen, taught in France, and became a preacher in London, where he published his famous lectures on "Modern Doubt and Christian Belief." He returned to Germany in 1865, and in 1868 became university preacher and professor of theology at Bonn. In 1873 he visited the U. S. as a delegate of the Evangelical Alliance. Here he delivered an address of great ability upon the rationalism of the present day. He has published "Leben und Lehre des Johannes Scotus Erigena" (1860) and "Modern Doubt and Christian Belief" (transl., 1874.)

**Christ'mas** [so called because an especial mass, the "mass of Christ," was celebrated on that day; Fr. *Noël*; Ger. *Weihnachten*; It. *Natale*, i. e. "birthday"], the day on which the birth of the Saviour is celebrated. The observance of the 25th of Dec. is ascribed to Julius, bishop of Rome, A. D. 337-352. The Eastern Church had previously observed the 6th of Jan., in commemoration both of the baptism and of the birth of Christ. Before the end of the fourth century the East and the West had exchanged festivals, the West adopting Jan. 6, in commemoration of our Lord's baptism, and the East adopting Dec. 25, in commemoration of our Lord's birth. The exact date of Christ's birth appears not to have been known to the early Church, and cannot now be determined. That the date was preserved in the public archives at Rome, though asserted by some of the ancient Fathers, is now not generally credited. As for the year, critical opinion is gravitating towards the year 5 or 4 B. C. And as for the day, we may be helped to a decision by considering that between the middle of December and the middle of February there is generally in Palestine an interval of comparatively dry weather, preceded and followed by the early and the latter rain. Thus, there might have been shepherds on the plain of Bethlehem watching their flocks by night.

Christmas is celebrated on the 25th of Dec. in nearly every part of Christendom. Among the causes that operated in fixing this period, perhaps the most powerful was that most heathen nations regarded the winter solstice as the beginning of the renewed life and activity of the powers of nature. The Romans, Celts, and Germans, from the oldest times, celebrated the season with great feasts. At the winter solstice the Germans held their Yule-feast, and believed that during the twelve nights reaching from the 25th of Dec. to the 6th of Jan. they could trace the personal movements on earth of their great deities. Some of these usages passed over from heathenism to Christianity, and have partly survived to the present day. But the Church sought to banish the deep-rooted heathen element by introducing its grand liturgy, besides dramatic representations of the birth of Christ and the first events of his life. Hence the so-called "manger-songs" and Christmas carols. Hence also the Christmas trees adorned with lights and other decorations, the custom of reciprocal presents and of Christmas meats and dishes. Christmas became a universal festival.

In the Roman Church three Christmas masses are usually performed—one at midnight, one at daybreak, and one in the morning. The day is also celebrated by the Anglican churches. The Greek and Lutheran churches likewise observe Christmas, but the Presbyterians and the English dissenters reject it in its religious aspect, although in England and the U. S. people of nearly all sects keep it as a social holiday, on which there is a cessation from all business. The festivities formerly lasted with more or less brilliancy till Candlemas, and with great spirit till Twelfth Day. (See CASSEL, "Weihnachten Ursprung, Bräuche und Aberglauben," 1862.)

REVISED BY R. D. HITCHCOCK.

**Christmas Carols** [Fr. *carole*; It. *carola*, a "round dance," perhaps from the Lat. *corolla*, a "circuit"; Welsh, *coroli*, to "dance," the name being thence applied to the music or song accompanying such a dance]. The word carol signifies a song of joy. The practice of singing sacred songs in celebration of the nativity of Christ as early as the second century is considered as established. Christmas carols are believed to have been devised as a substitute for the songs of the old heathen festivals. The oldest printed collection of English Christmas carols bears the date of 1521. By the Puritan Parliament Christmas was abolished altogether, and holly and ivy were made seditious badges; and in 1630 the Psalms, arranged as carols, were advertised. After the Restoration, the Christmas carols again exhibited their ancient hearty, jovial character. Those with which the dawn of Christmas is now announced in England are generally religious, though not universally so. The custom is by no means peculiarly English, being found in other countries of Europe.

**Christol'ogy** [Gr. *Χριστολογία*, "doctrine concerning Christ"] may include everything relating to the work as well as to the person of Christ, but as the work of Christ is discussed under Soteriology, it is better to confine Christology to the person, and we shall so employ it.

The incarnation of one of the persons of the Trinity results in a peculiar kind of self-consciousness, which is neither divine alone nor human alone, but Divine-human. Jesus Christ is not merely God, for in this case he would not differ as a person from the unincarnate Logos in the bosom of the Father. (John i. 18.) Neither is he merely man, for in this case he would not differ in respect to the

species of his personality from Socrates or any other human being. But he is God and man united—the God-man—a unique and singular species of person.

The early Church was not forced, by false theories respecting the nature of Christ, to make nice distinctions and definitions, and consequently made none. It was content with worshipping Jesus Christ; and worship is a more direct and impressive affirmation of his divinity than even a dogmatic assertion of it. In course of time, however, several errors arose which compelled the Church to make a careful and guarded statement of the peculiarity of Christ's complex person. The first of these errors was Arianism, which denied the existence of a truly and properly divine nature in Jesus Christ. The Arians allowed that he had in the composition of his wonderful personality a very exalted nature, which is higher than that of any creature whatever, but which is not literally and metaphysically divine. This highly exalted and superhuman nature, united with a human soul and body, constituted the Arian Christ. The second error was Patripassianism. The Patripassians asserted the real and strict Deity in Christ's person, but denied his humanity. According to them, the one solitary person of God (for they also denied a real distinction of persons in the Godhead) united itself with a human body, but not with a human soul. This single person of God, whom they denominated the Father, thus united with a material body, was the Patripassian Son of God, or Christ. Anterior to this union there was no Son of God. The third error was the Nestorian. This pertained to the relations of the two natures to each other, and not to the natures themselves, both of which were conceded. The Nestorian Christ is two persons, one divine and one human, in union. The important distinction between a nature and a person is not recognized. Nestorianism overlooked the fact that the second person in the Trinity did not assume into union with himself a human individual, but a portion of human nature not yet individualized. The Logos, in the words of Hooker, "did not assume a man's person into his own person, but a man's nature to his own person; he took *semen*, the seed of Abraham (Heb. ii. 16), the very first original element of our nature, before it was come to have any personal subsistence." The union is embryonic, and thus yields only a single personality. But instead of thus blending the divinity and the humanity into one self, the Nestorian scheme places two distinct selves, one divine and one human, side by side, and allows only a moral and sympathetic union between them. There is a God and there is a man, but there is no God-man. The fourth of the ancient errors in Christology is the Eutychian or Monophysite. This is the opposite error to Nestorianism. It asserts the unity of self-consciousness in the person of Christ, but loses the duality of the natures. In and by the incarnation the human nature is transmuted into the divine, so that after the incarnation there remains only one nature. For this reason the Monophysites held that it is correct to say that "God suffered," meaning thereby that Jesus Christ suffered in the divine nature.

The Council of Ephesus in 431 made some beginning towards the settlement of the questions involved, but it was reserved for the Council of Chalcedon in 451 to make the final statement. The Chalcedon symbol defines Christ's person as follows: "We teach that Jesus Christ is perfect as respects Godhood and perfect as respects manhood—that he is truly God, and truly a man consisting of a rational soul and body. He was begotten of the Father before creation as to his deity, but in these last days he was born of Mary, the mother of God, as to his humanity. He is one Christ existing in two natures, without mixture, without change, without division, without separation—the diversity of the two natures not being at all destroyed by their union in the person, but the peculiar properties of each nature being preserved, and concurring to one person and one subsistence."

This statement asserts the continued and everlasting existence of two natures in Christ's complex person, and adjusts their relations to each other. In the first place, the union of the two natures does not confuse or mix them in such a manner as to destroy their distinctive properties or transmute one into the other. The deity of Christ is just as pure and simple deity after the incarnation as before it; and the humanity of Christ is just as pure and simple human nature as that of Mary his mother or any other human individual, sin being excluded. In the second place, the Chalcedon statement prohibits the division of Christ into two selves or persons. The incarnating act, while it makes no changes in the properties of the two united natures, gives as a resultant a person that is a *tertium quid*—a resultant that is neither a human person nor a divine person, but a *theanthropic* person. Contemplating Jesus Christ as the result of the union of God and man, he is not to be denominated simply God, and he

is not to be denominated simply man, but he is to be denominated God-man.

This union of two natures in one self-conscious ego may be illustrated by reference to man's personal constitution. An individual man is one person, but this person consists of two natures—a material nature and an immaterial nature. The personality, the self-consciousness, is the result of the union of the two. Neither one taken by itself would yield the person. Both body and soul are requisite in order to a complete individuality. The two natures do not make two individuals in union and alliance. The material nature, taken by itself, is not the man, and the mental part, taken by itself, is not the man; only the union of both is. Yet in this intimate union of two such diverse substances as matter and mind, body and soul, there is not the slightest alteration of the properties of each substance or nature.

It follows from this statement of the Council of Chalcedon that while the properties of one nature cannot be attributed to the other nature, the properties of both natures may be attributed to the person resulting from their union. While it is not proper to say that the Divine nature suffered, it is proper to say that the God-man suffered. The first statement attributes to one nature the properties and acts of the other, and is therefore not allowable. The second statement asserts that Jesus Christ, the self-conscious Ego resulting from the incarnation, endured a passion the seat and medium of which was the human nature in this Ego. Here, again, the analogies of finite existence furnish an illustration. A man suffers the sensation of heat from a coal of fire. In this instance it would not be correct to say that the man's immaterial nature suffers, in the sense of being itself burned by the fire. The immaterial soul is not the sensorium in this instance. It is not the seat of the physical sensation. To say that it is would be to attribute to an immaterial nature the properties of a material nature. Yet, at the same time, the self-conscious person, the Ego resulting from the union of body and soul, feels the sensation of physical pain, but it feels it in and through the material part, and not the immaterial. In like manner, the entire humanity of Christ, the true body and reasonable soul, sustained the same relation to his divinity that the fleshly part of a man does to his rational part. It was the sensorium, the passible medium, by and through which it was possible for the self-conscious Ego, the God-man, to suffer. Hence, while it is proper to say that Jesus Christ, the God-man, existed before Abraham, and was born in the reign of Augustus Cæsar, that he was David's son and David's Lord, it would not be proper to say that the divine nature of Jesus Christ was born in B. C. 4, or that it died upon the cross in A. D. 30.

The positions taken at Chalcedon have been reaffirmed both in the mediæval and the modern Church. The doctrine of Christ's person is in some of its aspects even more mysterious and baffling to finite comprehension than the doctrine of the Trinity, and Christian science has not been inclined to go beyond the general outlines and distinctions made in 451. The Lutheran Church, in connection with the doctrine peculiar to them of the ubiquity of Christ's person, have made some attempts to explain that peculiarity of Christ's self-consciousness by which it is sometimes that of finite weakness and sorrow, and at other times that of infinite majesty and power. But the endeavor runs too near the brink of the confusion of natures, and their transmutation into each other, to be regarded as a real advance upon the Chalcedon Christology. (For the literature of Christology see DORNER's "Person of Christ;" HAGENBACH's "History of Doctrine;" HOOKER's "Ecclesiastical Polity," book v., chs. 51-55; PEARSON "On the Creed;" SCHAFF's "Church History," III., 747-777; SHEDD's "History of Doctrine," I., ch. 5.)

W. G. T. SHEDD.

**Christophe** (HENRI), a negro king of Hayti, was born Oct. 6, 1767. He joined in 1790 the insurgents who were fighting against the French, and was appointed a general of brigade by Toussaint l'Ouverture. He had a high command under Dessalines, and after the death of the latter in 1806 became master of the northern part of the island. Civil war ensued between Christophe and Pétion. Early in 1811, Christophe was made king of Hayti and crowned in 1812 as Henri I. He instituted orders of nobility with such titles as duke of Marmalade and count of Lemonade. His cruelty provoked his subjects to revolt, and, unable to quell this rebellion, he killed himself Oct. 8, 1820. Boyer then became ruler of Hayti.

**Chris'topher**, POPE, deposed and succeeded Leo V. in 903, and was himself deposed and put to death in the following year. He was succeeded by Sergius III.

**Christopher**, SAINT, a native of Syria or Palestine, supposed to have suffered martyrdom about 260 A. D. The

Roman Catholic Church celebrates his festival on the 25th of July. Many wonderful legends are told of his gigantic size and his miraculous deeds, but modern antiquaries are disposed to doubt whether this popular hero ever existed.

**Christ's Hospital**, or the **Blue-Coat School**, London, was founded by Edward VI. in 1553 as a hospital for orphans and foundlings. The dress worn by the boys at present consists of a blue woollen gown, with a red leather girdle, yellow breeches and stockings, a clergyman's bands, and a blue worsted cap, but this they seldom wear, generally going about bareheaded. The color of the dress was formerly russet. No child is admitted before seven or after ten years of age, and none can remain after fifteen, except "king's boys" (who attend the mathematical school founded by Charles II. in 1672) and "Grecians" (the highest class), of whom eight are sent on scholarships to the universities. About 800 boys can be admitted. The great hall of the hospital is a magnificent room. Latin and Greek are the basis of instruction, but the modern languages, drawing, etc. are taught. In 1683 the governors built a preparatory school at Hertford, where the children are instructed till they are old enough to enter the hospital, the girls remaining permanently there. It can receive about 400 of both sexes.

**Chro'mate of Lead** ( $\text{PbC}_2\text{O}_4$ ), a fine yellow pigment often called chrome yellow. It is found as a rare mineral, but is extensively manufactured for use as a pigment. It has a bright-yellow color. With prussian blue it produces various shades of green. *Chrome red* is a basic lead chromate,  $\text{Pb}_2\text{CrO}_5$ .

**Chromat'ic** [from the Gr. *χρῶμα*, "color" or "modification" in music], in music, is a term applied to a succession of notes at the distance of a semitone from each other. The word *χρωματικός* was used in a somewhat similar sense by the ancient Greeks. Ascending chromatic passages are formed by the whole tones of the diatonic scale being raised or elevated by a sharp or a natural, according to key, and descending passages by their being lowered by a flat or a natural. It is usual to speak of the chromatic scale, but the foundation of the system of music does not rest on a chromatic basis, but on a diatonic one.

**Chromatics.** See COLORS.

**Chrome.** See CHROMIUM.

**Chrome Green** is a name often given to several compounds of chromium: (1) *Chromic sesquioxide*, which is used for coloring glass emerald green, for painting on porcelain, and at one time for printing the U. S. "green-backs;" (2) *Guignet's green*,  $\text{Cr}_2\text{O}(\text{OH})_4$ , which is used in calico printing; (3) *a mixture of chrome yellow and prussian blue*, which is used as a green pigment for paints and printing-inks.

**Chrome Yellow.** See CHROMATE OF LEAD.

**Chro'mic Ac'id**, a compound of teroxide of chromium ( $\text{CrO}_3$ ) with water ( $\text{OH}_2$ ). The formula is  $\text{H}_2\text{CrO}_4$ . It forms several colored compounds, which are used as pigments or dyes. Among these are the chromate and bichromate of potash and the chromate of lead. The ruby derives its color from this acid. Chromic acid is used in surgery as a caustic.

**Chro'mic I'ron**, or **Chro'mite**, is the most abundant ore of chromium, and is found at Unst in the Shetland Isles, near Portsoy in Scotland, near Gassin in France, in Maryland, Pennsylvania, and in other regions. It is composed chiefly of the oxides of chromium and iron. It sometimes occurs crystallized in octahedrons, but commonly massive.

**Chro'mium**, or **Chrome** [from the Gr. *χρῶμα*, "color"], (symbol Cr), atomic weight, 26, or (new) 52.5, a metal discovered by Vauquelin in 1797, and so named from the many colored compounds it produces. It is whitish, brittle, and very infusible. Specific gravity, 5.5. It occurs naturally in the form of chromate of lead ( $\text{PbCrO}_4$ ) and in that of chromite of iron or chrome iron ore ( $\text{FeCr}_2\text{O}_4$ ). Combined with oxygen and water, it forms CHROMIC ACID (which see). Chromium is not used in a metallic or separate state, but several of its compounds are valuable pigments and dyestuffs. The oxide of chromium, which is green, is useful in enamel-painting and glass-staining. The chromate and bichromate of potash are salts largely used by dyers and calico-printers. The latter is an anhydrous compound which is of immense service in the arts. Chromium has recently been employed to harden steel; it is said that a very small addition has a decided effect.

**Chromo.** See LITHOGRAPHY.

**Chron'icle** [from the Gr. *χρονικός*, "relating to time" (*χρόνος*)], an historical register of facts and events arranged in the order of time; a history in which the events are related in the order of time. The histories written in the Middle Ages were chronicles. Among the most celebrated

writers of chronicles were Froissart, Eginhard, Monstrelet, Holinsbed, and Geoffrey of Monmouth.

**Chron'icles** [Lat. *Chronica*; Gr. *τὰ Χρονικά*], the name of two canonical books of the Old Testament. They were originally one book, containing a resumé of the sacred history from the creation until the Babylonian exile; the last two verses are repeated as the first verses of Ezra. The Hebrew name signifies "annals." The Septuagint named it *Παραλειπόμενα* ("Paraleipomena," Supplements), and the Vulgate borrowed this name. The character of the book, however, does not justify the name. It supplements the other historical books only occasionally, often it is identical with them. Hence the usual title is more correct. The book was composed at or soon after the time of Nehemiah by an unknown author. Its peculiar characteristic is that it is written from the stand-point of interest in the Levitical and ritualistic institutions, and not from the stand-point of the theocracy. Its authority was assailed, during the first half of this century, by the rationalists, but the searching criticism to which it has been subjected has convinced unprejudiced scholars that, allowance being made for the peculiarities of view which it acquired from the post-exilic Judaism, it contains valuable contributions to our knowledge of the history of the Israelites.

W. G. SUMNER.

**Chron'ogram** [from the Gr. *χρόνος*, "time," and *γράμμα*, a "letter"], an inscription in which a certain date is indicated by printing some of the letters in larger type than the others, and taking them as Roman numerals. The date 1632 is thus expressed in the inscription of a medal of Gustavus Adolphus: ChristVvs DVX ergo trIVMphVs. If it is a verse, it is called *chronostichon*.

**Chron'ograph** [Gr. *χρόνος*, "time," and *γράφω*, to "write"], an instrument used (chiefly in astronomy) for recording the exact instant of the occurrence of an event, such as the transit of a star over the spider-lines of a telescope. The record is made by electro-magnetism. One point or pen, governed by the clock, marks uniformly the seconds. Another is brought into action by an electric key under the finger of the observer. The first chronograph was simply Morse's telegraphic instrument slightly modified. The method was originally suggested by Prof. Locke of Cincinnati about 1850. The chronographs now in use usually employ a rotating cylinder covered with paper, and turning on a helical axis, each revolution occupying one minute.

**Chronol'ogy** [from the Gr. *χρόνος*, "time," and *λόγος*, a "treatise"], is the science of the dates of events in history. Mathematical chronology deals with such units of time as begin and end with the period of complete evolution of recurring celestial phenomena. (See CALENDAR.) As in geography and navigation longitude is measured from some arbitrary line, such as the meridian through Greenwich, so in historical chronology dates are fixed by giving their distance from some arbitrary point of time, usually chosen because of some remarkable occurrence which signalized it. Such a point, or epoch, forms the beginning of an era. The mathematical or astronomical units of time have not been the only units used in historical chronology. In early times accurate methods of mathematics were unknown, and such vague periods as "a generation," or the life of leading persons in a nation, such as kings, were assumed as units in chronology. The great variety of eras in ancient times confuses the student. Thus, the era of the Greeks began with the year of the Olympiad in which Coræbus was victor, being the first of those games at which the victor's name was recorded (776 B. C.). From this point the Greeks reckoned time by Olympiads or periods of four years. The Romans reckoned from the founding of the city (753 B. C.), which is believed the first fixed point from which time was ever computed. The Mohammedan era commences with the flight of Mohammed (622 A. D.), called the Hejra. The Roman and Greek methods of recording time continued in use long after the birth of Christ. After 312 A. D., however, the authorized system throughout the Roman empire was by indictions, periods of fifteen years, and this mode was at one time almost universal in the West, though the Olympiads were followed in the East till 440 A. D. The Christian era, first proposed in 527 A. D., is now universally used in Christendom (except among the Oriental Christians, many of whom profess to reckon time from the creation), though its use was not uniform in Europe till a short time before the discovery of America by Columbus. Chronology has to determine the relationship of different eras, so as to express in language appropriate to one mode of computation the date of an event recorded in another. The Christian era is attended by this inconvenience, that we must count backward for the dates of occurrences prior to the birth of Christ.

Different systems of chronology, such as the Chinese, Egyptian, Indian, and Chaldean, have been used in differ-

ent countries. Of sacred chronology there have been various schemes. In these the epochs are the Creation of the World and the Flood, but the manuscripts of the Bible do not agree as to the dates of these events. The chronology of Ussher reckons 4000 years from the creation to the birth of Christ, and to the flood 1656 years; the Samaritan makes the former much longer, though it counts from the creation to the flood only 1307 years; the Septuagint removes the creation of the world to 6000 years before Christ, and 2250 years before the flood. These differences have never been reconciled. It is now, however, universally admitted that the first chapter of Genesis leaves the period of the creation quite indefinite, and the most generally approved scheme interprets the *days* of creation as periods of indefinite length. (Manuals of chronology have been written by IDLER, 1831; BRINCKMEIER, 1843; BLAIR, 1851; and LÜCKE, 1862.)

**Chronometer** [from the Gr. χρόνος, "time," and μέτρον, a "measure"], a watch of peculiar construction and great perfection of workmanship, used for determining geographical longitudes, or other purposes where time must be measured with extreme accuracy. The chronometer differs from the ordinary watch in the principle of its escapement, which is so constructed that the balance is entirely free from the wheels during the greater part of its vibration; and also in having the balance compensated for variations of temperature. Marine chronometers generally beat half seconds, and are hung in gimbals in boxes about six or eight inches square. The pocket chronometer does not differ in appearance from the ordinary watch, excepting that it is generally a little larger. Chronometers are of immense utility in navigation, and ships going on distant voyages are usually furnished with several, for the purpose of checking one another, and also to guard against the effects of accidental derangement in any single one. The accuracy with which chronometers have been found to perform is truly astonishing, the departures from perfect uniformity of rate of running amounting only to small fractions of a second from day to day for long periods of time.

**Chronoscope** [from the Gr. χρόνος, "time," and σκοπέω, to "see"], an instrument invented in 1835 by Wheatstone for measuring the duration of the electric spark. It consisted essentially of a plane mirror revolving with a high but known velocity; the elongation of the image of the spark as seen in this mirror furnishing the measure of the duration. In 1858, Feddersen substituted a concave for the plane mirror, with better results. In 1867, Rood replaced the concave mirror by a set of achromatic lenses and a plane mirror, and succeeded in measuring intervals of time as small as 40 one-billionths of a second. A chronoscopic apparatus was constructed by Fizeau for measuring the velocity of light. In this there was employed a rotating circular disk with sectors alternately open and closed. A ray from a luminous source transmitted through one of the open sectors, and reflected back from a distant mirror, is, with a certain velocity of rotation, intercepted by a closed sector, and with a higher velocity is transmitted through the next following open sector. The distance traversed in Fizeau's experiment was 8633 mètres (about 5½ miles). With this and the known velocity of rotation the velocity of light per second is computed. Foucault used for the same determination a chronoscope with a concave revolving mirror and a distance of only three mètres (about ten feet). Chronoscopes for measuring the time of flight of projectiles have been invented by Wheatstone, Hipp, Henry, Navez, Benton, De Brettes, Gloesener, Schultz, and Bashforth. In these the beginning and end of the interval measured are marked by the passage of the induction spark, or mechanically by electro-magnetism, generally upon a revolving cylinder, but in some upon a fixed arc before which a pendulum swings. For marking equal minute intervals steel tuning-forks have been recently used in various ways.

**Chrudim**, a town of Bohemia, on the Chrudimka, a small river, 62 miles S. E. of Prague. It has a noble collegiate church, a convent, and a gymnasium; also manufactures of cloth and a large market for horses. Pop. 11,886.

**Chrysalis** [Gr. χρυσάλλης, from χρυσός, "gold"], a name originally belonging to those pupæ of butterflies which have golden-yellow spots, but extended to the pupæ of lepidopterous insects generally, and even to those of other orders. The chrysalides of lepidopterous insects are enclosed in a horny case, sometimes angular, sometimes round, generally pointed at the posterior end, sometimes at both ends. Before the caterpillar goes into this state it often spins a silken cocoon, with which foreign substances are sometimes mixed, in which the chrysalis is concealed. Chrysalides are often suspended by cords, and generally remain nearly at rest; some bury themselves in the earth. Most of them have at least a slight power of motion.

**Chrysanthemum** [from the Gr. χρυσός, "gold," and ἄνθος, a "flower"], a genus of herbs and shrubs of the order Compositæ, tribe Seneceionideæ, having an involucre with imbricated scales, a naked receptacle, the fruit destitute of pappus. The species of this genus are annuals, perennials, or shrubby, and all have leafy stems. They are natives chiefly of the temperate parts of the Old World. *Chrysanthemum carinatum*, an annual species with white ray florets and dark-red disk, a native of Barbary, is frequently cultivated. *Chrysanthemum Indicum*, the Chinese chrysanthemum, a native of Eastern Asia, has long been cultivated as an ornamental plant. Its colors are various—red, lilac, rose-color, white, yellow, orange, or variegated. It flowers in autumn and winter, is easy of cultivation, and is easily propagated by cuttings, suckers, or parting the roots.

**Chrys'elephantine** [from the Gr. χρυσός, "gold," and ἐλέφας, ἐλεφαντος, "ivory"] **Statues**, a term applied to images of gold and ivory extensively made among the ancient Greeks. The works executed by Phidias at Athens in the time of Pericles are the most famous of this class, the greatest being the colossal Athena of the Parthenon, twenty-six cubits high, representing the goddess in armor. The Olympian Zeus of Phidias was also of world-wide renown. The combination of gold and ivory was chiefly employed in temple statues; and though the more famous works of this class belong to an advanced period, this kind of art was very ancient, and probably borrowed from the adorning of wooden images with the precious metals. The flesh parts were oftenest of ivory, the clothing and ornaments of gold.

**Chrysip'pus** [Gr. Χρύσιππος], an eminent Stoic philosopher, born at Soli, in Cilicia, in 280 B. C., was a son of Apollonius of Tarsus. He was a pupil of Cleanthes, and was distinguished for his skill in dialectics and his subtlety as a disputant. He once said to Cleanthes, "Teach me only your doctrines, and I will find the arguments to defend them." The Sorites is said to have been invented by Chrysippus. He wrote a great number of works, none of which are extant. He was considered to be the greatest Stoic philosopher except Zeno. Died in 207 B. C. (See RITTER, "History of Philosophy;" J. F. RICHTEY, "Dissertatio de Chrysippo Stoico," 1738.)

**Chrysoberyl** [from the Gr. χρυσός, "gold," and βήρυλλος, "beryl"], a gem, the finer specimens of which are very beautiful, is an aluminate of glucina. Lapidaries sometimes call it Oriental or opalescent chrysolite. It is of a green color, inclining to yellow, semi-transparent, and has a double refraction. It occurs crystallized in six-sided or eight-sided prisms; sometimes in macles or twin crystals. Some specimens exhibit a beautiful opalescent play of light.

**Chrysocol'la** [Gr. χρυσόκολλα], a hydrated silicate of copper, sometimes called copper-green, was used as a pigment by the ancient Greeks. The color is verdigris or emerald-green, passing into sky-blue, with a shining or dull resinous lustre. It is found native in considerable abundance in Missouri and Wisconsin.

**Chrys'olite** [Gr. χρυσόλιθος, from χρυσός, "gold," and λίθος, a "stone;" Fr. *chrysolithe*], a mineral composed of silica, magnesia, and protoxide of iron, of a fine green color, with vitreous lustre, transparent, and having double refraction, in hardness about equal to quartz, and with a conchoidal fracture. It often crystallizes in four-sided or six-sided prisms, variously modified. Very fine specimens are brought from Egypt and from some parts of the East, also from Brazil. Chrysolite is used as an ornamental stone, but is not highly valued.

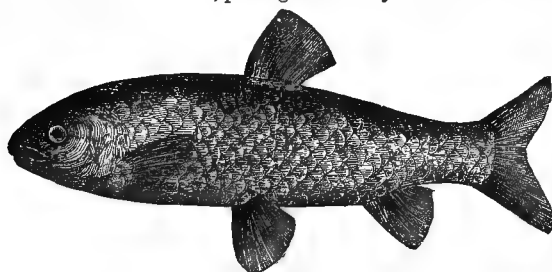
**Chrys'oprase** [Gr. χρυσόπρασος, from χρυσός, "gold," and πράσινον, a "leek," from its peculiar tint], a very rare variety of chalcedony, valued far above common chalcedony as an ornamental gem; a stone of this kind fit for mounting in a ring is worth from fifty to one hundred dollars. It is of a fine apple-green color in choice specimens, but inferior ones exhibit other shades. It is often set in a circle of diamonds or pearls. It is apt to lose its color through time if kept in a warm place, but dampness is favorable to its preservation, and it is therefore kept in damp cotton. It is found in Lower Silesia, in Colorado, and in Northern New York. The chrysoprase of the ancients is not certainly identified by modern authorities.

**Chrys'ostom** [Gr. Χρυσόστομος (i. e. "golden-mouthed")], (JOHN), the most accomplished orator of the ancient Greek Church, was born at Antioch in Syria about 347 A. D. He was brought up by his widowed mother, Anthusa, his father, Secundus, having died soon after his birth. He studied rhetoric under Libanius, the famous Sophist, and philosophy under Andragathius. Quitting the

legal profession, upon which he had entered, he was ordained deacon by Bishop Meletius in 381, and presbyter by Bishop Flavian in 386. His fame as a preacher spread throughout Christendom. On Feb. 26, 398, he was consecrated archbishop of Constantinople, having, by a mixture of force and fraud, been carried thither against his will. His boldness as a reformer brought him into trouble. Both among the clergy and at the imperial court enemies rose up against him. In 404 he was banished to Cucusus, a mountain-village in the Tauric range, between Cilicia and the Lesser Armenia, and Sept. 14, 407, died at Comana, in Pontus, on his way into still remoter exile on the eastern shore of the Black Sea. He was little of stature, with a large, bald head, hollow cheeks, and deep sunken eyes. His eloquence was of the highly ornate Asiatic type, but also very incisive and practical. In rebuke he was terrible, calling things by their right names. He had great reverence for the Scriptures, lived abstemiously, defied danger, promoted missions, and died exclaiming, "Glory be to God for all things! Amen." The best edition of his works is the Benedictine, 13 vols. folio, Paris, 1718-38. (See NEANDER, "Life of Chrysostom," in German, 2 vols., 1821, 3d ed. 1848; G. HERMANT, "Vie de Saint J. Chrysostome," 1664; PERTHES, "Life of Chrysostom," 1854; STEPHENS, "Life of Chrysostom," 1872.)

**Chrzanowski** (ADALBERT), a Polish general, born in 1788, served in the Polish revolution in 1830, when he was suspected of sympathy with the Russians, and in Piedmont in 1849, where he commanded the Sardinian army. After the disastrous battle of Novara he was dismissed. His last years he passed in Louisiana, where he died Mar. 2, 1861.

**Chub** (*Leuciscus cephalus*), a European fish of the family Cyprinidae, of the same genus with the roach, dace, etc. The color is bluish black, passing into silvery white on the



Chub.

belly; the cheeks and gill-covers a rich golden yellow. The chub rarely attains a weight exceeding five pounds. It is plentiful in many of the rivers of England, and occurs in the south of Scotland. It is found in many rivers of the continent of Europe. There are several species in the U. S. very much like the above. They are not in great esteem for the table. The chub rises well at a fly, and takes freely a variety of baits.

**Chuck-Will's-Widow** (*Antrostomus Carolinensis*), a bird of the family Caprimulgidae, a native of the southern parts of the U. S. It has received its singular name from its note, which resembles these syllables articulated with distinctness, and is repeated like that of the whippoorwill.

**Chucui'to**, or **Chuquito**, a town of Peru, department of Puno, is pleasantly situated on the western shore of Lake Titicaca, 101 miles E. of Arequipa. Mines of gold and silver have been opened in the vicinity. Pop. about 5000.

**Chudleigh Cape**, the N. E. point of Labrador.

**Chumbul'**, a river of India, rises in the Vindhyan Mountains, flows nearly north-eastward, and enters the Jumna 85 miles S. E. of Agra. Length, 500 miles.

**Chunam'**, the name of a fine quicklime made in India from calcined shells or from very pure limestone, and used for chewing with BETEL (which see); also used for cement and plaster. When chunam is used for plaster it is mixed with fine river sand and thoroughly beaten up with water; coarse sugar and eggs are sometimes added. When beautiful work is desired, three coats are applied to a wall, the last being in the form of a fine paste consisting of four parts of lime and one of fine white sand, beaten up with whites of eggs, sour milk, and butter (*ghee*).

**Chunar'**, a town of British India, in the presidency of Agra, on the Ganges. It is fortified, and has several military institutions. Pop. 11,058.

**Chu'prah**, a town of British India, presidency of Bengal, on the Ganges, 35 miles W. N. W. of Patna. It is the chief town of the district of Sarun. It contains many

mosques and pagodas. Here is a British military station. Pop. estimated at 30,000.

**Chuquibamb'a**, a mountain of Peru. Height 21,000 ft.

**Chuquisaca**, the extreme south-eastern department of Bolivia. Area, 72,802 square miles. The surface is variable. The rainfall is considerable. The mountainous western part only is inhabited, where the climate is pleasant. The soil yields cinchona, grain, tobacco, sugar, coffee, and cocoa. The exports are cattle, horses, wine, spirits, and sugar. Capital, Chuquisaca. Pop. 275,722, besides 50,000 wandering Indians.

**Chuquisaca** (golden bridge), **Su'cre**, or **La Pla'ta**, the official capital of Bolivia, is on a plateau near the Andes, 9343 feet above the level of the sea; lat. 19° 23' S., lon. 65° 30' W. It is well built, with regular, spacious, and clean streets. It has a magnificent cathedral with a large dome, a president's palace, a university, a college, several monasteries, and a theatre. It is an archbishop's see and the seat of the national legislature. The climate is pleasant. Rich silver-mines are worked in the vicinity. Pop. 23,979. Since the origin of war troubles with Chili, the seat of government of Bolivia has been at La Paz.

**Chur** [Fr. *Coire*], the capital of the Swiss canton of Grisons, is in a valley and on or near the river Rhine, 60 miles S. E. of Zurich, with which it is connected by railway. It has an ancient cathedral of the eighth century and a bishop's palace; also manufactures of cutting tools and zinc-ware. Pop. in 1880, 8889.

**Church** [from the Gr. *κυριακόν*, *i. e.* the "Lord's house" (from *Κύριος*, the "Lord"); Anglo-Saxon, *cyric* or *circ*; Ger. *Kirche*; Scottish, *kirke*; Lat. *templum*; Fr. *église*; Sp. *iglesia*; It. *chiesa*]. The primary signification of the English word church is the "house of the Lord;" it came afterwards to denote a collective body of Christians meeting in such a house for worship, and also the entire body of Christian people, as when we speak of Christ as "the Head of the Church." In this last sense it corresponds to the Greek *ἐκκλησία* (Lat. *ecclesia*, whence the Fr. *église*, Sp. *iglesia*, and It. *chiesa*), from *ἐκκαλέω*, to "call out," to "summon," to "assemble."

The earliest Christian ecclesiastical structures were copied not from the heathen or Jewish temple, but from that combination of a hall of justice and a marketplace to which the name *basilica* was given. The reason of this is probably to be found not so much in the opposition between Christians and heathens, as in the different conceptions which they formed of the nature and objects of worship. The rites of heathenism were performed exclusively by the priest, the people remaining without the often roofless temple, which was not for worshippers, but was the abode of Deity. This mysterious character rendered it unsuitable for services in which the people were to participate, and for the delivery of those public addresses which were employed as a means of Christian teaching and exhortation. To such purposes the *basilica* was readily adapted. Slightly changed in form, it served the purposes of Christian worship, but there was nothing in its form which tended to awaken sentiments of devotion. The cross had been used by Christians from a very early period, and gradually it had become the principal distinctive emblem of Christianity. Nothing could be more natural than that when it became desirable to give distinctively Christian character to the *basilica*, this should be effected by such a modification as should convert it into a representation of this emblem. Nor did this alteration lead to any very extensive change in form. The *basilica* frequently has side entrances, in place of, or in addition to, that from the end. All that was requisite, then, to convert the simple parallelogram into a cross was, that at each side, in place of direct communication with the exterior, should be passages or arms running out at right angles; which arms cut the building across, and were therefore *transepts*.

A central tower or spire is very frequently erected over the point at which the arms or transepts intersect the body of the cross. From this point the portion of the building westward to the Galilee or great entrance is called the nave, while the portion eastward to the high altar is the choir. In the more complete churches the nave, and frequently the choir, are divided longitudinally by two rows of pillars, the portion at each side being generally narrower and less lofty than that in the centre. These side portions are the aisles. Vestries for the priests and choristers generally exist in connection with the choir. Along the sides of the choir are seats or stalls, usually of carved oak; and amongst these seats, in a bishop's church, the most conspicuous is the *cathedra*, or seat for the bishop, from which the cathedral takes its name. The larger English cathedral churches have a chapter-house attached, which is



commonly octagonal, and is often one of the most beautiful portions of the whole. Cloisters are frequent, and the sides of those which are farthest from the church or chapter-house are enclosed by other buildings, such as a library and places of residence for officials. It is here that, in Roman Catholic churches, the hall, dormitories, and kitchens for the monks are commonly placed. Beneath the church there is the crypt. The baptistery is another adjunct, frequently altogether detached. The position of the nave, choir or chancel, aisles, and transepts is nearly invariable, but the other portions vary greatly.

In ordinary language, any building set apart for Christian ordinances is called a church, though when of a minor kind it is frequently designated as a chapel. After a long period of neglect the building of churches in a style emulative of the older architecture has greatly revived.

When applied to a body of Christian people, the word Church is very nearly the equivalent of the Greek word *ἐκκλησία*, as used in the New Testament. The whole body of the Church on earth is called the "Church militant," as contending with evil and sin; the saints after death are called collectively the Church triumphant. Protestants distinguish between the *visible* and the *invisible* Church—the invisible Church consisting of all who are spiritually united in Christ; the visible Church consisting of all who profess the religion of Christ. Roman Catholics do not in the same manner acknowledge the distinction, but regard a connection with the hierarchy and participation of ordinances as establishing a connection with the true Church. Many Protestants regard the Church as subsisting in virtue of the authority of Christ and through the faith of individual believers; Roman Catholics regard the succession of the hierarchy and the regular administration of the sacraments as essential to the existence of that catholic or universal Church which Christ planted. They also regard the Church in its official action as so guided by Heaven as to be infallible. Protestants, for the most part, regard the Church of Rome and the Greek Church as forming part of the visible Church, but Roman Catholics are not accustomed to make a corresponding admission with respect to Protestants. From the hierarchical principle of the Church of Rome and of the Greeks results an employment of the word Church to designate the hierarchy alone; so that thereby a most dangerous, and in its consequences most disastrous, distinction is established between the Church and the flock. But most Protestants employ it to denote collectively all the followers of Christ, or to designate some particular body of Christians worshipping in one place, or the members of some particular denomination.

REVISED BY J. THOMAS.

**Church** (ALBERT E.), LL.D., an American officer and mathematician, born in 1807 in Salisbury, Conn., graduated at West Point in 1828. He served, while lieutenant of artillery, at the Military Academy as assistant professor 1831 and 1833–37, and as acting professor of mathematics 1837–38, and in garrison at Newport and Boston harbors 1832–33. He resigned Mar. 13, 1838, and was appointed professor of mathematics in the U. S. Military Academy. He was member of several scientific associations and author of valuable mathematical works, specially prepared for the use of his cadet pupils—viz. "Elements of Differential and Integral Calculus," 1842, and of an "Improved Edition containing the Elements of the Calculus of Variations," 1851, of "Elements of Analytical Geometry," 1851, of "Elements of Analytical Trigonometry," 1857, and of "Elements of Descriptive Geometry, with its application to Spherical Projections, Shades, and Shadows, Perspective and Isometric Projections," 1865. D. Mar. 30, 1878.

GEORGE W. CULUM.

**Church** (REV. ALONZO), D. D., LL.D., an eminent Presbyterian divine, and president of the University of Georgia from 1829 to 1859. He was a native of Vermont, and was a graduate of Middlebury College in that State.

**Church** (BENJAMIN), a famous Indian fighter, born in Plymouth (now in Massachusetts) in 1639. He fought in King Philip's war, and commanded the colonists in the battle in which Philip was slain. He also led five expeditions against the French and Indians in Maine. He removed in 1674 to Little Compton, R. I. Died Jan. 17, 1718. He was distinguished for piety, valor, and integrity.

**Church** (FREDERICK EDWIN), an American landscape-painter, born at Hartford, Conn., May 14, 1826. He visited South America in 1853, and derived from the scenery of the Andes materials for several paintings. He gained a high reputation by his "View of Niagara Falls from the Canadian Shore." Among his other works are "The Heart of the Andes," "Morning on the Cordilleras," "Sunrise on Mt. Desert Island," "The Parthenon," and "Jerusalem."

**Church** (JOHN ADAMS). See APPENDIX.

**Church** (JOHN HUBBARD), D. D., a Congregational min-

ister, born at Rutland, Mass., Mar. 17, 1772, graduated at Harvard in 1797, became pastor of a church in Pelham, N. H., in 1798, where he was minister for forty years. He was prominent in the Bible and missionary societies, and an advocate of classical learning. Died June 13, 1840.

**Church** (PHARCELLUS), D. D., born Sept. 11, 1801, in Seneca, Ontario co., N. Y., educated at Hamilton, N. Y., pastor of Baptist churches in Poughkeepsie, Vt., Providence, R. I., Rochester, N. Y., Boston, Mass., was for ten years editor of the "Chronicle" (Baptist), New York City, a frequent contributor to other journals, and author of "Philosophy of Benevolence," "Religious Dissensions," "Antioch," "Pentecost," "Memoir of Theodosia Dean," "Templeton," etc.

**Church** (SIR RICHARD), a Greek general, was born in Ireland in 1785, and entered the British army. In the Greek war for independence he commanded the land forces. Afterwards he was the chief of the anti-Russian party, and minister under King Otho. Died Mar. 20, 1873.

**Church** (SAMUEL), LL.D., a distinguished American jurist, born at Salisbury, Conn., in 1785, graduated at Yale in 1803, was eleven years a judge of probate in his native State, a judge of the superior court in 1833, and chief-justice of Connecticut (1847–54). Died Sept. 12, 1854.

**Church** (SANFORD E.), LL.D., an eminent American jurist, b. in Milford, Otsego co., N. Y., Apr. 18, 1815, studied law and rose to prominence in his profession. He was chosen lieutenant-governor of the State of New York in 1850, and again in 1852. In 1857 he was elected comptroller, this latter being the last elective office held by him. He was nominated in 1859 for comptroller, but defeated, and nominated again in 1863, with the same result. In 1862 he was Democratic nominee for Congress from the twenty-seventh New York district. In May, 1870, he was elected chief judge of the court of appeals of the State of New York, which position he accepted and held till his death. In 1872 he was requested to stand as candidate for the Democratic nomination for governor, but he declined the honor. In politics he was ever a steadfast Democrat, and, though frequently approached by opposing parties, he never sacrificed his political principles to personal preferment. Under Pierce and Buchanan the opposition made him tempting offers, but notwithstanding he was opposed to the Nebraska bill, he rejected all proffers of prospective patronage. After 1864 he retired from active political life. D. May 14, 1880.

**Church Calendar.** See CALENDAR, EASTER, and EPOCH, by F. A. P. BARNARD.

**Church Discipline**, in its more limited sense, includes the means employed by the Church, besides the ministration of the word and sacraments, to secure on the part of its members faithfulness to their profession and blamelessness of life. The Christian congregation, like every other community, needs discipline for the sake of self-preservation; but, besides this, discipline also rests upon the authority of Christ, and arises out of the very constitution of the Church. Among early Christians it assumed forms of great severity towards offenders. At a later period discipline was chiefly exercised with respect to persons accused of heresy and schism. The penances of the Church of Rome form an important part of its discipline, and therewith its indulgences are connected, as well as its rule of auricular confession. In the Protestant churches public confession of sins by which scandal has been given, and submission to public rebuke, are sometimes required. The power of exclusion from church membership is generally retained until repentance and reformation of life. In a wider sense, church discipline is used to designate the whole polity of a Church, including its CHURCH GOVERNMENT (which see).

**Church Government.** It is obvious that the Church must have a fixed polity according to which its affairs are administered. It is disputed among Christians how far this has been prescribed by Divine authority, and how far left to the discretion of men. The form of government depends primarily on the idea entertained of the constitution of the Church. Congregationalists place church government in the hands of the members of the congregation and the office-bearers whom they have elected. Baptists distinguish between the church proper and the congregation, hence they lodge this power in the church, as the primary body. Episcopalians, Presbyterians, and the various Methodist churches agree that many congregations are to be united under a common government; but this, according to Presbyterians, is properly carried on by ministers and elders of these congregations meeting for this purpose; while, according to Episcopalians, it is more or less absolutely in the hands of bishops. The government of the Methodist Episcopal churches is chiefly in the hands of the quarterly conference and the annual and general conferences, in which the laity have more or less share.

**Church History.** See ECCLESIASTICAL HISTORY, by PROF. PHILIP SCHAFF, S. T. D., LL.D.

**Chur'chill**, or **Missinnippi**, a river of North America, rises in a lake near lon. 109° W. It flows nearly north-eastward, passes through Nelson's Lake, and enters Hudson's Bay in lat. 59° N. Length, estimated at 800 miles.

**Churchill** (LORD ALFRED), a brother of the duke of Marlborough, was born in 1824, studied at the Sandhurst Military College, served in the British army (1842-48), and afterwards was long a member of Parliament. He is distinguished for his interest in the African race, and was a delegate to the sixth meeting of the Evangelical Alliance at New York in 1873.

**Churchill** (CHARLES), an English poet and satirist, was born at Westminster in Feb., 1731. He was a fellow-student and friend of the poet Cowper. Although he had a strong aversion to the clerical profession, he was ordained as a priest in 1756. In 1758 he succeeded his father as curate at St. John's, Westminster. His parishioners were scandalized by his dissipated and licentious habits, and by his negligence of his duties. He produced in 1761 "The Rosciad," a witty satire on theatrical managers and performers, which was very successful. About this time he resigned his curacy and quitted the profession of clergyman. He defended himself against certain critics by an admired poem entitled "The Apology." He was an intimate friend of John Wilkes, whom he assisted in the "North Briton." In 1763 he published "The Prophecy of Famine," a satire on the Scots, which is much admired. Among his other works are "The Conference," "Gotham," and "The Author." "Churchill," says Thackeray, "has those brilliant flashes of insight and spontaneous felicities of expression by which every true critic at once distinguishes the man of natural power from the man of mere cultivation." He died at Boulogne, France, during a visit, Nov. 4, 1764. (See TOOKE, "Life of Churchill;" and MACAULAY's essay entitled "Charles Churchill," 1845.)

**Churchill** (SYLVESTER), an inspector-general in the U. S. army, born in Woodstock, Vt., Aug. 2, 1783, educated in Vermont, published a newspaper till 1812, when he was appointed a first lieutenant of artillery U. S. A.; promoted to be captain Aug., 1813; assistant inspector-general, with the rank of major, Aug. 29, 1813; retained May, 1815, in artillery; major Third Artillery 1835; inspector-general, with rank of colonel, June 25, 1841. Gen. Churchill served with credit during the war of 1812-15; from 1815 to 1836 was on garrison or special duty; served during the war with the Creek Indians, and in Florida 1836-41, when he was appointed inspector-general; accompanied Gen. Wool in the war with Mexico, and for distinguished services at Buena Vista was brevetted brigadier-general U. S. A.; retired from active service Sept. 25, 1861. Died at Washington, D. C., Dec. 7, 1862.

**Churching of Women**, a usage prevailing in certain branches of the Church, of women on recovery after child-bearing going to church to give thanks. It appears to have been borrowed from the Jewish law (Lev. xii. 6). In the Church of the early ages it was accompanied with various rites, and in the Roman Catholic and Greek churches it is imperative. In the Anglican Church, also, a service for the churching of women finds a place in the Liturgy.

**Church Jurisdiction**, such as it was established by Constantine the Great in 331, did not simply mean that the Church should exercise jurisdiction in all ecclesiastical affairs, but actually meant a complete absorption by the Church of the jurisdiction of the State also in civil affairs. Paul had admonished the Christians not to bring their cases before unbelieving judges, and thus arose a practice which was legalized by Constantine. When, however, the court and the judges had become Christian, there was no reason for so extensive a Church jurisdiction, and the State immediately began to conquer back its old rights, confining the Church jurisdiction to purely spiritual affairs. But the contest was long and fierce, and is by no means ended as yet. A striking exposition of the enormous claims which the pope made, and of the opposition he met with already in the times of the Council of Constance, may be found in Gerson's "De potestate ecclesiastica," written during the sessions of the council. (See KULTUR-KAMPF, "Falk-Laws, Perry-Laws.")

**Churchman** (JOHN), an able preacher of the Society of Friends, was born at Nottingham, Pa., June 4, 1705, entered upon his ministry in 1733, and preached in many parts of the U. S. and Europe. A narrative of his experiences was published in 1780 in London. Died July 24, 1775.

**Church Methodists.** See PRIMITIVE WESLEYANS.

**Church of England and Wales.** See ENGLAND, CHURCH OF, by REV. BEVERLEY R. BETTS.

**Church of God**, a denomination of Christians first

organized at Harrisburg, Pa., in 1830, by the converts and followers of John Winebrenner, formerly a minister of the German Reformed Church. The doctrines of this Church are a belief in the Bible as the authoritative revelation of God; also in the Trinity, in human depravity, the vicarious atonement, and the freedom of the will (rejecting the Calvinistic doctrine of election). This Church also practises adult immersion as the only baptism, and administers the Lord's Supper to all Christians who desire it. They believe that literal washing of the feet is one of the ordinances of the Church. In all other respects the Church of God agrees with other evangelical Christian churches. The congregations of this denomination are in part independent in church government, but are united into "elderships," which are again joined into one "general eldership," which owns the church property. They have several newspapers and colleges, and number over 30,000 members, 460 churches, and 410 ministers.

**Church of Scotland.** See SCOTLAND, REFORMED CHURCH OF, by DAVID INGLIS, LL.D.

**Church of Scotland, Free.** See FREE CHURCH OF SCOTLAND, by DAVID INGLIS, LL.D.

**Church Rates**, in England, and formerly in Ireland, a tax on the parishioners and occupiers of land for repairing the church and defraying all expenses (other than that of maintaining the minister) incident to divine service. The church being regarded as belonging to the clergy, the expense of maintaining it is frequently laid on the rector or vicar. The origin of church rates is a matter involved in obscurity. It is certain that the expenses paid in this manner formerly were paid out of the tithes. Lord Campbell is of opinion that the contributions of the parishioners were at first voluntary, and that the custom at last assumed the form of an obligation. There is no legal mode of compelling the parishioners as a body to provide the rate; and this has occasioned difficulty in imposing the tax in parishes in which dissent is prevalent. In recovering the rates from individuals refusing to pay, formerly the only mode was by suit in the ecclesiastical court; at present, in cases under ten pounds, the justices of the peace, on complaint of the church-wardens, inquire into the merits of the case and order payment. Against the decision of the justices an appeal lies to the quarter sessions. There are few social arrangements in England that have been the cause of greater irritation than the church rates. Since the first bill for the abolition of church rates was introduced by Lord Althorp in 1834, scarcely a session has passed in which some attempt has not been made at legislation on this subject. Church rates in Ireland ceased with the disestablishment of the Church of Ireland in 1871. In Scotland the system is similar to that in England, though the name of church rates is not used.

**Church-Wardens** in the Anglican churches are officers whose duty is to protect the church edifice, to superintend the performance of public worship, and maintain order during service. There are generally two in each parish. In some dioceses they are appointed by the clergymen, and in others are chosen by the parishioners. Their assistants are sometimes called questmen.

**Church-yard** (THOMAS), born in 1520, was a prolific author of prose and verse in the early part of Queen Elizabeth's reign. He was at first a servant of the earl of Surrey, and afterwards a soldier. Some of his works have been from time to time reprinted, more for the pleasure of bibliophiles than on account of any great merit. His "Worthiness of Wales," "Chips concerning Scotland," and "Legende of Jane Shore" are the best known of his works. Died in 1604.

**Churn**, an apparatus for agitating cream for the separation of butter, of which many forms are in use. Trials to test the merits of different churns have failed to settle which is the best for actual use, for the same machine under different conditions does not always yield the same result. The oldest form is the upright or plunge churn. Barrel churns, sometimes of monster size, are used in large dairies in Holland. For small or moderate-sized dairies perhaps the most suitable is the box churn, having the agitators fixed on a horizontal spindle. To all forms of churns power can be and is applied. Horse-power is in very general use in large dairies in Great Britain. In exceptional cases steam-power is used. (See BUTTER, by PROF. C. F. CHANDLER.)

**Chur'ton** (RALPH), archdeacon of St. Andrew's, is best known for his Bampton Lecture on the prophecies relating to the destruction of Jerusalem, delivered in 1785. He was born near Bickley, Cheshire, Dec. 8, 1754, was educated at Brazenose, Oxford, and died Mar. 23, 1831. He was a laborious and faithful minister, and the author of several biographical and other works of decided merit.

**Churubus'co**, a village or hamlet of Mexico, on the

Rio de Churubusco, about 6 miles S. of the city of Mexico, the scene of a battle between the American forces under Gen. Winfield Scott, marching on the city of Mexico, and the Mexicans, defending the approaches to their capital, under President Santa Anna. The battle of Contreras was fought on the same day, and both can be described in connection.

Leaving a competent garrison at Puebla, Gen. Scott advanced his forces upon the capital Aug. 7-10, 1847, the army becoming united about the head of Lake Chalco. Reconnaissances made Aug. 12-13 upon the Peñon, a strongly fortified, isolated mound, commanding the principal approach to the capital from the E., and upon Mexicalcingo to the left of the Peñon, resulted in Scott's falling back upon a previously entertained project of turning these strong eastern defences by passing S. of Lakes Chalco and Jochimilco, thus reaching the hard though much broken ground to the S. and S. W. of the capital, near San Augustin. By a sudden inversion, Worth's division, followed closely by Pillow's and Quitman's, marched on the 15th. Twiggs' division being left at Ayotla till the 16th to threaten the Peñon and Mexicalcingo, and deceive the enemy as long as practicable, marched on the 16th towards Chalco, met and dispersed a force of Mexicans double his own in numbers, under Gen. Valencia.

Worth's division arrived at San Augustin on the 18th, and was pushed forward to San Antonio, 3 miles distant, on the direct road to the capital.

A reconnaissance was commenced on the 18th, and continued next day, to the left of San Augustin over difficult fields of rocks and lava which extend from San Antonio towards Magdalena; Pillow's division was advanced to make a road for heavy artillery, and Twiggs' thrown forward to cover this operation. At 3 P. M. of the 19th this advance came to a point where the road could only be continued under the fire of twenty-two pieces of the enemy's artillery, strongly entrenched and supported by cavalry and infantry. Our batteries had advanced within range of the enemy's camp, and Pillow's and Twiggs' divisions moved forward to dislodge him from his position. A battle ensued which lasted till nightfall, our troops maintaining their position.

Observing the hamlet of Contreras on the road leading from the capital, through the entrenched camp, to Magdalena, and the streams of reinforcements advancing from the capital by that road, Gen. Scott determined to occupy that place and arrest reinforcements, and Col. Morgan was ordered with his regiment (the Fifteenth) to move forward for this purpose. Riley with his brigade was already on the enemy's left and in advance of this hamlet, and Shields was ordered to follow and support Morgan. The night of the 19th found these troops, with the brigades of Gens. P. F. Smith and Cadwalader, all under Smith, in and about Contreras, on the same road with the enemy's entrenched camp, and half a mile nearer the capital. At 3 A. M. (Aug. 20th) the movement was commenced on the rear of the enemy's camp, Riley leading, followed by Cadwalader and Smith. Despite the darkness, rain, and mud, an elevation behind the enemy was reached by Riley, from whence his intrenchments were stormed and carried in seventeen minutes. Cadwalader successfully executed the part assigned him of diverting the enemy, and brought up to the general assault two of his regiments, who poured destructive volleys into the works. Smith's brigade (temporarily under Major Dimick, First Artillery), in the mean time following, discovered a long line of Mexican cavalry outside the works, which were attacked and routed. Shields, remaining at Contreras, held large numbers of the enemy in check, and by pursuit added largely to the brilliant results of the day. The American force here engaged numbered (including Shields) not more than 4500, while the Mexican army numbered 20,000, all of whom, not captured or killed, now fled. Two 6-pounders taken from the Fourth Artillery at Buena Vista (though without dishonor) were here recaptured, besides twenty-two pieces of ordnance, 800 prisoners, 700 mules and many horses, and immense quantities of small-arms and ammunition.

The battle being over before the advancing brigades of Worth's and Quitman's were in sight, they were ordered back to their old position, and Worth was ordered to attack San Antonio, which place he soon forced, its garrison being shaken by the news of the victory at Contreras. While these operations were going on on the left, a party was sent to reconnoitre the strongly fortified church or convent of San Pablo in the hamlet of Churubusco, and Twiggs with a brigade and a battery ordered to follow and attack the convent. Pierce's brigade was at the same time sent to attack the Mexican right and rear, in order to favor the movement on the convent and cut off retreat; Shields to follow Pierce closely and take command of the left wing. The line from right to left soon became briskly engaged; Shields, in the rear of Churubusco, being hard

pressed, was reinforced by the rifles and Sibley's troop Second Dragoons.

Worth's division, being soon reunited and in hot pursuit from San Antonio, was joined by Gen. Pillow, who, discovering that San Antonio had been carried, hastened to the attack of Churubusco. The hamlet bearing this name, besides the strongly fortified convent of San Pablo, presented a strong field-work at the head of a bridge over which the road passes from San Antonio to the capital, and within and about these works the entire remaining forces of Mexico were collected, some 27,000 men; the American force being about 8000.

Twiggs hotly pressing the convent, Worth and Pillow manoeuvred closely upon the *tête-de-pont*, which latter was finally assaulted and carried at the point of the bayonet; and twenty minutes after the convent, which had held out for two hours and a half, yielded to Twiggs' division, and signals of surrender were displayed; but not, however, until the Third Infantry had entered the works.

Shields in the mean time had been hotly engaged on the right against superior numbers with varying success, but resulting in a final victory for him; so that on the forces of Worth and Pillow coming up in rapid pursuit of the enemy, they were joined by Shields, and the three pursued the fugitives to within a mile and a half of the capital. Thus, in a single day were two great battles fought and victories won, by which 3000 prisoners were taken, 4000 killed or wounded, thirty-seven pieces of ordnance captured, the entire army dispersed, and the capture of the ancient capital and an honorable peace ensued. The American loss was 1053, killed and wounded.

**Chusan**, an island near the E. coast of China, province of Che-Kiang, about 45 miles N. E. of Ning-Po. It is nearly 50 miles in circumference, and is mountainous, but mostly fertile and well cultivated. The products of the soil are tea, rice, cotton, tobacco, &c. The camphor tree and bamboo flourish here. The climate is pleasant and healthy. Ting-Hai, the capital, was taken by the British in July, 1840, and again in Oct., 1841, but it was restored to the Chinese at the end of the war.

**Chut'ny**, or **Chut'ney**, a stimulating condiment very largely used in India, and to a considerable extent in Great Britain and America. Chutny is a compound of mangoes, capsicum, and lime-juice, with some portion of other fruits, such as tamarinds, etc., the flavor being heightened by garlic. It is sometimes manufactured for sale in England, but not in large quantities. Families occasionally make it for their own use, and various receipts are given for its manufacture.

**Chwalynsk'**, a town of Russia, in the government of Saratov, a river-port on the Volga. It has various manufactures and large fruit gardens. Pop. 14,262.

**Chyle** [from the Gr. χυλός, "juice," "chyle"], a fluid produced in the small intestines, and absorbed from them by the lacteals and the veins. The food undergoes various changes in the alimentary canal, one of which is its conversion in the stomach into a pulpy mass termed *chyme*. The *chyme*, which passes into the small intestine, is acted upon by the bile, pancreatic fluid, and intestinal juice, and through their influence is separated into the *chyle*, and into matters unfit for nutrition, which ultimately find their way out of the system. The mode in which the nutritious *chyle* is taken up by vessels distributed over the small intestines is described in the article *DIGESTION*. Obtained from the thoracic duct of an animal that has been killed while the process of digestion is going on (especially if it has taken fatty food), *chyle* is a milky-looking or yellowish fluid, with a faint alkaline reaction. Like the blood, it coagulates after its abstraction from the animal, and in about three hours a small clot is separated. On examining *chyle* under the microscope we find that it contains enormous numbers of minute molecules of fat, together with nucleated cells (*chyle-corpuscles*), apparently identical with the white blood-cells. The chemical constituents of *chyle* are much the same as those of blood—fibrin, albumen, fat, extractive matters, and salts being the most important. But it may be regarded as certain that the greater part of the saccharine and nitrogenous elements of food enters the veins directly from the stomach and the small intestines, through the capillaries, and that the *chyle* of the thoracic duct consists principally of the fatty parts of food mingled with lymph from the lymphatic glands.

**Chyme** [from the Gr. χυμός or χύμα, "liquid," for χεύμα, verbal noun from χέω, "to pour"], a name sometimes given to the food after the process of stomach-digestion, and before the action of the intestinal juice, bile, and pancreatic fluids has taken place upon it. The name is of late not much used, but it is a convenient term, and as such deserves to be retained.

It is a recognized fact that during the process of stomach-

digestion some part of the nutritive matter of the food is taken up by the walls of the stomach, and passes directly into the venous blood. Of the remainder, Mialhe states that the albuminoid elements are changed by the gastric juice into a new substance called albuminose; while Lehmann and others, following up a hint from Mialhe, have shown that each albuminoid affords a peculiar kind of albuminose (or peptone, as it is now often called). The principal varieties now recognized are albumen-peptone, casein-peptone, and fibrine- (or musciline-) peptone. The peptones are believed to be already fitted for absorption into the circulation. Upon starch, sugar, and oils the gastric juice has but little effect. Chyme, then, consists of the peptones and the starchy, saccharine, and fatty elements of food, mingled with certain residual matters which are not useful as food, but which, with other waste products, are ultimately expelled directly from the alimentary canal.

**Chytræus** (DAVID KOCHHAFF), a German theologian, born in Swabia Feb. 26, 1530, was a scholar of Camerarius and Melanchthon, professor at Rostock, and member of the Diet of Augsburg, of which he wrote an account (1576), and various other religious conferences. He was one of the framers of the "Formula Concordiæ" and author of "Chronicon Saxonie," "De Lectione Historiarum," etc. Among his other writings are "Historia Confessionis Augustanæ" (1578) and "De Morte et Vita Eterna" (1590). His complete works have been several times reprinted. Died June 25, 1600. He was one of the most learned and influential Lutheran divines of his time. His life has been written by Schützlin and several others.

**Cialdi'ni** (ENRICO), an able Italian general, born in Modena Aug. 8, 1811. He entered the Spanish army in 1835, and fought in several campaigns against the Carlists. In 1848 he returned to Italy, and joined the Italian patriots in the war against Austria. He served Victor Emmanuel as a general in the Crimean war (1854-55). In June, 1859, he commanded with success against the Austrians at Palestro. He defeated the papal general Lamoricière at Castelfidardo in 1860, and besieged Gaeta, which he took in Feb., 1861. He became a senator of Italy in 1864, commanded one of the armies operating against Austria in 1866, and was appointed chief of the royal staff in the same year. In Oct., 1867, he was requested by the king to form a cabinet after the resignation of Ratazzi, but without success. He withdrew from the army, and opposed the ministry of Lanzi. He accompanied Amadeo as ambassador extraordinary to Madrid, and after discharging his mission returned in Spain. He was ambassador to France from 1876 to 1881.

**Cib'ber** (COLLEY), an English dramatist and actor of German extraction, born in London Nov. 6, 1671. He began to act comedies in 1689, and married a Miss Shore in 1693. In 1695 he produced a play called "Love's Last Shift, or the Fool in Fashion," which was successful. He also wrote "The Careless Husband" (1704), "The Non-juror" (1717), and "An Apology for the Life of Colley Cibber," which is an amusing work. In 1730 he was appointed poet-laureate. Died Dec. 12, 1757. Notwithstanding the reputation for stupidity which Pope's "Dunciad" has conferred upon Cibber, there is no doubt that he was in reality one of the most brilliant writers of that brilliant age. His morals, however, were not of the purest.—His son THEOPHILUS (1703-58) was an actor, an author, and a writer of repute, and husband of Susanna Maria Cibber, a celebrated actress.

**Cib'ol**, a plant of the onion or garlic genus, the *Allium fistulosum*, an Asiatic plant, much cultivated in parts of Europe for its tops, which are tubular, somewhat like those of the onion. It stands in the ground all winter, growing from year to year without replanting, and has no bulb.

**Cibo'lo**, a river of Texas, rises in Kendall county, flows south-eastward, and enters the San Antonio near Helena. Entire length, about 110 miles.

**Cibo'rium** [Gr. *κιβόριον*, the "pod" of the lotos-bean; hence a cup-shaped vessel], in the Roman Catholic Church, a variety of the pyx, or vessel used to contain the consecrated host. The ciborium is of gold or silver, and its cover is frequently surmounted by a cross. The name is also given to a canopy over the altar sustained by four columns, to which the pyx, in the form of a dove, was suspended by chains.

**Cibra'rio** (LUGI), an Italian historian, born at Turin Feb. 23, 1802. He published, besides other works, "Economia Politica del Medio Evo" (1839), a "History of the Monarchy of Savoy" (1840), and a "History of Turin" (1847). Became minister of public instruction in 1852, and minister of foreign affairs in 1855. Died Oct. 1, 1870.

**Cica'da** [Gr. *τετραγ*], the Latin name of a well-known European insect, called also *Cica'la* [It.], which gives its

name to a genus of Hemiptera noted for the shrill noise which it makes. The cicada of the ancient classic poets was chiefly admired for its shrill song. The cicadas frequent shrubs and trees, and feed on their juices, having an apparatus for piercing the bark and sucking out the juice or sap. Their organ of sound is situated on each side of the under and anterior part of the abdomen. Cicadas abound in tropical and sub-tropical regions. They mostly have transparent and veined wing-covers. We have several species of cicada in the U. S., of which the best known is the "seventeen-year locust," *Cicada septendecim*. The *Cicada canicularis* is a well-known species with a W-shaped mark on the back. Its appearance was once said to be a forerunner of wars.

**Cicatriza'tion** [from the Lat. *cicatrix*, a "scar"], the healing of a broken surface in the skin or in a mucous membrane, by which process a dense fibrous material is substituted for the lost texture. The new tissue is called the cicatrix, and usually resembles, to a considerable extent, the structure which it replaces; it is, however, less elastic, and from its shrinking in volume sometimes produces an appearance of puckering. The glands and other special structures of the original tissue are wanting in the cicatrix, which, however, usually performs its office well. The cicatrix of burns and scalds has often a remarkable tendency to contract and distort the neighboring surface.

**Cic'ely** (*Myrrhis*), a genus of umbelliferous plants, of which one species, sweet cicely (*Myrrhis odorata*), is common in Central and Southern Europe and in Asia, but in Great Britain it appears to have been introduced. It is a branching perennial, two feet high or upward, with large triply pinnate leaves and pinnatifid leaflets, somewhat downy beneath; the fruit and the whole plant powerfully fragrant, the smell resembling that of anise. The seeds, roots, and young leaves are used in soups, etc. The plant was formerly much in use as a medicinal aromatic. The U. S. have at least four wild plants somewhat resembling the above—the rough and the smooth sweet cicely, *Osmorrhiza brevistylis* and *longistylis*, of the Atlantic States, and *Myrrhis occidentalis* and *Osmorrhiza nuda* of the far West. The roots are sometimes eaten, having an agreeable taste, but several poisonous umbelliferous plants closely resemble cicely, and caution should be observed in gathering it.

**Cicero** (MARCUS TULLIUS), an illustrious Roman orator, author, and statesman, was born at Arpinum (now Arpino), about 70 miles E. S. E. of Rome, on the 3d of Jan., 106 B. C. He is often called TULLY by English writers. He belonged to the plebeian *gens Claudia*, and the only member of the family who previously to the great orator gained any distinction in Roman history was Cælius Claudius Cicero, who was *tribunus plebis* in 454 B. C. The significance of the surname *Cicero* is unknown. It may be connected with *cicer*, "pulse," and have been given to some ancestor of the orator as an honorable distinction for some agricultural feat; as, for instance, the raising of that kind of grain. He was liberally educated by his father, an opulent *eques* of the same name, was a pupil of Archias, the Greek poet, and learned to speak Greek fluently. He also became deeply versed in Greek literature and philosophy. His disposition was genial and amiable, his habits temperate and exemplary. In the year 91 B. C. he assumed the manly gown (*toga virilis*), and began to study law under Mucius Sævola the Augur, who was a jurist of great eminence. In his early youth he wrote "Pontius Glaucus" and other poems, which were admired by his contemporaries, but are not extant. According to Plutarch, "he was regarded as the best poet, as well as the greatest orator, in Rome." He passed through a course of discipline in rhetoric and elocution, studied logic under Diodotus the Stoic, attended the lectures of the Greek philosopher Philo, and neglected no mental exercise, however arduous. At the age of twenty-five he began to plead in the Forum, and, according to the custom of Roman advocates, his services were always gratuitous. About the year 80 he defended Roscius Amerinus with courage and success when he was prosecuted for a capital crime by an agent or favorite of Sulla, then dictator, the fear of whose enmity deterred the other advocates from pleading for the defendant.

His constitution was naturally delicate, and his physical condition was such that his friends advised him to abandon the bar or to improve his health by travel. In 79 B. C. he departed from Rome and went to Athens, where he passed about six months, and studied philosophy with Antiochus of Ascalon, Zeno the Epicurean, and Demetrius Syrus. He there formed an intimate friendship with the celebrated Titus Pomponius Atticus. He afterwards extended his travels through Asia Minor, and returned to Rome with a great improvement in his lungs, voice, and constitution.

In 75 B. C. he obtained the office of *quæstor*, the first step in the gradation of public honors, and it was decided

by lot that he should perform the duties of *quæstor* in Sicily. The integrity, moderation, and humanity of his official conduct excited general admiration among the people of Sicily. He returned to Rome in the year 74, married (about 79 B. C.) an heiress named Terentia, and soon rose to the foremost rank in his profession. His chief forensic rival was Hortensius. Cicero excelled in sarcasm and witticisms, with which he often seasoned and enlivened his orations and arguments. No advocate had greater power over the feelings and sympathies of his auditors. It was his habitual practice to act as counsel for the defence in criminal trials, but he deviated from this rule in the case of Caius Verres, who was prosecuted by the Sicilians in 70 B. C. for nefarious acts of cruelty and rapine. Only two of his admirable orations against Verres were actually spoken in court, for the evidence against the accused was so convincing that his counsel declined to plead, and Verres went into exile before the decision of the cause. Cicero was elected *ædile* in 69 B. C. by a majority of the voters of every tribe, and in that capacity had the charge of the temples and public edifices. Having offered himself in 66 as a candidate for the office of prætor, which was the next in the ascending scale of public honor, he was elected first *prætor urbanus* by the suffrages of all the centuries. The duty of prætors was to preside as judges over the highest courts. According to Plutarch, "he acted with great integrity and honor as president in the courts of justice." During his term of office as prætor he made an important political oration for the Manilian Law ("Pro Lege Manilia"), the object of which was to appoint Pompey commander-in-chief in the war against Mithridates the Great.

After the expiration of his term of office (which was one year) he prepared to compete for the consulship, and offered himself as a candidate in 64 B. C. Catiline was one of the defeated candidates in this election, which resulted in the choice of Cicero and C. Antonius. Cicero entered upon the office on the 1st of January, 63, at a time when the republic was in a critical condition in consequence of the prevalence of corruption, sedition, and treasonable designs. He succeeded in forming a political alliance between the senate and the equites or knights, and by this wise policy promoted the cause of liberty and order. "He was," says Middleton, "the only man in the city capable of effecting such a coalition, being now at the head of the senate, yet the darling of the knights." He acquired great celebrity by the courage and energy with which he defeated the conspiracy of Catiline, whom he denounced in four eloquent orations. Catiline, who was the leader of a large number of desperate men, had formed a plot to burn the city and massacre many of the senators. Cicero, who was notified of this plot by a woman named Fulvia, pronounced before the senate on the 8th of November his first oration against Catiline, who was present and rose to reply, but his voice was drowned by cries of "traitor!" and "parricide!" (See CATILINE.) The versatility and elasticity of Cicero's mind were signally exemplified by the fact that during the crisis of this conspiracy, before Catiline was defeated in battle, he defended Murena against a charge of bribery in an oration which abounds in witty and good-humored raiillery.

For the defeat of this great conspiracy, Cicero received unbounded honor and applause. Men of all ranks and all parties hailed him as the saviour of the republic and father of his country. In the language of Juvenal,

"Roma Patrem Patriæ Ciceronem libera dixit."

"Cicero could boast," says William Ramsay, "of having accomplished an exploit for which no precedent could be found in the history of Rome. In the garb of peace he had gained a victory of which the greatest among his predecessors would have been proud, and had received tributes of applause of which few triumphant generals could boast." He incurred, however, the enmity of many persons by the capital punishment of Lentulus, Cethegus, and other accomplices of Catiline. He was censured for violation of the constitution and laws by the execution of these conspirators, although they had been condemned to death by the senate. At the expiration of his consulship, having refused to accept the government of a province, he returned to the senate as a private individual (62 B. C.), and purchased an elegant mansion on the Palatine Hill. He also owned villas or country-seats at Tusculum, Arpinum, Formiæ, and other places. He opposed the triumvirs Cæsar, Crassus, and Pompey, whose coalition he considered to be dangerous to the peace and liberty of the state, and he endeavored, without success, to detach from that coalition Pompey, who was his personal friend. In 59 B. C. his malignant enemy Clodius obtained power as tribune of the people, and proposed a law "that whoever has put to death a Roman citizen without due trial shall be interdicted from fire and water." Many thousands of Roman citizens now expressed sympathy for Cicero, but as the consuls were hostile to him,

he yielded to the storm and went into exile in April, 58 B. C. A law was then speedily enacted to interdict Cicero from earth and water, and his house on the Palatine Hill was burned by Clodius. The lack of fortitude which he exhibited in his exile (which was passed in Greece) is severely criticised by several writers. In a letter to his wife Terentia he wrote, "It is not my crimes, but my virtue that has crushed me." The excessive violence of his enemies tended to produce a speedy and strong reaction. The new consuls and tribunes elected for the year 57 were friendly to Cicero, whose recall was also advocated by Pompey and a majority of the senate. In August, 57, a bill for his restoration was adopted by an overwhelming majority of the voters, who had come from various parts of Italy to the *comitia centuriata* at Rome. "There had never been known," says Middleton, "so numerous and solemn an assembly of the Roman people as this." On his return to Rome he was greeted with abundant demonstrations of popular favor and enthusiasm. Between 57 and 52 he pleaded several causes in the courts, and found leisure to write two important works, entitled "De Republica" ("On the Republic, or the Principles of Government"), and "De Legibus," a philosophical treatise on the origin, nature, and perfection of law.

For a term of one year (51 B. C.) he acted as proconsul or governor of Cilicia and Pisidia, where his administration was a model of moderation, purity, and probity. He returned to Italy in the year 50, and found that a civil war was imminent between Cæsar and the senate. He hesitated whether he should take an active part in the coming contest, and wished to act as a mediator, but eventually he joined the army of Pompey, who fought for the senate. "He fluctuated greatly," says Plutarch, and was in the utmost anxiety; for he says in his letters, "Whither shall I turn? Pompey has the more honorable cause, but Cæsar manages his affairs with the greatest address. In short, I know whom to avoid, but not whom to follow." His wit, however, did not fail even in this gloomy crisis. When Pompey asked him, "Where is your son-in-law?" (Dolabella), Cicero replied, "He is with your father-in-law." After the battle of Pharsalia (August, 48 B. C.), Cato offered the command of the army to Cicero, but he declined it, and, returning to Italy, submitted to the power of Cæsar, who treated him with clemency. He afterwards devoted himself to literary labors in retirement, and found consolation in the calm enjoyments of speculative philosophy. In the ensuing period of three or four years (47-44) he produced numerous works on philosophy and rhetoric, which are admirable monuments of his profound and varied learning as well as of his immense mental activity. As a philosopher he preferred the principles of the New Academy. In the year 45 he lost his accomplished daughter Tullia, whom he regarded with the fondest affection. He approved the assassination of Cæsar, and denounced the conduct of Mark Antony in a series of orations called *Philippics*, the first of which was spoken in the senate in September, 44. The second *Philippic* is a masterpiece of eloquent invective. For a few months in the year 43, while Octavius co-operated with the senate against Antony, Cicero was the most prominent statesman in Rome. Between December, 44, and May, 43 B. C., he uttered his last twelve *Philippics*, which were received with general applause, but the republican cause was soon ruined by the coalition of Octavius with Antony and Lepidus. Cicero was proscribed by them, and was killed by the soldiers of Antony near his Formian villa in December, 43 B. C. He left one son, named Marcus Tullius. The moral character of Cicero is admitted to be excellent even by those who censure his public conduct. His worst foible was vanity, exhibited in a habit of self-laudation. According to Niebuhr, "The predominant and most brilliant faculty of his mind was his wit. In what the French call *esprit*—light, unexpected, inexhaustible wit—he is not excelled by any of the ancients." As an orator he surpassed all the ancients except Demosthenes. Modern critics concur in unanimous admiration of the consummate grace and beauty of diction which enchant successive generations in the periods of Cicero. He amplifies everything. His words seem to gush forth without effort in an ample stream; and the sustained dignity of his oration is preserved from pompous stiffness by the lively sallies of a ready wit and a vivid imagination. His periods are sonorous, but present a great variety of cadences. His "Letters," of which more than eight hundred are extant, are models of exquisite Latinity, and are highly prized for the light which they throw on the history and antiquities of the Roman republic. Among his works which remain entire are about fifty orations; also treatises, entitled "De Finibus, libri v." (an Inquiry into the Supreme Good); "Brutus seu de Claris Oratoribus" (a critical notice of Roman orators); "De Amicitia" (a dialogue on friendship); "Tusculanæ Disputationes" (disputations



on various questions of philosophy); "De Naturâ Deorum, libri iii." ("On the Nature of the Gods"); "Orator, seu de Optimo Genere Dicendi" ("The Orator, or On the Best Manner of Speaking"); and "De Officiis, libri iii." (an excellent treatise on ethics). One of his greatest works, "De Republicâ," is lost except a large fragment. He also wrote treatises, "De Gloria" ("On Glory") and "De Virtutibus" ("On the Virtues"), which are not extant. Mutilated copies have been preserved of his works entitled "De Legibus" and "Academicorum, libri iv." Among the best editions of his complete works are those of Ernesti, Halle, 5 vols. 8vo, 1774-77; Olivet, Paris, 9 vols. 4to, 1742; and Orelli, Zurich, 9 vols. 8vo, 1826-37. (See PLUTARCH, "Life of Cicero;" CONYERS MIDDLETON, "History of the Life of Cicero," 1741; F. FABRICIUS, "Historia Ciceronis," 1563; ABEKEN, "Cicero in Seinen Briefen," 1835, and an English version of the same, 1854; W. FORSYTH, "Life of M. T. Cicero," 2 vols., 1864; LAMARTINE, "Cicéron," 1852; ORELLI, "Onomasticum Tullianum;" J. MORABIN, "Histoire de Cicéron" 3 vols., 1745; DRUMANN, "Geschichte Roms." The most vivid and charming "Life of Cicero" is by ANTHONY TROLLOPE, 1880, 2 vols.)

WILLIAM JACOBS.

**Cicero** (MARCUS TULLIUS), the only son of the preceding, was born in 65 B. C. He is said to have been dissipated, indolent, and intemperate. In the year 49 he joined the army of Pompey, and received the command of a squadron of cavalry. Soon after the battle of Pharsalia (48 B. C.) he went to Athens, and studied philosophy under Cratippus. Having been appointed a military tribune by Brutus in 44 B. C., he defeated C. Antonius, and did good service in the Macedonian campaign. By the favor of Octavius (Augustus) he became consul in the year 30, and was governor of Asia (Syria) in 29-28.

**Cicero** (QUINTUS TULLIUS), a brother of Cicero the great orator, was born about 102 B. C. He was elected prætor for the year 62, after which he officiated as governor of Asia for three years, and returned to Rome in 58 B. C. In Asia, however, he gave great offence to both the Greeks and the Romans by the violence of his temper and the corruption and licentiousness of his favorites. He was appointed in the year 55 legate (*legatus*) to Cæsar, whom he attended in an expedition to Britain, and in 54 he commanded a legion in Gaul. In the civil war he took arms against Cæsar, but he made his peace with him in 57 B. C. He was proscribed by the triumvirs, and killed in 43 B. C.

**Cicerone**, che-châ-ro'nâ [from *Cicero*, a derivative reference to the loquacity of guides], an Italian word signifying a guide who shows and explains to travellers the interesting objects, antiquities, and famous places which abound in Italy.

**Cicisbeo**, che-chis-bâ'o [Fr. *cicisbée* or *sigisbée*], a name applied since the sixteenth century, in Italy, to the acknowledged attendant upon a married lady. In Italian society it was at one time unfashionable for the husband to associate with his wife anywhere except in his own house. In society or at places of amusement the wife was accompanied by her *cicisbeo*, who attended at her toilet to receive her commands for the day. This custom, which was once universal, has now almost disappeared. *Cicisbeo* is synonymous with *cavaliere servente*. The custom is highly commended by several Italian writers.

**Cicogna'ra, da** (LEOPOLDO), COUNT, an Italian antiquary and writer on art, was born at Ferrara Nov. 26, 1767. He was for many years president of the Academy of Fine Arts in Venice, and was a friend of Canova. His chief work is a "History of Sculpture from the Renaissance of that Art to the present Century" (3 vols., 1813-18), which is highly esteemed. He wrote a "Life of Canova" (1823). Died Mar. 5, 1834.

**Cicu'ta**, the ancient Latin name of the *Conium maculatum* (hemlock), a poisonous plant which was used at Athens as means of capital punishment. This is the plant which is popularly called *cicuta* in the U. S. and Europe. (See CONIUM.) *Cicuta* is also the name of a genus of umbelliferous plants which are poisonous. The *Cicuta maculata* (spotted cowbane) grows in swamps in the U. S. Its root is a very deadly poison. Other equally poisonous species grow in the U. S. and in Europe.

**Cid** [Arab. *seid*, a "lord"], surnamed EL CAMPEADOR (the "champion"), the most celebrated national hero of Spain, was a Castilian whose proper name was RODRIGO (or RUY) DIAZ DE BIVAR. He was born at Burgos about 1040. He became commander of the army of Sancho II. of Castile, who reigned from 1065 to 1072. About 1085 he was banished by Alfonso VI. He had married Doña Ximena, a relative of King Alfonso. Even while in exile he was the commander of a retinue of knights and vassals, and he waged war with success against several princes. He gained a victory over the Moors, and became sovereign

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of Valencia in 1094. Died in 1099. His exploits have been embellished by many marvellous and fabulous inventions. His life is the subject of an anonymous epic called "The Poem of the Cid," which, according to Southey, is the "oldest and finest poem in the Spanish language," and also of a tragedy by Corneille (1636). (See R. SOUTHEY, "Chronicle of the Cid," 1808; M. J. QUINTANA, "Life of the Cid," in Spanish and French, 1837; "Romancero General," 1604.)

**Ci'der** [Fr. *cidre*; It. *cidro*], the fermented juice of apples, extensively prepared in parts of England, in Ireland, in the northern districts of France, and in North America. In Normandy vast quantities of apples are grown for the preparation of cider. The apples are first reduced to pulp in a mill, and the pulp is afterwards subjected to pressure. The apple-juice is placed in casks in a cool place, when fermentation begins, part of the sugar is converted into alcohol, and a clear liquid is obtained, which can easily be racked off from sedimentary matter. Cider is largely used as a beverage. It contains from 5½ to 10 per cent. of alcohol, and is intoxicating when drunk in large quantities. Cider quickly turns sour, becoming *hard cider*, owing to the development of acid, and great difficulty is experienced in the attempt to keep it sweet. Large quantities are used in the manufacture of VINEGAR (which see).

**Cienfue'gos**, a town of Cuba, 111 miles S. E. of Havana, is the capital of a district of its own name. Sugar is exported from this place. Pop. 9950.

**Cie'za**, a town of Spain, in the province of Murcia, near the river Segura, and on a railway, 24 miles N. W. of Murcia. It has manufactures of linen cloth. Pop. 10,910.

**Cigar'**, or **Segar'** [Fr. *cigare*; Sp. *cigarro*], a small roll of tobacco-leaves for smoking. The cigars of Havana are the most highly prized, but those from Manila, usually called cheroots, are also excellent. The manufacture of cigars in the U. S. is an important industry. For the outer part or wrapper of a cigar the tobacco raised in the Connecticut Valley is considered the best, from its fine elastic quality. (See TOBACCO.)

**Cignani** (CARLO). See APPENDIX.

**Cil'ia** [the plu. of *cilium*, the Lat. for "eyelash"], the hairs which grow from the margin of the eyelids. The term is also applied to microscopic filaments which project from animal membranes, and which are often endowed with quick, vibratile motion. In most of the very low animals the respiratory function is effected by means of vibratile cilia; many animalcules and the gemmules of the acrites move by a similar mechanism; and it has recently been ascertained that vibratile cilia have a share in the performance of some important functions in the highest classes of the animal kingdom, where they have been detected on the membrane lining the female generative organs and in the respiratory passages and the ventricles of the brain. Cilia in botany are long hairs situated on the margin of a vegetable body.

**Cilic'ia** [Gr. Κιλικία], an ancient division of Asia Minor, was bounded on the N. by Mount Taurus, on the E. by Mount Amanus, on the S. by the Mediterranean, and on the W. by Pamphylia. The surface is partly mountainous, and partly occupied by fertile plains adjacent to the sea. The chief river was the Cydnus. The principal towns were Tarsus, Soli, Seleucia, Mallus, and Aphrodisias. The ancient Cilicians were distinguished for maritime enterprise and also for piratical habits. In early ages Cilicia was an independent kingdom. It was afterwards a part of the Persian empire, and was reduced to a Roman province in the time of Pompey. It coincides nearly with the Turkish division of Adana. Among the eminent natives of Cilicia were Saint Paul, Chrysippus the Stoic philosopher, and Aratus the poet.

**Cil'ley** (JONATHAN), an able lawyer and politician, born at Nottingham, N. H., July 2, 1802, graduated at Bowdoin College in 1825, was admitted to the bar of Maine in 1829, became Speaker of the Maine house of representatives, and in 1832 a presidential elector; was elected to Congress in 1837, and Feb. 24, 1838, was killed in a duel by William J. Graves of Kentucky. The combatants fought with rifles, eighty yards apart, and fired three times each. The affair caused much excitement at the time, Cilley's friends declaring the duel to have been unfairly conducted, and denouncing Graves as a murderer.

**Cimabu'e** (GIOVANNI), an Italian painter, born in Florence in 1240, was eminent as a restorer and reformer of the art of painting. The fine arts at that time had degenerated into a formal conventionalism. He received lessons in art from two Greek or Byzantine painters, and formed a more natural style than that of his masters. He painted in distemper and in fresco, and adorned the church of St. Francis at Assisi with his works. He excelled in design and expression. Died about 1302. Among his pupils was Giotto. (See VASARI, "Lives of the Painters.") REVISED BY C. C.

**Cimaro'sa** (DOMENICO), an Italian composer, born at Naples Dec. 17, 1755, was a pupil of Durante. He resided at St. Petersburg and at Vienna and other German courts. He composed a number of successful operas, among which are "Il Matrimonio Segreto" ("The Secret Marriage") and "L'Olimpiade." His works are remarkable for originality and spirit. Died Jan. 11, 1801.

**Cimarron's**, former cap. of Colfax co., N. M. (see map of New Mexico, ref. 5-K, for location). Pop. in 1880, 290.

**Cim'bri** [Gr. Κίμβροι], a warlike people of ancient Europe whose origin is involved in obscurity. They were regarded as Germans by Cæsar and Tacitus, whose opinion has been adopted by most moderns. H. Müller and other writers suppose that they were Celtic, and that Cim'bri is another form of *Cymri*, which is the Welsh name of their own nation. In 113 B. C. the Cim'bri and the Teutones issued from the N. part of Germany, crossed the Eastern Alps, and invaded the territory of the Romans, whom they defeated in battle. They afterwards moved across the Rhine, and pillaged part of Gaul. The Cim'bri and Teutones gained another victory over the Romans in the year 109. Within a period of six years they defeated four consuls and routed five Roman armies, so that great consternation prevailed at Rome. They invaded Spain in 104 B. C. In 102 B. C., Marius defeated the Teutones at Aquæ Sextiæ (Aix), in Gaul. The army of Cim'bri at the same time invaded the north of Italy by a different route, and gained a victory over the Roman consul Catulus near the Adige. The infantry of the Cim'bri had shields fastened together with chains. The two Roman armies were then united under the joint command of Catulus and Marius, who gained a great victory over the Cim'bri near Vercellæ (Vercelli) in July, 101 B. C. It is said that more than 100,000 Cim'bri were killed in this battle. The Cim'bri in the time of Tacitus lived near the North Sea, and in Jutland, which was called the Cimbric Chersonese. (See PULLMANN, "Die Cimbern," 1870.)

**Cimin'na**, a town of Sicily, in the province of Palermo, 19 miles S. E. of the city of Palermo. Pop. 5269.

**Cim'merians** [Gr. Κιμμεριοί], according to the Homeric legends, were a people dwelling "beyond the ocean-stream," where the sun never shines and perpetual darkness reigns. Hence the proverbial expression, "Cimmerian darkness." The historical Cimmerii were a nomadic race of great antiquity, who lived between the Borysthènes (Daieper) and the Tanais (Don). According to Herodotus, they were expelled from that region by the Scythians, and migrated to Asia Minor. They waged war against Alyattes, king of Lydia, about 600 B. C. The Strait of Yenikale derived from them the name of Cimmerian Bosphorus. Some antiquarians identify the Cimmerii with the Cymbrî and the Cymry (which see).

**Cimo'lian Earth** [Gr. γῆ Κιμωνία], a kind of earth which the ancients used to obtain from the islands Cimolus and Siphnus in the Cyclades. It was sometimes used in medicine, but was especially employed instead of soap in washing clothes. It appears to have been a variety of steatite or soapstone.

**Ci'mon, or Ki'mon** [Κίμων], an eminent Athenian commander and statesman, born about 502 B. C., was a son of Miltiades, who commanded at Marathon. He served with distinction at the great battle of Salamis, 480 B. C. Cimon and Aristides commanded the Athenians, who, co-operating with the other Greek armies, prosecuted the war against Persia in 478 B. C. Soon after this date he became commander-in-chief of the allies, who preferred him to the Spartan Pausanias. He defeated the Persians on the Strymon, and in 466 gained a great naval victory at the mouth of the Eurymedon. He was for some time the most prominent statesman of Athens, and a rival of Pericles. Cimon improved Athens by planting trees and building walls to the Piræus. In 461 B. C. he was banished by ostracism, but he was permitted to return in 456. He obtained command of a fleet in 449, and besieged Citium, in Cyprus, where he died in the same year. He was a conservative in politics. (See PLUTARCH, "Life of Cimon," CORNELIUS NEPOS, "Cimon;" GROTE, "History of Greece;" THIRLWALL, "History of Greece.")

**Cinalo'a, or Sinalo'a**, a state of the Mexican confederation, is bounded on the S. W. by the Gulf of California, and intersected by the rivers Culiacan and Cinaloa. Area, 25,928 square miles. The surface is partly mountainous. The rainy season begins about June 20, and lasts nearly two months. Capital, Culiacan. Pop. 178,527.

**Cincho'na**, commonly pronounced sin-ko'na, is the name of a genus of trees belonging to the order Rubiacæ, tribe Cinchoneæ, producing the bark commonly known as Peruvian bark, Jesuits' bark, etc., and from which the alkaloids quinia (quinine) and cinchonina are obtained.

The trees of this genus are sometimes of great magnitude, but some of them in high mountain-regions are shrubs with stems only eight or ten feet in height. They are all natives of South America, between lat. 20° S. and lat. 10° N., and chiefly grow on the eastern slopes of the Cordilleras. Other tropical countries have of late been stocked with cinchonina trees, especially Java and some other Dutch colonies. The British government has successfully introduced them into India and St. Helena; and the bark produced on the Neilgherry Hills is remarkably rich in quinia. All cinchoninas are evergreen, with laurel-like, entire opposite leaves, and generally with beautiful fragrant flowers. Of more than thirty species, several are comparatively worthless in medicine.

Much difficulty has been experienced in ascertaining the species by which the different varieties of cinchonina bark are produced. The commercial names are derived partly from the color of the kinds, and partly from the districts in which they are produced or the ports whence they are shipped. The best sort, known as Calisaya or royal yellow bark, is chiefly the product of *Cinchona Calisaya*, a large tree, growing in hot mountain-valleys of Bolivia and Peru. The proper discrimination of the different kinds requires experience. The taste is always bitter, but it is possible to distinguish by the taste those varieties which contain quinia most largely from those in which cinchonina is the principal alkaloid.

The collection of the bark is carried on by Indians, who pursue their occupation during the dry season. The trees are felled as near the root as possible, that none of the bark may be lost, and the bark, being stripped off, is carefully dried; the quilled form of the thinner bark is acquired in drying. Even the roots of the best species are carefully peeled. The bark is made up into packages averaging 150 pounds weight, called drums or seroons. A number of spurious kinds of bark are either sent into the market separately or are employed for adulterating the genuine kinds. The very numerous varieties are classed as (1) yellow, (2) red, (3) pale, and (4) Carthagena barks.

The Peruvian Indians call the trees *kina*, from which the Spanish name *quina* is derived, but it is not certain that they knew the use of the bark before the arrival of the Spaniards. It is a medicine of great value in the cure of intermittent fevers and diseases attended with much debility, also in certain diseases of the nervous system. It seems to have been first imported into Europe in 1639 by the wife of the viceroy of Peru, the countess of Cinchon (from whom it was named), who had been cured of an intermittent fever by means of it. The Jesuits afterwards carried it to Rome and distributed it, and thus it acquired the name of Jesuits' bark. It acquired great celebrity in Spain and Italy, being sold at high prices by the Jesuits, by whom it was lauded as an infallible remedy, while by physicians it was coldly received, and by the Protestants generally repudiated. It was, however, used in England in 1658. It seems to have been employed without discrimination, and to have fallen into the hands of empirics. It was again brought into notice by Sir Robert Talbot, who acquired great celebrity through the cure of intermittents by means of it, and from him Louis XIV. purchased his secret in 1679. Soon afterwards Morton and Sydenham, the most celebrated English physicians of that age, adopted the remedy, and its use from this period gradually extended. As it thus gradually came into general use it became an export item of great importance to Peru, and in order to preserve the commercial monopoly Peru employed singular measures to conceal the fact that the tree was also growing in New Granada. An alarm afterward arose that the South-American supply was nearly exhausted, and, in 1833, Dr. Boyle suggested that an attempt should be made to transplant the tree to the Neilgherry Hills in Hindostan. In spite of the remonstrances of the governments of the South-American republics, plants were successfully carried to India in 1861, and in 1863 bark from the Neilgherry Hills was exhibited in Europe and recognized as equal to that from Peru. The discovery of the alkaloids on which its properties chiefly depend, within the present century, constitutes a new era in the history of this medicine.

The active principles of cinchonina are the alkaloids QUINIA (which see), cinchonina, and several other alkaloids of less importance. When isolated, the alkaloid cinchonina has the formula  $C_{20}H_{24}N_2O$ , and can be obtained in a crystallized state. The alkaloid quinia is now extensively in use in medicine in the form of disulphate of quinia, and is given in doses of from one to twenty grains in almost all the cases to which the bark is applicable, and for this reason the bark itself is much less used than formerly.

REVISED BY WILLARD PARKER.  
**Cincinnati**, the "Queen of the West," an important R. R. and commercial centre, capital of Hamilton co. and metropolis of the State of Ohio (see map of Ohio, ref. 7-C).

for location of county), one of the largest and most important inland cities of the U. S., and is situated in lat. 39° 6' 30" N. and lon. 84° 24' W., 764 miles from New York and 610 miles from Washington, in the beautiful Valley of the Ohio, extending along the northern bank of the Ohio River and over the adjacent hills for miles. The main portion of the city is in the valley, and is built on two plateaux. The territory of the city has an area of twenty-four square miles, on which regular streets, mostly 66 feet in breadth, are laid out, and paved with boulders or wooden blocks. Cincinnati is divided into twenty-five wards, besides the suburbs Clinton and Avondale, which, in connection with Mount Auburn and East Walnut Hills, now parts of the city, contain some of the most beautiful private residences and country villas. Quite a number of other suburban towns surround the city; among which may also be counted the cities of Covington, Newport, Dayton, and Ludlow in the State of Kentucky, which are situated immediately opposite Cincinnati, and connected with it by bridges and ferries. The government of the city rests in the hands of a mayor, who is endowed with the veto power, boards of councilmen, of aldermen, of fire commissioners, of education, of health, of public works, of revision, of control, of trustees of the sinking fund, and a number of minor boards.

Cincinnati is prominent as a commercial and manufacturing city. Its favorable situation, extensive railroad connection, and numerous factories make it the commercial emporium of the adjacent fertile and densely settled States and a centre of Western manufactures.

**Public Buildings.**—Among the public buildings the most prominent are the Cincinnati College, the court-house, the city hall, the Ohio and Miami colleges, the Public Library, Grand Central Dépôt, the Masonic Temple, Odd Fellows' Hall, the workhouse, house of refuge, the new city hospital, the U. S. Government building, the Music Hall, the house of the Jesuits, and Cincinnati University, while Pike's and Robinson's opera-houses, the Grand Opera House, Sinton's, Johnson's, Wiggins's, Mitchell's, and Ortiz's blocks, the Wesleyan Female College, and the Grand Hotel may be ranked among its finest private structures. Among the churches, St. Peter's cathedral, with its beautiful steeple of Dayton stone and its chimes, St. Francis Xavier's church of the Jesuits, St. Paul's Methodist church, the Second Presbyterian, St. John's Episcopal, and the Central Christian church are the most prominent. The total number of churches is 203.

**Education.**—Cincinnati has 8 literary colleges, 2 academies of the Sisters of Notre Dame, 6 medical colleges, 1 law school, 1 college of music, 1 of pharmacy, 1 of dentistry, 5 commercial colleges, and a university. The city has 28 district, 4 intermediate, a normal, and two high schools, with 128 male and 531 female teachers, and 36,560 pupils. Besides these, there are in the city 16,560 other pupils attending Church schools, and 600 in charitable and reformatory institutions. The colored population has its own schools, as well as the Catholics and other religious associations. Among the numerous libraries, the most prominent are the Public Library, with 131,179 volumes, open to everybody; the Young Men's Mercantile Library, with 45,000 volumes; the law library, with 18,000 volumes; the Historical Library, with 1738 volumes and many valuable MSS.

**Benevolent Institutions.**—Among the benevolent institutions under the control of the city government are the house of refuge, the poorhouse, the hospital, the lunatic asylum, and the infirmary. Besides these city institutions, private charity supports five orphan asylums, seven hospitals, a widows' home, a children's home, a home for the friendless, House of the Good Shepherd for fallen women, Union Bethel, a protectory for boys, and a vast number of benevolent aid societies.

**Miscellaneous.**—It has 3 medical and obstetrical societies and 1 dental society, an astronomical society, an historical and philosophical society, a society of natural history, a zoological society, an acclimatization society, a society for the prevention of cruelty to animals, a wine-growers' association, a horticultural society, and many literary clubs. There are also a chamber of commerce, a board of trade, cotton exchange, produce exchange, coal exchange, etc. Cincinnati has 14 daily and 52 weekly papers, 10 semi-monthly and 49 monthly, 1 semi-weekly, 1 tri-weekly, 1 bi-monthly, 11 quarterly, and 3 annual publications. It has 7 theatres. Twenty-eight railroads connect Cincinnati with all parts of the country; 217 steamboats ply between the different points on the river. It has 21 horse railroads, 4 inclined plane railroads, 3 steam ferries, and three fine bridges (one of them, the splendid Cincinnati and Covington suspension bridge, built by Roebling, connects Cincinnati with Covington, Ky.).

The commerce of Cincinnati is very large. Its chief

article of exportation, pork, has given it the name of "Porkopolis." It has also a large trade in tobacco, groceries, beer, and whiskey. The imports in 1883 amounted to \$284,239,878, and the exports to \$290,907,330.

**Manufactures.**—The manufactures of Cincinnati are not less important than its commerce. It had in 1883, 5518 manufactories; capital, \$77,624,359; hands employed, 90,523; value of real estate occupied, \$43,767,681; value of products, \$194,572,526. The principal manufactures are iron, metal, and wooden wares, leather, soap, candles, clothing, whiskey, beer, chemicals, earthenware, carriages, paper, boots and shoes, books, tobacco, cigars, etc.

**Finances, etc.**—Cincinnati has 13 national banks, with an aggregate capital of \$9,100,000, and 5 private banks, with \$1,221,000 capital. In 1883 the value of all taxable property in the city was \$169,733,917; tax receipts, \$3,456,115.72; all receipts, \$4,911,954.07; expenses, \$4,675,248.89; the bonded debt was \$23,907,474.49; the assets far exceed the liabilities. The taxable property was estimated on the duplicate of 1883 at \$169,733,917. Cincinnati has 24 steam fire-engines, 2 chemical engines, 5 hook and ladder companies, 275 fire-alarm telegraph stations, and 5 patrol wagons.

**Cemeteries, Parks, etc.**—Of the 23 cemeteries, Spring Grove Cemetery, containing 443 acres, is the finest and largest. Among the ten parks of the city, the Garden of Eden, containing 225 acres, is the largest. The beautiful Tyler Davidson fountain on Fifth street, surrounded by an esplanade and cast in Müller's bronze foundry in Munich (Bavaria), after designs by Albert von Kreling, by order of Henry Probasco, is one of the grandest ornaments of the city. Cincinnati is the seat of a police court, superior court, court of common pleas, 1 district court, 1 probate court, and the U. S. court for the southern district of Ohio. Since 1853 Cincinnati is the seat of a Catholic archbishop.

**History.**—Cincinnati was founded by New Jersey men in 1789, and laid out by Col. Ludlow, who plotted it on a plan similar to that of Philadelphia. The nucleus was formed by Fort Washington, below which the village of Cincinnati was mainly built. For years it did not promise to rise much above the ordinary village, and not until 1816, when steamboat navigation was introduced on the Western rivers, did it push forward. From that date, however, it made rapid strides to prominence, and occupied in a few years the first rank among Western cities, which it maintained for a long while. It was incorporated as a town in 1802, and as a city in 1819. Its first mayor was Major Ziegler. Towards the middle of the century it attracted a vast German immigration, and some parts of the city, called "Over the Rhine," are almost entirely settled by Germans.

**Population.**—While the population of the city in 1800 amounted to only 800, it had increased in 1860 to 161,044, in 1870 to 216,239, and in 1880 to 255,139.

**Literature.**—Of the local works on Cincinnati, the following are some of the most important:

DRAKE, DANIEL, "Notices concerning Cincinnati," Cincinnati, 1810, 8vo; "Natural and Statistical View or Picture of Cincinnati and the Miami Country," Cin., 1815, 12mo; "Early Physicians, Scenery, etc. of Cincinnati," Cin., 1852, 12mo; DRAKE, B., and MANSFIELD, E. D., "Cincinnati in 1826," Cin., 1827, 12mo; CIST, C., "Cincinnati in 1841," Cin., 1844, 12mo; "Cincinnati in 1851," Cin., 1851, 12mo.; "Cincinnati in 1859," Cin., 1859, 12mo.; LEA, T. G., "Plants of Cincinnati," Phila., 1849, 8vo; STEVENS, G. E., "The Queen City in 1869," Cin., 1869, 18mo; FOOTE, J. P., "Schools of Cincinnati," Cin., 1855, 8vo; "Spring Grove Cemetery Illustrated," Cin.: MAXWELL, S. D., "Suburbs of Cincinnati," Cin., 1870, 4to; TAFT, A., "Cincinnati and her Railroads," Cin., 1870, 8vo; "Cincinnati and the Miami Country Celebration," Cin., 1834, 8vo; CLARK, P. H., "Black Brigade of Cincinnati," Cin., 1870, 8vo; CARTER, JUDGE A. G. W., "The Old Court House; Reminiscences and Anecdotes of the Courts and Bar of Cincinnati," Cin., 1880, 8vo.

REVISED BY G. BRÜHL.

**Cincinnati, Order of** [named from the patriot Cincinnati], a society founded in the U. S. in 1783 by the officers of the Revolutionary army, whose object was to cherish and perpetuate the feelings of patriotism, friendship, and fraternity which had been produced by the toils and dangers they had experienced in common, and to relieve the wants of the families of such as had fallen in the war. General Knox was one of the authors of its constitution. The badge of this society is a bald eagle, suspended by a dark-blue ribbon with white borders, a symbol of the union of the U. S. with France. The privilege of membership was extended to a number of French officers. Considerable dissension and discussion was excited on the question of the succession of regular membership, which at first was limited to the eldest male posterity, together with their kindred

who should be worthy, etc. Popular jealousy was roused by the privilege granted to primogeniture, which was denounced as a germ of hereditary aristocracy. At a general meeting held in Philadelphia in 1784 this subject was discussed, and some change was made in the constitution as a concession to the popular sentiment. Gen. Washington accepted in 1787 the office of president of the order, which he continued to hold by successive re-election until his death. Branches of the order were organized in each of the States. Of these some have been abolished or discontinued, but others remain active and hold annual meetings. Hamilton Fish, a son of Col. Nicholas Fish, one of the original members, was elected president in 1872, and has since been re-elected.

**Cincinna'tus** (LUCIUS QUINTIUS), [so called because he wore his hair in long curling locks, *cincinnati*], an eminent Roman patriot and dictator, born about 519 B. C., belonged to the patrician order. He cultivated a small farm with his own hands, and was regarded as a model of pristine virtue and simplicity of habits. About 458 B. C. he became consul. According to Smith's "Dictionary," he was illegally appointed consul suffectus in 460 B. C. He was appointed dictator two years later, and gained a victory over the Æqui. In the year 450 he was an unsuccessful candidate for the office of decemvir. He was chosen dictator in 439 B. C., to oppose the machinations of Spurius Melius, accused of treason. Much of what is related of him by Livy is now thought to be legendary.

**Cinc'ture** [Lat. *cinctura*, a "girding," from *cingo*, *cinctum*, "to gird"], in architecture, is the ring or fillet at the top and bottom of a column which divides the shaft from the capital or base.

**Cin'eas** [Gr. Κινέας], a Thessalian orator and negotiator, who, as Plutarch says, in youth had heard Demosthenes. He became a confidential minister of Pyrrhus, king of Epirus, who, in 280 B. C., sent Cineas to Rome to negotiate a treaty of peace or alliance. His artful and plausible speeches were frustrated by Appius Claudius, and his mission was a failure. Died after 278 B. C.

**Cin'erary Urn** [Lat. *urna cineraria*, from *cinis* (gen. *cineris*), "ashes"], a vessel used by the people of antiquity to contain the ashes of the dead gathered from the funeral pile. The embers were drenched with wine, and placed in the urn, which was then placed in a family mausoleum. Only the rich could afford so expensive a rite. Slaves and inferior persons were burned, and their ashes placed in the *olla*, or common clay pot, which was then stored in a columbarium. Cinerary urns were of marble, clay, glass, alabaster, or sometimes even of gold. The celebrated urn known as the Portland vase in the British Museum is of this character. (See PORTLAND VASE.) Cinerary urns often had epitaphs and beautifully wrought artistic figures upon them.

**Cini'si**, a town of Sicily, in the province of Palermo, is 14 miles W. N. W. of Palermo, and near the sea. Here is an old feudal castle which has been converted into a convent. Pop. 6714.

**Cin'na** (C. HÆLVIVS), a Roman poet and a friend of Catullus, was perhaps the same as the Cinna whom Virgil compliments in his ninth eclogue. He wrote an epic poem called "Smyrna," of which only a few lines are extant. He was killed in 44 B. C. by a mob of Cæsar's adherents, who mistook him for another Cinna, who was an accomplice of Brutus.

**Cinna** (LUCIUS CORNELIUS), a Roman patrician who was a partisan of Marius in the civil war between Marius and Sulla. He became consul in 87 B. C., while Marius was in exile and Sulla was conducting a campaign in Asia. By an effort to reinstate Marius he provoked a violent conflict, and was driven out of Rome, but he and Marius soon returned with an army and obtained the mastery in that capital. They massacred many friends of Sulla. Cinna was re-elected consul as a colleague of Marius, who died in 86 B. C. He raised an army and marched to oppose Sulla, who was returning from Asia, but was killed by his own mutinous soldiers in 84 B. C. His daughter Cornelia was married to Julius Cæsar.

**Cin'nabar** [Fr. *cinnabre* or *cinnabre*; Ger. *Zinnober*; Lat. *cinnabaris*; Pers. *kambar*], a red pigment sometimes called vermillion, is an ore of mercury, from which nearly all the mercury of commerce is obtained. It is a sulphide of mercury, composed, when pure, of 86.2 per cent. of mercury and 13.8 of sulphur. It occurs massive and crystallized in six-sided prisms; has an adamantine, almost metallic lustre, and a carmine color. Specific gravity, nearly 8.5. The term vermillion is usually applied to this mineral when it is reduced to powder in order to be used as a pigment. It is a rare mineral. The most productive mines of cinnabar are those of China, of Almaden in Spain, New Almaden in California, and Idria in Carniola.

The annual product of the mine of New Almaden is about 2,600,000 pounds. The mines of Almaden have been worked 2300 years and are still very productive. The cinnabar is found there in a dark-colored state.

**Cin'namon** [Lat. *cinnamomum*] is the aromatic bark of certain trees of the genus *Cinnamomum*, which belongs to the order Lauraceæ, natives of tropical and sub-tropical parts of the East. Cinnamon is mentioned in the Old Testament by a name almost the same as that which it still bears. True cinnamon is chiefly produced by the *Cinnamomum Zeylanicum*, which grows in the island of Ceylon; introduced into the West Indies in 1782, it is now cultivated there also. The tree attains the height of twenty to thirty feet, and is eighteen inches in thickness. The leaves are oval, four to six inches long, with a blunt point; they have the taste of cloves. The fruit is somewhat like an acorn in shape; it is a small drupe, brown when ripe. The branches of three to five years' growth being cut down, the epidermis is scraped away; the bark is split longitudinally with a knife and taken off. The pieces are then exposed to the sun, when it curls up into quills, the smaller of which are thrust into the larger, and the whole tied up in bundles. Cinnamon is arranged according to its quality by persons who chew it, although in a short time it produces painful effects on their mouths. It is used by cooks and confectioners, and in medicine as a stomachic and carminative. Its virtues depend chiefly upon the essential oil which it contains. Oil of cassia is very often substituted for this oil, as cassia is for cinnamon. Indeed, the ordinary cinnamon of commerce is cassia, that name being given to the product of probably eighteen or twenty different species of *Cinnamomum*. The root of the cinnamon tree contains camphor. The fruit yields a highly fragrant, concrete oil, called "cinnamon suet," and in Ceylon was formerly made into candles for the use of the king. *Cinnamomum Loureirii*, of Cochinchina and Japan, yields a bark even superior to that of *Cinnamomum Zeylanicum*. A species of cinnamon grows at the elevation of 8500 feet in the Himalaya Mountains. The oil of cinnamon is generally prepared in Ceylon by grinding coarse pieces, soaking them in sea-water for two or three days, and then distilling. Two oils pass over—one lighter, the other heavier, than water. Oil of cinnamon varies in color from yellow to cherry-red; the yellow variety is the best. Oil of cinnamon leaf is prepared in Ceylon, and is met with in commerce under the name of clove oil, which it resembles. Cinnamon water is obtained by adding water to cinnamon, and distilling, or by diffusing the oil of cinnamon through water by the aid of sugar or carbonate of magnesia. Spirit of cinnamon is procured by acting upon cinnamon with spirit of wine and water and distilling; and tincture of cinnamon, by soaking cinnamon in spirit of wine. The medicinal properties of cinnamon are aromatic and carminative, and it is serviceable in nausea and vomiting, and in cases of flatulence and of spasm of the stomach. The eocene deposits of the U. S. and other countries abound in fossil remnants of trees referred to the genus *Cinnamomum*.

**Cin'namon Bear, or Yellow Bear**, a bear occasionally found in the U. S., is regarded as a mere variety of the common black bear. (See BEAR.)

**Cinnamon Stone** is a variety of lime garnet of a clear cinnamon-brown color, and is a silicate of alumina and lime. The finer specimens are highly prized and used in jewelry. Many of the stones sold as hyacinths are in reality cinnamon stones. They are found most abundantly in Ceylon.

**Cinq-Mars, de** (HENRI COIFFIER DE RUZÉ), MARQUIS. See APPENDIX.

**Cinque Cento**, *chèn-kwà chèn'to* [an Italian word signifying "five hundred"], a term used to designate the style of art which arose in Italy about the year 1500, after the fall of the great schools. It is sensuous in its character, the subjects being usually borrowed from ancient mythology or history. The same term is also applied to the literature and architecture of that period, and is nearly synonymous with the later RENAISSANCE (which see).

**Cinquefoil**, *sink'foil* [from the Fr. *cinque*, "five," and *feuille*, a "leaf"], a common name of the five-finger or POTENTILLA (which see); also a bearing in heraldry, which is usually depicted with five leaves issuing from a ball as a centre point. Cinquefoil, in architecture, is an ornamental foliation in five compartments, used in the tracery of windows, panellings, and the like. The cinquefoil is often represented in a circular form, the spaces between the points or cusps representing the five leaves.

**Cinque Ports** (*i. e.* "five ports"), the English seaport-towns of Dover, Sandwich, Hastings, Romney, and Hythe, to which William the Conqueror granted important privileges. Winchelsea, Rye, and Seaford were subsequently

added to the original five ports. They are under the government of a lord warden. The Cinque ports in early times were required to furnish such shipping as the sovereign required for the public service. In the time of Edward I. they were bound to furnish fifty-seven ships, equipped and manned at their expense, for fifteen days. The Cinque ports became so powerful and audacious that they sent out piratical expeditions and waged war without authority from the king. The Municipal Reform act has broken up the ancient organization of the ports.

**Cin'tra, or Sintra**, a town of Portugal, in Estremadura, on the slope of the Serra de Cintra, 14 miles N. W. of Lisbon. It is remarkable for the picturesque beauty of its situation and its delightful climate. It has an ancient castle, originally occupied by Moorish kings, and afterwards by Christian sovereigns. On two hills are the Penha convent and a Moorish castle, and within the town is a palace. The citizens of Lisbon are accustomed to spend their Sundays in Cintra.

**Cione di Andrea.** See ORCAGNA.

**Ciotat, La** (anc. *Citharista*), a maritime town of France, department of Bouches-du-Rhône, is on a bay of the Mediterranean 14 miles S. E. of Marseilles. It is well built, and has a good harbor, with an active trade in wine, fruits, and olive oil. Pop. in 1881, 9702.

**Ci'pher** [Fr. *chiffre*; Arabic, *kifr*, "empty"], the symbol 0 in numerical notation, which is sometimes called "naught," and has no intrinsic value, but serves to determine the local value of the other digits or figures by which it may be accompanied in the expression of a number.

**Cipher, or Mon'ogram**, an intertexture of letters, as the initials of a name; an arrangement of the initial letters of a person's name, used as a private mark by artists and others. The term is also applied to certain characters or arbitrary signs used in writing despatches, etc. in cases where secrecy is desirable. (See CRYPTOGRAPHY.)

**Circæ'a**, a genus of herbaceous plants of the order Onagraceæ, having a corolla of two petals and two stamens. The *Circæa Luteiana* (enchanter's nightshade) is a native of Europe and the U. S., growing in damp woods. It bears small whitish flowers in racemes.

**Circars, Northern**, an extensive maritime province of British India, in the presidency of Madras, with 470 miles of sea-coast. The surface is diverse. The principal rivers are the Godavery and Krishna. The soil is fertile, yielding cotton, grain, and tobacco. Area, 23,760 square miles. Pop. estimated at 3,000,000.

**Circas'sia**, a region in the Western Caucasus belonging to Russia, and extending from lat. 42° 30' to 45° 40' N., and from lon. 37° to 46° E. The soil is fertile, and the climate cool and healthful. The forests are of luxuriant growth. Coal and iron abound. Area, about 33,000 square miles.

The name Circassians is often applied to the people of the neighboring parts of the Caucasus, but the Circassians proper inhabit only the north-western part of the Caucasus, with the exclusion of Abkasia, or the portion between the Black Sea in the W. and the lower bank of the river Kuban in the N. They number from 500,000 to 600,000, and are divided into fifteen tribes or clans. The language of the Circassians, like the other tongues spoken in the Caucasus, is difficult to learn, and its philological relations, and the ethnological relations of these peoples, are very difficult questions. The Circassians are a warlike people, among whom it is held more honorable to live by plunder than by industry. They cherish the most unrestrained love of independence. There are five distinct ranks—viz. chiefs, nobles, freemen, dependants, and slaves. The class of freemen makes up the great mass; they possess property and enjoy the same political rights as the nobles. The fourth class, the dependants, are the vassals of the princes and nobles. The fifth class comprises the slaves, or those who have been made captive in war. The princes and nobles are principally Mohammedans, while the great mass of the people have a religion which is a mixture of Christianity and paganism. The Circassians are ignorant. Besides agriculture and the rearing of cattle, they possess few other branches of industry, and are given to wild and lawless pursuits. The Circassians are handsome, strong, active, and temperate, and are characterized by self-dependence, courage, and prudence. They are chiefly known through their struggles to maintain their independence against Russia, and for their custom of selling their daughters to the Turks and Persians.

**Cir'ce** [Gr. *Κίρκη*], a sorceress of classic mythology, celebrated for her skill in magic arts, was a sister of Pasiphaë. According to Homer, she was a daughter of the Sun, and lived on the island of *Ææa*, where she transformed many men into swine and other beasts by her

drugs and incantations. Ulysses passed a year with her. (See the "Odyssey," book x.)

**Circensian Games.** See CIRCUS.

**Cir'cle** [from the Lat. *circulus*, a diminutive of *circus*, a "ring"], in geometry, is a plane figure bounded by a curved line which is everywhere equally distant from a point within called the centre. The curved line which bounds the circle is called the circumference. The distance from the centre to the circumference is called the radius, and any two radii which together form a straight line constitute the diameter.

In the mechanic arts the ratio of the diameter to the circumference is assumed to be as 7 to 22, which is exact enough for practical operations, though the real ratio can never be perfectly expressed. In ordinary mathematical work it is assumed to be as 1 to 3.1416, which is very slightly too large. Mr. William Shanks, a British mathematician, has carried out the decimal to 607 places. The diameter and circumference are in fact incommensurable, and it is conclusively demonstrated that the famous problem of "squaring the circle" can never be solved.

The circle is one of the conic sections, it being exhibited by cutting a right cone in a plane parallel to its base. It is often referred to the second order of curves, and regarded as an ellipse, whose foci coincide with each other.

In astronomy, the term "great circle" is applied to those circles which divide the celestial sphere into two equal parts, as the equator and the MERIDIAN (which see).

**SIX-POINTS CIRCLE**, the circle which passes through the middle points of the sides of a triangle. It passes also through the feet of the three perpendiculars let fall from the angles upon the opposite sides, and possesses many remarkable properties. The same circle is referred to by some European writers as the *nine-points circle*, since, besides the six points already named, the middle points of the three lines joining the vertices of the triangle to the intersection of the three perpendiculars also lie in its circumference. Feuerbach, Brianchon, and many others have investigated the properties of this circle. The first of these geometers discovered that it touched the inscribed as well as the three escribed circles of the triangle.

**Circle, Mural.** See MURAL CIRCLE.

**Circle of Perpetual Apparition**, a lesser circle of the celestial sphere, is parallel to the equator, and increases with the latitude of the place where the observer is stationed. All stars included in it are always above the horizon. These are called circumpolar stars.

**Cir'cleville**, a city and R. R. centre, capital of Pickaway co., O. (see map of Ohio, ref. 6-E, for location of county), is on the Scioto River and the Ohio Canal, 104 miles E. N. E. of Cincinnati and 25 miles S. of Columbus. It occupies the site of highly interesting ancient works, consisting of a circle and square, perfect in form, fully described in Howe's "History of Ohio." It has large pork-packing establishments and a number of mills and factories. The lands in the vicinity of Circleville are largely devoted to broom-corn culture, thus making it a leading market for that article. The celebrated speech of Logan the Indian chief was made 4 miles S. of Circleville. Camp Charlotte, where Lord Dunmore encamped in 1774, and made a treaty of peace with Indians, is 7 miles S. E. of Circleville. Pop. in 1870, 5407; in 1880, 6046.

**Cir'cuit** [Lat. *circuitus*, from *circum*, "around," and *eo, itum*, to "go"], a name given in England, Wales, and Ireland to certain divisions of the country made for judicial purposes. These circuits are visited by judges at appointed times for holding courts. The judges were anciently called justices in eyre (from the Lat. *eo, ire*, to "go"). The complete number of circuits in England and Wales is seven. A counsel is not expected to practice in another circuit than that to which he has attached himself unless he receives a special retainer, though this regulation is only enforced by the discipline of the bar, without any legal injunction which necessitates it.

**Circuit Court**, the name of the courts of the U. S. next inferior to the supreme judicial court. The U. S. are divided into circuits, and in each circuit one of these courts is held. The presiding judge is either the chief-justice of the U. S., one of his associates, a special circuit justice, or, in some instances, a district judge. The circuit court has jurisdiction, direct or appellate, both in law and equity. It also hears appeals from a court of admiralty in certain cases. Criminal cases may also in some circumstances come before it. Several States of the Union have circuit courts. (See COURTS, by GEORGE CHASE, LL.B.)

**Cir'cular** [Lat. *circularis*; Fr. *circulaire*], round, like a circle, circumscribed by a circle; ending in itself, as a parolism in which the second proposition proves the first, and is proved by it. "Circular sailing" is the



method of sailing by the arc of a great circle. As a noun, circular sometimes signifies a document addressed to a circle of persons or to a number of persons having a common interest, as a circular letter.

**Circular Functions**, a term which, as generally employed, is synonymous with trigonometrical functions.

**Circular Notes**. See LETTERS OF CREDIT.

**Circular Numbers** are numbers whose powers end on the same figure as they do themselves; such are numbers ending in 0, 1, 5, 6.

**Circular Parts**, in spherical trigonometry, the name given to two rules invented by Lord Napier, and demonstrated in his "*Mirifici Logarithmorum Canonis Descriptio*" (see also TODDUNTER'S "Spherical Trigonometry"), for obtaining the formulæ relative to a right-angled spherical triangle.

**Circular Points at Infinity**, the two imaginary points in which any circle intersects the infinitely distant right line in its plane.

**Circulating (or Recurring) Decimal**, a decimal in which certain digits are continually repeated. Thus, 1.5723723... , *ad infinitum*, is a circulating decimal of which the figures 723 constitute the *recurring period*, called also the *repetend*.

**Circulating Library**. See LIBRARIES, by A. R. SPOFFORD, LL.D., Librarian of Congress.

**Circulation of the Blood**. In all animals, even the simplest and lowest, there is a movement, more or less regular, of blood, or of a fluid equivalent to it, furnishing material for the formation and repair of the body. Sponges, while living, have no closed *internal* circulation, but their nutrition and aëration are sustained by the incessant flow of the water in which they exist through their numerous pores. Other Protozoa (as the lowest group of animals is designated), as Rhizopoda, have, within their soft, jelly-like substance, cavities (vesicles) which alternately contract and dilate, serving the purpose of aëration of their bodies, with redistribution of their material. Animals a grade higher, as the Actinia (sea-anemone), have a free communication between the stomach and the general cavity of the body, from which, through fine ramifications to certain parts, the nutritious fluid is circulated, though never separated as true blood. In worms no distinct circulation of blood has been proven to exist. Cavities (*lacunæ*) there are, and in some, as the leech, vessels called *pseudo-hæmal* vessels, ramifying through the body and containing a fluid, generally red, but these always have a tubular communication with the exterior. In insects there is a dorsal segmented vessel, with valves between the segments, which conveys the blood forward by its rhythmical contractions. The blood, which is often colored, and contains corpuscles (though never colored, as in vertebrates, by the corpuscles), then flows into *lacunæ*, or spaces through the body, coming in contact with the air introduced by the tracheal tubes. Crustaceans, as the lobster, have a muscular heart, with six arterial branches, going to the head, stomach, liver, and posterior parts. Thence the blood passes through a number of *lacunæ*, and returns by a number of veins, which expose it, in the *gills*, to the air before reconveying it to the heart. Thus the heart of the crustacean is *systemic*, not respiratory, in its mode of distribution of the blood. The oyster has a heart, not far from the muscle which closes its shell; its vascular system, however, is incompletely closed. In the cuttle-fish there is a strong systemic heart, with valves; it sends blood to all the organs except the gills. The blood returns into a contractile venous enlargement (*sinus*), which conveys it to the gills through from two to four branches or veins. Other sinuses then receive it, and these, being contractile, send it back to the heart. All invertebrates (animals without an internal skeleton) have, if any, a *systemic* heart, and none of them have *colored* corpuscles in their blood.

Vertebrate animals always (except the anomalous *Amphioxus*) have blood containing both red and colorless corpuscles, the former of which give to it its color. In fishes the heart is branchial or respiratory. Consisting of an auricle and a ventricle, it receives venous blood from the body, and propels it, by four or five arched vessels, through the gills, whence it circulates, to be returned by veins to the auricle. In the eel, torpedo, and one or two other fishes, contractile venous sinuses assist this return.

In fishes generally it is supposed that the impulse of the heart suffices for the whole round of the circulation. More probably, however, this is supplemented by arterial, if not venous, propulsion, and by a power acting in the (intermediate) capillary region. All vertebrate animals have a closed circulatory system, consisting of a heart, arteries, capillaries, and veins. In all vertebrates there is, also, a portal system, composed of veins going from the digestive,

and sometimes other, organs to the liver—in fishes to the kidney also—whence veins again convey the blood to the heart.

Reptiles and amphibia have a heart with three cavities—two auricles and one ventricle. Of the auricles, one receives blood from the lungs (except in the early stage of life of the frog, and some other amphibia; and from the lungs and gills *both* in the perennibranchiate amphibia, as Proteus); and the other receives the blood from the body generally. These two kinds of blood (aërated, or arterial, and non-aërated, or venous) mingle in the single ventricle, whence they are redistributed to the lungs and all over the body by arteries. In the crocodile, however, a partition almost separates the two halves of the ventricle, thus approaching the arrangement in the higher animals.

Birds have four cavities—two auricles and two ventricles—making a completely double heart, always situated in the middle of the thorax or chest. One auricle receives the blood by large veins coming from the body generally. This auricle passes the blood into its connected ventricle, which sends it, by pulmonary arteries, to the lungs. Thence it returns, by pulmonary veins, to the other auricle, and this conveys it into its attached ventricle. That cavity then propels it through the aorta, or main arterial trunk, for general distribution over the body. In birds the portal venous system mainly connects the liver with the digestive organs; but a few of its veins communicate with the kidneys, posterior internal organs, and lower extremities.

All mammals (viviparous vertebrate animals which suckle their young) have a double heart, consisting of two auricles and two ventricles—a respiratory and a systemic heart conjoined. In man, for instance, the right auricle and ventricle constitute the respiratory or pulmonary heart—the left, the systemic; and after birth, although closely adherent together, no direct communication exists between them. In the dugong the two ventricles are partly separated by a deep notch. In the ox and many other ruminants a bony deposit strengthens the inter-ventricular wall. Only in man and some of the anthropoid (man-like) apes does the heart incline to the left side; in other animals it is usually median. This promotes the symmetry which is so especially important in swift-running animals, as the hound and deer, and in birds for flight.

The arrangement of the branches of the aorta differs in the several classes of vertebrate animals. Fishes have four or five aortic arches, going to the gills. The lower reptiles have three aortic arches on each side; the higher reptiles, one on each side, descending over the roots of the two lungs to form together the abdominal aorta. Birds have only one—the right aortic arch, passing over the root of the right lung. In mammals, including man, there is only a single aortic arch, over the root of the left lung; this, giving off branches above, becomes in its descent the abdominal aorta. The manner of origin of the ascending branches (subclavian and carotid) of the aorta differs also, even among the Mammalia. In man it is least symmetrical; two arterial trunks passing upward from the aorta on the left side (left carotid and subclavian), while there is one (*arteria innominata*) only on the right, soon subdividing into two. The horse and ruminants have but a single aortic principal branch, which gives off all four of the carotid and subclavian arteries. The portal circulation in mammals is never connected with the kidneys.

A *rete mirabile* is a network of closely interjoining (anastomosing) arteries, which finally unite into a single trunk. Whales and other Cetacea (aquatic, fish-like mammals) have *retia mirabilia* connected with their intercostal arteries within the chest, evidently serving the purpose of reservoirs to retain and distribute aërated blood while the animal is submerged for a long time. There are also in the same animals venous plexuses or *retia*, for the detention, under like circumstances, of impure, non-aërated blood. Protective arrangements of the arteries exist in certain special instances, as the passage through the pelvic bones of the main artery of the hind part of the tail in the whale; of the great artery of the anterior extremity through the humerus or arm-bone of the lion; and of the corresponding artery through the coffin-bone (hoof-bone) of the horse. In all these cases vigorous action of the muscles in locomotion or prehension might unduly obstruct, at times, the flow of arterial blood but for such a provision, by which muscular or tendinous pressure upon the artery is prevented by its enclosure within bony walls.

The circulation of the blood in man corresponds altogether (except in the unsymmetrical location of the heart and of some of the arterial trunks) with the mammalian type above described. In connection with the human circulation, however, some additional particulars may be here given.

**Action of the Heart**. (For anatomy, see HEART; also ARTERY, CAPILLARY, and VEIN.)—Being composed of spirally-arranged muscular fibres, the heart, by its rhythmical

contractions and relaxations, empties itself and becomes filled with blood alternately, in an adult man or woman, between sixty-five and seventy-five times a minute while at rest in health. From the right ventricle the venous blood (poured into it from the right auricle, which receives it from the great *venæ cavae*) is sent through the pulmonary artery and its branches to the capillaries which ramify minutely throughout the lungs. These combine to form small veins whose union into larger trunks finally constitutes the four pulmonary veins, which empty the (now aerated or arterialized) blood into the left auricle. This conveys it into the left ventricle, whence it is impelled through the aorta, by the branches of which it becomes distributed all over the body in capillary networks, to return to the heart by means of the veins; all of which empty at last into the ascending and descending *venæ cavae*.

For the maintenance of this round of the circulation the *valves* of the heart are indispensable. Membranous and muscular valves (tricuspid and mitral) intervene between each auricle and its corresponding ventricle. Pocket-like (three-folded, semilunar) valves also exist at the mouths of the two great arteries which convey blood from the heart; namely, the pulmonary artery from the right ventricle, and the aorta from the left ventricle. When the auricles are contracting, the (tricuspid and mitral) valves between them and the ventricles are open, allowing the blood to flow through. The auricles being emptied and the ventricles filled, the latter then contract, and at the same time, and in the same act, close the auriculo-ventricular valves; so that the blood is forced onward through the two arteries above named (pulmonary artery and aorta). While the ventricles are contracting (this being called the *syctole*), the heart is spirally twisted, elongated,\* and thrust slightly forward against the space between the fifth and sixth ribs, below the left nipple. This quite perceptible movement is the impulse of the heart. No power other than that of elasticity has been proved to exist in the dilatation (*diastole*) of the cavities of the heart. The immediate cause of the systolic contraction is most probably the contractility resident in the heart's muscular tissue, acting under the stimulus of aerated (oxygenated) blood. It is also placed under the modifying influence of the nervous apparatus or system, having minute ganglia upon its surface, and being connected with the brain and spinal cord by branches of the pneumogastric nerve. Why the action of the heart should be so regularly rhythmical is not known. But as it has been shown (by Bowman and Marey) that *all* muscular action is alternating or vibratory in its character, it is possible that the spiral arrangement of the heart's fibres may have to do with the peculiar manner of the heart's contraction. With some (especially cold-blooded) animals the heart has been found to contract for some minutes, or even hours, after its removal from the body, and sometimes when quite emptied of blood.

Of the *sounds* of the heart, audible when the ear is placed over it against the chest, the first (longest and loudest) is explained principally by the closing, with vibration, of the auriculo-ventricular walls during the systole of the ventricles. Other minor causes are the impulse of the heart, the rush of blood into the great arteries, and the friction of the heart's muscular fibres amongst themselves. The second sound has been shown experimentally to be caused by the flapping together, after the systole, of the pocket-like (semilunar) valves at the mouths of the aorta and pulmonary artery.

**Arterial Circulation.**—Since the arteries contain, in their middle coat, a portion of (smooth, pale, involuntary) muscular as well as elastic tissue, this must have an important influence upon the blood-movement. The fact that the relative amount of muscular tissue is greatest in the smallest arteries, which are farthest from the heart, suggests their adaptation to the purpose of supplementing the action of the heart in propelling the blood through the capillaries. The same idea is reasonably connected with the observation that after death the arteries are always found to have emptied themselves, by their last contraction, into the veins. It is also supported by the apparent need of such an arterial power to complete the circulation commenced by the merely branchial (not systemic) heart in fishes, and by the fact that in acephalous (born without a head) children the heart is found to be absent, so that the circulation in them must have been arterial and capillary only; as well as by the proof that during early embryonic life every human being is likewise without a heart, the blood-movement then depending on the blood-vessels alone. Notwithstanding these and many other obvious reasons in favor of such a view (which was accepted by the distinguished John Hunter and Sir Charles Bell), the more common opinion among

physiologists has been, for many years, that the office of the muscularity of the arteries is of a "stop-cock" or "flood-gate" nature, opposing a graduated resistance to the impulse given to the flow of blood by the heart. Lately, however, careful experiments by Legros and Onimus ("Journal de l'Anatomie et de la Physiologie," 1868-70) have given new confirmation to the former opinion, in favor of a truly active part taken by the arteries in the circulation. Certainly, in some way these vessels have to do with the regulation of the changing supply or determination of blood to various parts of the body at different times. This variation we see in blushing; in the erectile tissues and organs; in the effect of friction or mustard, etc. upon the skin; in the increased flow of blood to the jaws during the time of dentition in infants, to the ovaries during ovulation, the uterus in gestation, the male reproductive organs of some animals at certain periods, and the antlers of the deer during their annual new growth. In all these variations the vaso-motor nerves (belonging to the ganglionic system) must have an important influence.

**Capillaries.**—Having but a single elastic coat, without muscularity, these very (microscopically) minute vessels simply adapt themselves to the blood that passes through them. Yet besides the transudation of the lymph or plasma of the blood from them for the nutrition of the tissues, and the absorption into them of waste materials, a force is probably added to the forward movement of the blood in the capillary region. Prof. Draper of New York has pointed out that this may occur in two ways, both of which are common to animals and plants. One is capillary attraction—i. e. the attraction of fine tubes for liquids in which they are immersed, such as is observed in inanimate (metallic or glass) tubes or porous bodies, as well as in living plants and animals. The other is the "vital affinity," or attraction of nutrition, exercised by the tissues towards materials present in the blood, and withdrawing them constantly from the current, thus making room, by diminution of resistance, for its onward flow. The volume of the capillary system in man is about 300 times that of the arteries.

**Venous Circulation.**—On account of the distance traversed by the blood (passing as it does through the capillary ramifications) before it reaches the veins, and their greater aggregate volume (three times that of the arterial system), as well as the obtuseness of the angles made generally by their branches with the main trunks, the flow of the blood is much slower through the veins than through the arteries. Veins have, as the arteries have not, valves along their course, opening only towards the heart. By these the propulsive power is economized, and on account of their influence also, the effect of muscular pressure, during exercise, upon the veins, always favors the blood-movement towards the heart. Inspiration, by lessening the pressure upon the auricles and *venæ cavae* during the expansion of the chest, tends to promote the return of venous blood to the heart. Forced expiration has an effect the reverse of this, but by increase of pressure upon the heart it favors the expulsion of the blood through the arteries.

The velocity of the movement of the blood through the arteries averages from twelve to twenty feet in a second; in the capillaries, about two inches in a minute; in the veins, from six to twelve feet in a second. Experiments prove that the whole round of the circulation is accomplished in a little less than half a minute during rest and health.

The discovery of the circulation of the blood, as now understood, was made by Dr. William Harvey in 1619, first published by him, however, in 1628. He was partially anticipated by Servetus, Realdo Columbus, and Cæsalpinus; almost entirely so by Paolo Sarpi, whose claim in this respect has been generally overlooked. The discovery was completed by the demonstration (with the aid of the microscope) of the blood-corpuscles and the capillaries, between 1658 and 1687, by Swammerdam, Malpighi, and Leeuwenhoek. (See, on the circulation, CARPENTER'S, MARSHALL'S, or DALTON'S "Treatises on Physiology," "Essay on the Circulation of the Blood," by CHARLES BELL, London, 1819; "Physiologie Médicale de la Circulation du Sang," par E. J. MAREY, Paris, 1863; LEGROS and ONIMUS, "Experimental Observations" in the "Journal de l'Anatomie et de la Physiologie," 1868-70; and "Essays upon the Arterial Circulation and Vaso-motor Physiology," by H. HARTSHORNE, in "Transactions of the American Medical Association," 1856 and 1872.)

HENRY HARTSHORNE.

**Circulation of Sap** in plants is its ascent from the roots to the leaves and other green parts, and its partial descent after elaboration in these organs. The sap drawn from the ground by the roots (see *ENDOSMOSE*) ascends in exogenous plants especially through the alburnum. The descent takes place chiefly through the liber or inner bark. It appears that on its return to the root a small portion is excreted, and that the greater part ascends again, readapted to the use of the plant. Much of the water which is taken

\* This was proved by the late Dr. Pennock of Philadelphia, many years ago, by many elaborate experiments, although not yet admitted by all writers on physiology.

up by the roots is thrown off by the bark and leaves. The sap is also laterally diffused through the cellular tissue of plants. Physiologists dislike the term *circulation* applied to sap, as suggesting a closer analogy than really exists to the circulation of blood in animals, since sap does not flow freely through vessels, but exists in closed cells, passing from cell to cell through the cell-walls, being impelled by osmotic action. (See *CYCLOSIS* and *LEAF*.)

**Circum,** a Latin preposition signifying "round" or "about," and forming the prefix to many compound words.

**Circumcision** [Lat. *circumcisio*, from *circum*, "around," and *cædo*, *cænum*, to "cut"], the cutting off of the prepuce, a religious or sanitary practice in many ancient and modern nations. The prevalent idea has been that it originated with Abraham, who circumcised himself and his household, and transmitted the custom to his descendants. But circumcision was common in Egypt as early as the fourth dynasty of kings, and probably earlier, long before the birth of Abraham, 1996 B. C. At the present day it prevails from China to the Cape of Good Hope and in parts of Australia and in many of the South Sea Islands, and early Spanish travellers found it to be prevalent in the West Indies and in Mexico. It has been long practised by tribes in South America. Whether Abraham obtained his knowledge of circumcision from the Egyptians we cannot determine. The Philistines and some of the Canaanites were not circumcised; and the institution in the family of Abraham was sufficient to mark off that family from the surrounding nations. In the case of Abraham's descendants the rite acquired a religious significance as the token of the covenant between God and his people. Saint Paul looked upon circumcision as symbolical of the spiritual change of heart.

The Jews are accustomed to circumcise their children on the eighth day after birth; the Arabians, in the thirteenth year, in remembrance of their ancestor Ishmael. The Copts and Abyssinians are perhaps the only people professing Christianity among whom circumcision is practised, though it is probable that some Christians of the Caucasus have adopted it from their Mohammedan neighbors. The circumcision of females, or what is equivalent, is not unknown among various African and Arabian tribes.

**Circumference** [from the Lat. *circum*, "round," and *fero*, to "carry"], a curved line which encloses a plane figure, and is synonymous with periphery. It is applied especially to the curved line which encloses a circle, and bears a certain constant ratio to its diameter. (See *CIRCLE*.) The term perimeter is used to designate the whole bounding lines of a plane figure enclosed by several straight lines, as a square or polygon.

**Circumflex** [from the Lat. *circum*, "about," and *flecto*, *flectum*, "to bend"; literally, "bent about" or "over"], in grammar, a character or accent originally denoting a rise and fall of the voice on the same long syllable, marked in Greek  $\circ$  or  $\omega$ , and in Latin  $\circ$ .

**Circumnavigation** [from the Lat. *circum*, "around," and *navigo*, *navigatum*, to "sail"], means, literally, a sailing round, and is usually applied to the act of sailing round the globe. This was formerly considered a great achievement. The first person who circumnavigated the earth was Magellan, in 1519. Sir Francis Drake sailed round the globe in 1577. Among the other celebrated navigators who performed this voyage was Captain James Cook, in 1768-79.

**Circumpolar** [from the Lat. *circum*, "around," and *polus*, the "pole"] **Stars**, stars which revolve within the circle of perpetual apparition, and appear to move around the pole, and complete their diurnal circles without setting. The number of stars so circumstanced increases with the latitude of the place, or, in other words, with the elevation of the pole above the horizon of the observer.

**Circumstantial Evidence.** See *EVIDENCE*, by PROF. T. W. DWIGHT, LL.D.

**Circumvallation** [from the Lat. *circum*, "about," and *vallum*, a "rampart"]. In fortification, an intrenchment or series of defensive works erected by a besieging army, facing outward from the place invested or besieged, is called a line of circumvallation. It is designed to defend the besieging army against an attack from a hostile army operating in the rear. It usually consists of a chain of redoubts, either isolated or connected by a parapet.

**Circus** (plu. **Cir'ci**), [originally, a "circle" or "circular space"]. The circus of ancient Rome was a large structure without a roof, for chariot and horse races, and for the exhibition of athletic exercises and conflicts of wild beasts. It appears that it was originally of a circular or oval form, whence the name. The Circusian games, according to tradition, originated in the time of Romulus, when they were dedicated to the deity Consus, and called

*Consualia*. The rape of the Sabines occurred at the Circusian games. After the war in which Tarquinius Priscus captured Apollæ, his victory was celebrated by games. A space was marked out for a circus, and the senators and knights erected scaffoldings round it for themselves. The games thenceforth were held annually, and a permanent edifice was afterwards constructed. This was distinguished as the Circus Maximus. It was enlarged at various times. In the time of Julius Cæsar it was 1875 feet long and 625 feet wide; the depth of the buildings surrounding the space was about 312 feet. Its dimensions were subsequently much greater. All the circi in Rome, of which there were a considerable number, are nearly obliterated, but a circus on the Appian Way, about two miles from Rome, known as the Circus of Maxentius, is still in a state of preservation. Its construction is believed to have differed very little from that of other ancient buildings for similar purposes. Along the sides and at the end were ranges of stone seats for the spectators. At the other end were the *carceres* or stalls, covered and furnished with gates, and in which the horses and chariots remained until on a given signal the gates were thrown open. In the centre was the *spina*, a long and broad wall round which the chariots drove, terminating at both ends in *meta*, or goals. The games were inaugurated by a procession from the Capitol, in which persons bearing the images of the gods went first, and were followed by the performers in the games, the consuls, and others. The circus was particularly designed for races, an amusement of which the Romans were passionately fond. In consequence of the popular enthusiasm, the victor received substantial pecuniary rewards. A pitched battle was sometimes represented. By the formation of canals and the introduction of vessels a sea-fight was occasionally exhibited, but under the empire this was transferred to the amphitheatre. In providing for the killing of wild beasts vast sums of money were expended. Animals were procured from every part of the Roman empire. The exhibition attained a political importance which none who aspired to popularity ventured to overlook. Pompey is said to have given public exhibitions in the circus for five days, during which 500 lions and twenty elephants were destroyed. The principal Circusian games were held annually in September, and lasted five days.

**Cirencester** (pron. sis'eter), (anc. *Corinium*), a town of England, in Gloucestershire, on the river Churn, and on a branch of the Great Western Railway, 89 miles by rail W. N. W. from London. It has an agricultural college, several hospitals, and manufactures of carpets, woollen cloths, and cutlery. Canute held a council here in 1020. Cirencester partly occupies the site of *Corinium*, an ancient Roman town two miles in circuit. Pop. in 1881, 7703.

**Cirillo** (DOMINICO), born at Grugno, in the kingdom of Naples, 1734, died at Naples 1799; studied medicine, visited England and France, was appointed professor first of botany, afterward of medicine, in Naples, and wrote a number of books and treatises which enjoyed a great reputation in their time. When, in 1799, the French under Champrouet entered Naples and the Parthenopean republic was established, Cirillo was elected a member of the legislative assembly, and acted as its president. As soon, however, as the French left Naples, King Ferdinand returned, and by the aid of the English he compelled the republicans to surrender. Cirillo was sentenced to death, and, as he refused to ask for mercy, he was hanged.

**Cirrhopoda**, a faulty form of CIRRIPEDIA (which see).

**Cirripe'dia** (plu.), or **Cirripeds** [from the Lat. *cirrus*, a "curl," and *pes* (plu. *pedes*), a "foot"], an order of crustaceans characterized by the development of the feet (generally six pairs) as cirrhi. Barnacles are familiar examples of cirripedia, but many species are now known, and all in their mature state are attached to objects of various kinds, as rocks, sea-weeds, shells, etc., or are parasitic. Some are found in the skin of whales, some in the flesh of sharks. They are divided into the sub-orders Rhizocephala, Apoda, Abdominales, and Thoracica. The last are either pedunculated or sessile, the former family supported on a flexile stalk, which is wanting in the latter. Barnacles (Lepadidæ) are pedunculated cirripedia, and Balani (acorn-shells, sessile barnacles) are without a stalk.

The likeness of these animals to mollusks is chiefly external. The gills, when these exist, occupy the same relative position as in crustaceans, but the aëration of the blood is also effected in the *cirri*, as the limbs are called, of which there are six pairs on each side, each composed of many joints and fringed with stiff hairs. The *cirri* nearest the mouth are short and form a sort of net for the capture of minute animals, being incessantly thrown out from a lateral opening, and drawn in again in such a manner as to convey to the mouth any prey which they may have caught. Almost all are hermaphrodite, but in a

few genera the sexes are distinct, the males being not only very small in comparison with the females, and more short-lived, but, in their mature state, parasitic on the females, or attached to them; while in some appear complementary males attached to hermaphrodites. The young swim freely in the water, and are furnished with eyes, which disappear after they have permanently fixed themselves. They have also shells different from those of their mature state. The shelly coverings of the cirripedia are all formed according to a certain type, but they differ extremely in the number of pieces of which they consist, some having only five valves, and others have more than 100 additional pieces. They are from half an inch to several inches in length.

**Cir'rus** (plu. **Cirri**), a Latin word signifying a "lock of curled hair," is used in botany to denote a tendril, a spiral and filiform appendage of climbing plants. It twines around such objects as occur in the vicinity, and thus obtains support for the stem, which is too weak to support itself in an erect position. The cirrus is a modified leaf, or in some cases is an elongation of the midrib of a pinnate leaf.

The term *cirrus* is also applied to a thin fleecy cloud floating in the sky at a great elevation, and called mare's tail, or curl-cloud.

**Cis**, a Latin preposition meaning "on this side," is often prefixed to the names of rivers or mountains to form adjectives; as *Cisalpine*, "on this side of the Alps;" *Cispadane*, "on this side of the Po." These terms are used with reference to Rome.

**Cisal'pine Republic**, a former state in the north of Italy, founded by the French in 1797, comprised Lombardy, Rovigo, the duchy of Modena, the Venetian territory S. and W. of the Adige, the Valtellina, and the legations of Bologna, Ferrara, and the Romagna. Area, about 16,000 square miles, with a population of 3,500,000. Milan was the capital. An intimate connection was formed in 1798 between this republic and France by a treaty of alliance offensive and defensive. In 1802 it took the name of the Italian Republic, and chose Napoleon as its president. It was transformed into the kingdom of Italy in 1805, and continued to be subject to Napoleon until 1814.

**Ciscauca'sia**, one of the two divisions of Caucasia. Area, 86,030 sq. m. It contains government of Stavropol and territories of Kuban and Ter. Pop. 1,418,698.

**Cisco**, Tex. See APPENDIX.

**Cisleitha'nia**, since 1867 the usual, though not official, collective name of that part of the Austro-Hungarian monarchy which is situated this side (as viewed from Vienna) of the river Leitha. It embraces all the German crownlands, Istria, Dalmatia, Galicia, and the Bukovina; in general, all the provinces not appertaining to the Hungarian crown. (See TRANSLEITHANIA.)

**Cis'padane Repub'lic**, a former state of Italy, was organized by the French after the battle of Lodi in 1796. It was bounded on the N. by the river Po (anc. *Padus*), and comprised Modena, Reggio, Bologna, and Ferrara. In 1797 it was merged in the Cisalpine Republic.

**Cis'platine Repub'lic**, for some time (from Oct., 1828, to July, 1831) the name of the republic of Uruguay. Previously this republic had been, under the name of Cisplatine Province, a part of Brazil.

**Cis'rhene Repub'lic**, a name selected for the projected confederation of the German towns situated west of the Rhine in 1797. The project was not carried into execution, because the peace of Campo Formio transferred the entire left bank of the Rhine to France.

**Cissam'pelos** [Gr. *κισσάμπελος*, the name of a kind of vine, from *κισσός*, "ivy," and *άμπελος*, a "vine"], a genus of plants of the order Menispermaceæ, of which some possess valuable medicinal properties, particularly *Cissampelos Pareira*, a native of the warm parts of America, the root of which is known by the name of PAREIRA BRAVA (which see).

**Cissey, de** (ERNEST LOUIS OCTAVE), a French general, born in Paris Dec. 23, 1811. A general of division (1859), he shared in the events attending the investiture and capitulation of Metz, 1870. He served against the Commune in the siege of Paris in March and April, 1871, and was minister of war from July, 1871, to Aug., 1876. D. June 16, 1882.

**Cis'soid of Di'ocles** [Gr. *κισσώδης*, "ivy-like," from *κισσός*, "ivy"], a curve invented by the Alexandrian mathematician Diocles, with a view to the solution of the problem of the duplication of the cube, or the insertion of two mean proportionals between two given straight lines. It may be regarded as the pedal of a parabola with respect to the vertex; in other words, it is the locus of the vertex of a parabola which rolls upon an equal parabola, so that corresponding points of the curves always coincide with their

point of contact; it is also the inverse of a parabola with respect to its vertex. Its equation is  $(a - x)y^2 = x^3$ .

**Cista'cea** [from *Cistus*, one of the genera], a natural order of exogenous plants, herbs, or shrubs, mostly natives of Southern Europe and Northern Africa. Several are natives of the U. S. They have regular flowers, hypogynous and mostly indefinite stamens, and an inverted embryo in mealy albumen. Many of the species are prized for the beauty of their flowers. The *Cistus creticus* and a few others yield the resinous balsamic substance called gum labdanum.

**Cister'cians** [from *Cistercium*, now *Cîteaux*, their first abbey], or **Bernardines**, an order of Benedictine monks and nuns which was founded in 1098. Through the influence chiefly of Saint Bernard of Clairvaux, who became a monk of Cîteaux in 1113, the order in little more than a century after its foundation had more than 1800 abbeys. The Cistercians were distinguished from the order of Clugny by their severe rule and strict poverty, by being independent of the bishops, by not meddling with the cure of souls, by their dress, and by their peculiar government. As long as Saint Bernard lived the order occupied a very conspicuous place in the world, but by the middle of the thirteenth century it had passed its point of culmination, and its historical mission was inherited by the mendicant orders, the Dominicans and the Franciscans. Among the fraternities of Cistercians were the nuns of Port Royal, the Recollets, and the Trappists. Among the English abbeys were Woburn, Tintern, and Rievaulx; among the Scottish, Melrose, Glenluce, Balmerino, and New Abbey. Riches and indolence brought this order into decay. Before the Reformation many of its convents had ceased to exist. In 1872 only a few convents existed, chiefly in France and Austria. In 1880 the Cistercians were banished from France.

**Cis'tern** [Lat. *cisterna*, from *cista*, a "box" or "chest"], a tank constructed for holding water. Where the supply of water is uncertain, or where rain-water is used, every house requires a cistern. Cisterns are variously constructed—of iron, or wood lined with lead, zinc, cement, or of slate, in which case, the sides and bottom are grooved, and cemented to prevent leakage; large cisterns are generally made cylindrical, so that the pressure acts at all points equally from the centre. Some are simply excavated in the earth and plastered with hydraulic cement.

**Cis'tus**, or **Rock Rose**, a genus of plants, the type of the order Cistaceæ, comprises several species which are natives of the Levant and Southern Europe, and are cultivated for the beauty of their flowers. (See CISTACEÆ.) The *cistus* of the English poets is the rock-cist (*Helianthemum*), a genus of which there are four British and several American species.

**Cit'adel** [It. *citadella*, dimin. of *città*, a "city," a "little city," because in ancient times, though but a small portion of the city, it was the most essential part of all, and in fact represented the whole], a fort of four or five bastions in or near a town, or a strong fort constructed within fortifications. It is designed partly to enable the garrison to keep the inhabitants of the town in subjection; and in case of a siege it serves as a place of retreat for the garrison, and enables it to hold out after the town has been captured.

**Cita'tion**, in law. 1. This term is principally used in connection with an ecclesiastical court, to indicate the act of summoning persons to appear before it. A citation gives the court jurisdiction over the parties cited or summoned. The surrogates' or probate courts in the U. S. have a jurisdiction corresponding in part with the English ecclesiastical courts, and resort to a citation unless some other method is supplied by statute. The citation is prospectively abrogated in England by an act of Parliament taking effect Nov. 2, 1874. After that time proceedings in all the higher courts will be commenced by a uniform method—the summons.

2. "Citation" is also employed to mean a reference to precedents or authorities in support of a law argument. These are commonly indicated by well-known abbreviations, to be found in such works as Bouvier's "Law Dictionary," 12th and later editions.

**Cîteaux**, formerly **Cisteaux** (anc. *Cistercium*), a hamlet of France, in Côte-de'Or, about 10 miles S. S. E. of Dijon. Here was a celebrated monastery of the Cistercian order founded in 1098. Remains of the magnificent buildings of this monastery are still visible.

**Cithæ'ron** [Gr. *Κιθαρώνας*], **Mount**, now **Elatea**, a famous mountain-range of Greece, on the boundary between Attica and Boeotia, was covered with forests. The highest summit rises 4620 feet above the level of the sea. It is often mentioned by ancient classical poets.

**Cith'ara** [Gr. *κithάρα*], a stringed musical instrument of the ancient Greeks and Romans, resembled a guitar or harp.

Derived from this word, or cognate with it, are the English *guitar* (Old Eng. *gittern* and *cithern*); Dutch *cyter*; Ger. *Zither*.

**Cities of Refuge.** The Levitical law set apart six cities of refuge for the manslayer, in which he might be safe from the avenger of blood. These cities were Hebron, Shechem, and Kadesh-Naphtali on the west of Jordan; Bezer, Ramoth-Gilead, and Golan on the east. The Hebrews kept the roads to the cities clear, and signs were set up to show the way. The manslayer was protected in the cities of refuge until the death of the high priest, after which the avenger of blood had no claim against him. Thus this institution was connected with the typical emblems of the Jewish religion, while it restrained the avenging of blood.

**Citizen** [Lat. *civis*; Fr. *citoyen*, from *cité*, a "city"], a resident in a city; in free states one who has the elective franchise, and may take part in legislative or judicial deliberations. Between a citizen and a subject this distinction is sometimes made, that while the latter is governed, the former also governs; and thus, though a citizen may be a subject, many subjects are not citizens. In this sense, which is substantially that attached to the term by the Romans, it has come down to modern times. In Greek communities the citizenship was at first readily attained by those who were not born to it; but at a later period, when the organization of Greek civic life had reached a higher degree of perfection, admission to citizenship was procured with much greater difficulty. In Sparta, according to Herodotus, there were only two instances of their conferring citizenship in full measure on strangers. The Perioeci, who shared the Spartan territory, though not on equal terms, were probably, as regarded political rights, much in the same position with the Roman plebeians. In Rome there were perfect and less perfect citizens. All the private rights of citizenship belonged to the citizens of the lower class, but the honors of the magistracy were denied them. But all citizens of all classes in the *comitia centuriata*, and in the tribes even the *liberti* or freedmen, had the right of voting. But it would appear that in the case of the *Ærarians* and *Cærites*, though they were reckoned citizens, the right of voting was in abeyance. Inferior in rank to the citizens there were two other classes—the *Latini* and the *Peregrini*. Roman citizenship was acquired most frequently by birth, but for this it was requisite that both father and mother should be citizens. If a citizen married a *Latina* or a *Peregrina*, the children followed the status of the mother. In earlier times the citizenship could be conferred only by a vote of the people assembled in the *comitia*. In some of the provinces the *Latinitas* was given as a step to the *Civitas*, the former being converted into the latter in the case of any one who had exercised a magistracy in his own state or city. The constitution of Caracalla extended citizenship to the whole Roman world, the distinction between *Cives* and *Latini* being preserved only in the case of freedmen and their children. Even this distinction was abolished by Justinian, the only divisions of persons henceforth being into subjects and slaves.

REVISED BY T. D. WOOLSEY.

**Citizen**, in modern law, is used to indicate the class of persons who owe an indefeasible allegiance to a state, and are entitled to certain rights and privileges appertaining to freemen. This view prevailed at a date as early as the time of Bodin (A. D. 1576), who defines a citizen to be "a free subject holding of the sovereignty of another man." (Knolles' translation, A. D. 1606.) Citizenship, in this sense, is not to be confounded with the elective franchise or the holding of offices of government. Children, the insane, and the non-voting classes in general are citizens. The same writer says: "They are to be called citizens that enjoy the rights and privileges of the state. This is to be understood according to the condition and quality of every one; the nobles as nobles, the commons as commons, the women and children in like case according unto the age, sex, and condition and deserts of every one of them. . . . It may be well said that special privileges make not a man a citizen, but the mutual obligation of the sovereign to the subject, to whom, for the faith and obeisance he receiveth, he oweth justice, counsel, aid, and protection which is not due unto strangers."

The subject may be further considered under the following general divisions: I. The mode of becoming a citizen; II. The obligations, rights, and privileges of a citizen with special reference to the Constitution of the U. S.

I.—1. The leading mode of acquiring citizenship is by birth in the country or under a state of allegiance. Birth in the country confers citizenship without reference to the citizenship of the parent, who at the moment of birth owes at least a local allegiance, and though an alien is temporarily a subject, except in the case of foreign ambassadors

and ministers. This rule would apply to the case of persons, though in a foreign country, who were in our army, as their allegiance would be due to the U. S. On this same principle the children of American ambassadors born abroad are citizens.

2. A more difficult question is as to the citizenship here of children born abroad of American parentage. It should be noted in the discussion of this question that allegiance is twofold—perpetual and local. When an American citizen goes to a foreign country, he cannot by his own act put off his citizenship. He is still subject to our laws, and can, according to modern views, still be governed by our criminal legislation. "The power to tie and bind the subject cannot be tied down to places." It would seem on principle that as the mutual obligation from which citizenship springs still exists, his child would still be a citizen, though not born within the territory of the state to which allegiance is due. Lord Bacon, who would naturally look upon this subject with the eye of a philosopher, plainly took this view. In his famous argument concerning the *post nati* in the time of King James I., he said: "If a man look narrowly into the law on this point, he shall find a consequence that may seem at the first strange, but yet cannot be well avoided; which is, that if divers families of English men and women plant themselves at Rouen or at Lisbon, and have issue, and their descendants do intermarry among themselves, without any intermixture of foreign blood, such descendants are naturalized to all generations, for every generation is still of *liege parents*, and therefore naturalized; so as you may have whole tribes and lineages of English in foreign countries." (Harg., *State Trials*, 81.) If this broad proposition should be attended with any evil consequences, they could be corrected by suitable legislation. The strictly legal authorities are, however, hopelessly in conflict. The proposition that the foreign-born children of citizens are aliens is argued with great force and power by Mr. Horace Binney in his well-known article on the "Alienigenæ of the United States" (2 *Am. Law Register*, 193, A. D. 1854). An outline of his argument is that there are no early legal decisions affirming the citizenship of such persons, but that, on the other hand, the preamble to an early statute on this subject (25 Ed. III., stat. 2) of the year 1350, the language of text-writers, such as Lord Coke, Jenkins, and Blackstone, the expressions of authors of digests, such as Comyns and Mr. Bacon, all point to the fact that the persons in question are aliens. The argument is legal and based upon authorities, and does not enter into the philosophy of the subject as depending on the doctrines of allegiance. Opposed to this view of Mr. Binney is a recent and carefully considered case in the New York court of appeals (*Ludlam vs. Ludlam*, 26 New York R., 356). This case maintains that the statute of 25 Ed. III., ch. 2, above referred to, was simply an affirmation of already-existing law, and that the common law proceeds solely upon the doctrine of allegiance, which does not depend upon locality and place, and cannot be confined within boundaries. It holds that the true test of the allegiance of the child is parentage, that it is transmitted from the father to the child, and that, accordingly, the state may claim allegiance from the children of its citizens wherever born. These doctrines are supported by a reference to *Calvin's Case*, 7 Coke R., 1, in the sixth year of James I., and other authorities. The doctrine of this case appears to be based on sound principles of political philosophy, whatever view may be taken of the result of the legal decisions. The discussions of this subject by various writers led to the following important enactment by Congress in Feb., 1855: "Persons heretofore born, or hereafter to be born, out of the limits and jurisdiction of the U. S. whose fathers were or shall be at the time of their birth citizens of the U. S., shall be deemed and considered, and are hereby declared to be, citizens of the U. S.: Provided, however, that the rights of citizenship shall not descend to persons whose fathers never resided in the U. S." If the theory of Mr. Binney be correct, this statute conferred citizenship where it did not before exist; if that of *Ludlam vs. Ludlam* be sound, then it restricted the rights of the foreign-born descendants of citizens, perhaps unnecessarily.

3. Citizenship by Naturalization.—An alien may be made a citizen by the act of a state or a nation co-operating with his own act. Sometimes this citizenship is complimentary or honorary; usually it is attended with true, or intended, renunciation of foreign citizenship. The question thus recurs, Whether a person can by his own act put off his citizenship? The prevailing opinion of jurists, with some dissent, is that he cannot. This proposition seems quite clear where the sovereign distinctly refuses to permit the renunciation of citizenship. The tie of allegiance creates reciprocal rights and duties; the state cannot rightfully discard the citizen without just cause of forfeiture, nor can the citizen repudiate his obligations to the state without its consent. Assuming that mutual agreement is necessary



to dissolve the relation of sovereign and citizen, the more difficult question is, Whether the agreement of dissolution can be *inferred* from the prolonged absence of the citizen, coupled with foreign naturalization, and the failure of the state, after notice, to reclaim him? The better opinion would seem to be that there must be some affirmative act of renunciation on the part of the state to which the allegiance is due, though there are weighty opinions to the contrary. For the purpose of settling the perplexing and irritating questions that frequently arise, the U. S. have entered into treaties of naturalization with a number of foreign powers. (For details see NATURALIZATION.) Naturalization may take place either by a mere law of a general nature, such as that which provides that every alien woman who marries a citizen of the U. S. shall be deemed and taken to be a citizen, or it may occur in special instances affirmative on the part of the individual to be naturalized. In this country the power to naturalize is exclusively vested in Congress by a provision in the U. S. Constitution. There is an important provision concerning citizenship in the fourteenth amendment to the U. S. Constitution as follows: "All persons born or naturalized in the U. S., and subject to the jurisdiction thereof, are citizens of the U. S. and of the State wherein they reside." The precise effect of this provision has not yet been settled by judicial decision. It would seem, however, that it should not be construed by implication to deprive any person of citizenship who would possess it by common law, such as the children of ambassadors or other citizens born abroad. The ninth amendment would lead to this conclusion: "The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people." Citizenship at present, as will be shown hereafter, leads to important rights and privileges of which it would be unjust to deprive any one entitled to them. The words "subject to the jurisdiction of the U. S." would exclude from citizenship the children of foreign public ministers and members of the Indian tribes, though Indians born out of the tribal organizations would seem to be citizens.

Interesting questions concerning citizenship arise in case of the union of two separate nations, or of the division of a single nation into two separate states. The first of these cases was discussed with much acuteness and learning when Scotland and England were united under James I.; the second has been extensively considered by the courts, both in England and America, in connection with American independence. *Calvin's case* (7 Coke's Reports) is the leading English authority upon the whole subject, where it was declared that the *post nati* (persons born after the union) of Scotland were natural-born subjects, and could inherit lands in England. In respect to the result of our own Revolution, opinions differ as to the time when the separation between England and the U. S. became complete, though they substantially agree as to the effect of the division. The American view is, that the separation took place at the Declaration of Independence, July 4, 1776; the English, that it was consummated at the treaty of peace in 1783. Accordingly, a person born in England before July 4, 1776, who did not reside in the U. S. after that date, became, as to this country, an alien, as well as all his descendants. The effect of this rule is not to work a forfeiture of vested rights, and the real estate owned by a former citizen continued to be vested in him, though he could not, after the day named, acquire an indefeasible title to land.

II.—The provisions of the U. S. Constitution concerning citizenship have recently assumed great importance, growing out of the controversies concerning the legal condition or status of persons of African descent. The Constitution as originally adopted made no provision concerning citizens of the U. S., except an incidental direction that Senators, Representatives, and the Executive should be such citizens. There were, however, distinct clauses concerning the rights and privileges of the citizens of the several States, such as that the judicial power of the U. S. shall extend to controversies between a State and a citizen of another State, and between citizens of different States, and that the citizens of each State shall be entitled to all privileges and immunities of citizens in the several States. This last clause has led to much judicial discussion, some points of which will be noticed hereafter. Under the clause which provided that the judicial power should extend to controversies between citizens of different States, the question arose in the now famous case of *Scott vs. Sandford* (19 Howard's Reports, 39), whether an emancipated negro could be considered as a "citizen of a State;" and it was decided that he could not be so regarded, and accordingly that he could not maintain an action on that basis in the Federal courts. It would seem to follow that he could not claim the benefit of the other constitutional provision respecting privileges and immunities. The division of

public opinion occasioned by this decision, and the desire to settle by a positive rule the condition of the slaves emancipated by the thirteenth amendment to the Constitution, as well as that of the colored race in general, led to the fourteenth and fifteenth amendments, the provisions of which are now to be considered, as far as they affect citizenship. All persons born or naturalized in the U. S. are declared to be citizens of the U. S. and of the State in which they reside; and it is provided that "no State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the U. S.;" and also that the "right of citizens of the U. S. to vote shall not be denied or abridged by the U. S. or by any State on account of race, color, or previous condition of servitude." Though the condition of the colored race led to these amendments, their construction is not to be confined to it. It will be observed that the same words are here used as in the body of the Constitution—"privileges and immunities"—except that they are here declared to belong to "citizens of the U. S.," while there they appertain to "citizens of each State" in reference to the "several States." The meaning of the words "privileges and immunities" in the body of the Constitution has been, as already stated, much considered. They have been held to mean such privileges, etc. as are of a general nature, such as security to life and liberty, the right to acquire property, to have access to courts of justice, and freedom to pursue and obtain happiness and safety, with such restrictions as are necessary to the public good. Whatever guarantees upon these points a State accords to its own citizens, it must extend to citizens of other States. But the Constitution before the amendments gave no directions as to the mode in which a State should treat its own citizens, except in a few specially marked instances, such as the prohibition to pass bills of attainder and *ex-post facto* laws. In other respects the State was left to its own action towards its people. Under the amendments there is provision made for the privileges and immunities of citizens of the U. S. A momentous question now arises: Does this provision trench on the great power which has all along been vested in each State to regulate the conduct of its own citizens? Does Congress under it have the right to enter upon the once exclusive field of State legislation and the domain of State constitutions, and to override all its action as to privileges and immunities of citizens? This question came up for careful consideration before the Supreme Court of the U. S. in the very important case of the *Butchers' Benevolent Association vs. the Crescent City Live-stock Company* (A. D. 1872). The State of Louisiana had granted an exclusive right to the latter company to engage in the business of slaughtering cattle within a certain district, including the city of New Orleans. It was claimed by the plaintiffs, who had been engaged in the same business, and who were by the act prohibited from following it, that the law created a monopoly, that its exclusiveness was contrary to the spirit of free institutions, and that it was opposed to this provision of the U. S. Constitution. It was, however, considered by the court that there is now a clear distinction between citizens of the U. S. and citizens of a State—that there may be persons of the former class who are not members of the latter, and that the constitutional amendment is solely applicable to privileges and immunities of citizens of the U. S., *as such*; and that accordingly the clause does not refer to such regulations as the State may make for its own citizens, though they may also fill the character of citizens of the U. S. If it be asked, What scope there is in this construction for the amendment? the answer is, that the court does not seek to lay down any abstract rule on the subject, and will decide questions as they arise. Some instances of its application may be suggested, such as the right to visit the seat of government to assert a claim or to seek its protection; to freely approach its seaports, sub-treasuries, land-offices, and courts of justice; to be protected on the high seas; to assemble and petition for the redress of grievances; to invoke the privilege of the writ of *habeas corpus*; and freely to change the residence from one State to another. These appertain to citizens of the U. S. in general. It was decided by the same court that a claim to practice law in a State by one of its citizens (Mrs. Bradwell) did not come within the phrase "privileges and immunities" of a citizen of the U. S. It is a matter of congratulation to all who desire to see the equilibrium of forces between the general government and the States properly preserved, that the court was able to see its way clear to a somewhat rigorous construction of the clauses of this amendment. The effect of the fifteenth amendment has not been settled by the courts, but its object is well known. It of course abrogates all State law or constitutional provisions creating distinctions among citizens of the U. S. as to the exercise of the right of suffrage based upon race and color, and for ever prevents the

introduction of them either through the action of the States or the general government. T. W. DWIGHT.

**Cit'ric A'cid** [from the Lat. *citrus*, a "citron"], a vegetable acid present in limes and lemons, and to a less extent in gooseberries, currants and other fruits. In preparing it the juice of lemons is allowed to ferment, and chalk being added citrate of lime is formed. This precipitate being treated with sulphuric acid, sulphate of lime is formed, and the acid remains in solution. It is tribasic, having the symbol  $H_3C_6H_5O_7$ . It is readily soluble in water, and has an intensely sour taste; it is used in medicine as an antiscorbutic and refrigerant, and by the silk-dyer to heighten the colors of safflower and cochineal, and by the calico-printer for discharging mordants.

**Citrine Ointment.** See MERCURY, MEDICINAL USES OF.

**Cit'ron** [Gr. *κίτρον*; Lat. *citro* and *citrus*; It. *cedro*; Fr. *citron*], the fruit of the citron tree (*Citrus medica*), which is cultivated in the south of Europe and other warm countries. It is a native of India. By some botanists it is regarded as perhaps the original type of the species which produces the lemon, sweet lemon, lime, and lime; but by others some of these are regarded as distinct species. The citron tree has oblong leaves; the fruit is large, rough, and furrowed; the rind thick and tender; the pulp sub-acid and refrigerant. The part chiefly valued is the rind, which has a delicious odor and flavor, and is made into preserves. The juice is employed to make a syrup for flavoring liquors. The cedrat is a variety of the citron, from which chiefly the fragrant oil of cedrat, used by perfumers, is procured. The varieties of citron are numerous. The fruit of the largest kinds is sometimes nine inches long and twenty pounds in weight.

**Citronel'la** [Fr. *citronelle*], a perfume prepared from the *Melissa officinalis*, or common BALM (which see); also, a liquid prepared in Barbados from the rind of the citron, and used in France for flavoring the best brandies. The name *citronelle* is also given in France to the common southernwood (*Artemisia Abrotanum*). The term *citronella* is, however, chiefly applied by perfumers at present to an oil imported from Ceylon. It is the product of *Andropogon Schoenanthus*, a kind of grass.

**Citron Melon.** See MELON.

**Citros'ma** [from the Gr. *κίτρον*, "citron," and *ὄσμη*, "smell"], a genus of trees of the order Monimiacæ, natives of the tropical parts of South America. The leaves abound in an oil similar to the oil of citron.

**Cit'rus** [a Latin name from the Gr. *κίρπια*, the "citron tree"], a genus of evergreen trees of the order Aurantiacæ, natives of the warm parts of Asia. It comprises the citron (*Citrus medica*), the orange (*Citrus Aurantium*), the lemon (*Citrus Limonum*), bergamot, cedrat, lime, tangerine, shaddock, lime, and other trees which are extensively cultivated for their fruit or for their leaves and flowers, which are used in perfumery. The genus is distinguished by numerous stamens irregularly united in bundles by their filaments, and a pulpy fruit with a spongy rind. The leaves and the rind abound in volatile oil. These oils are isomeric with each other, with the oil of turpentine, and with a great variety of other oils. The fruit (*hesperidium*) is in structure a sort of large berry.

**Cittadel'la**, a town of Northern Italy, in the province of Padua, on the Brentella, 14 miles N. E. of Vicenza. It has manufactures of paper and woollen fabrics. Pop. 7213.

**Città-della-Pie've**, a town of Italy, in the province of Perugia, 23 miles W. S. W. of Perugia, was the native place of the eminent painter Perugino. Pop. 6755.

**Città di Castel'lo** (anc. *Tiberinum*), a town of Italy, in the province of Perugia, on the Tiber, about 23 miles N. W. of Perugia. It has a cathedral, several palatial mansions, and Gothic structures. Pop. in 1878, 24,412.

**Cittano'va**, a town of Italy, in the province of Catanzaro. Pop. 11,103.

**Città Vec'chia**, a fortified city of Malta, 6 miles W. of Valetta, is on a limestone hill in which extensive catacombs were excavated at a remote period. It has a large and handsome cathedral. It was called *Medina* by the Saracens, who occupied it for some time. Pop. 7000.

**Cit'y** [Fr. *cité*; Lat. *urbs* or *civitas*; Ger. *Stadt*], a large town, an incorporated town; a term used to include both a

large collection of houses and its inhabitants. As first used in the languages of modern Europe, the word *city*, like the Latin *civitas*, was equivalent to state rather than to town or borough (*urbs*); and while the latter signified a collection of households governed by municipal laws, but subject to the laws of the country of which they formed a part, the title *city* was given to such towns as, with their surrounding district, were independent of external authority. Nearly the only cities in this sense now are the free towns of Germany and such of the cantons of Switzerland as consist of a town and its surroundings. In England the cities are towns which either are or have been sees of bishops, though there are several towns which were anciently episcopal, but which are not now called cities. In America the term is applied to most towns which are incorporated and governed by a mayor and aldermen.

**City Island**, N. Y. See APPENDIX.

**City Point**, port of entry of Prince George co., Va. (see map of Virginia, ref. 6-H, for location of county), on the James River, at the mouth of the Appomattox, 10 miles by railroad E. N. E. of Petersburg. This point being a good landing, was seized by the troops under Gen. Butler in his movement up the James, May, 1864, and later, June, 1864, became the head-quarters of Gen. Grant after his passage of this river; and during his subsequent operations against Petersburg and Richmond was the principal landing and dépôt of supplies for his army. Pop. in 1880, 484.

**Ciudad de las Casas**, the capital of the Mexican department of Chiapa, is about 450 miles S. E. of Mexico. It has a cathedral, a Catholic college, and several monasteries. It was formerly called *Ciudad Real*. Pop. 6430.

**Ciudadel'la**, a city and seaport of the island of Minorca, on its W. coast, 25 miles N. W. of Mahon. It has a cathedral and several convents; also manufactures of woollen fabrics. Pop. 5726.

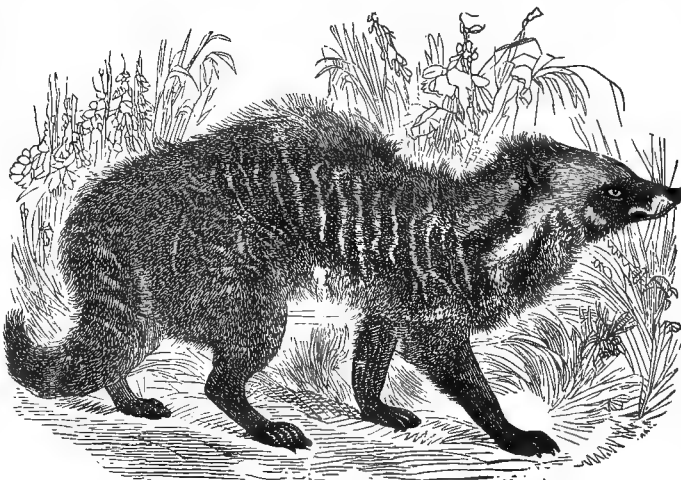
**Ciudad' Real'**, a province of Spain, is intersected by the river Guadiana, and bounded S. by Sierra de Morena. Area, 7840 sq. m. Capital, Ciudad Real. Pop. 264,908.

**Ciudad Real** ("city of the king"), a town of Spain, capital of the above province, is situated on a plain about 5 miles S. of the Guadiana and 102 miles S. of Madrid. It has several fine churches, monasteries, and hospitals. The nave of the parish church is a magnificent Gothic structure. Here are manufactures of linen and coarse woollen fabrics. This town was the head-quarters of the Hermandad, or Holy Brotherhood, founded in 1249 for the suppression of robbery. Pop. 10,366. The French here defeated the Spaniards in Mar., 1809.

**Ciudad' Rodri'go**, a fortified town of Spain, on the river Agueda, here crossed by a fine bridge, about 90 miles S. W. of Salamanca. It has a Gothic cathedral founded in the twelfth century, and a citadel. During the Peninsular war it was considered an important point as a key of Spain on the west. It was invested and taken by the French general Massena in July, 1810. The army of the duke of Wellington assaulted and took this place, with 150 guns, in Jan., 1812. For this achievement the Spanish government gave him the title of duke of Ciudad Rodrigo. Pop. 6429.

**Cives.** See CHIVES.

**Civ'et** [Fr. *civet*; Arabic, *zubbâd*], a brown substance



Civet.

of a strong, offensive odor which is used in perfumery, because when mixed in small proportions with certain other

perfumes it is considered to improve them greatly. It is quite costly, and is consequently much adulterated. It is produced by a carnivorous animal called the civet or civet-cat (*Viverra Civetta*), an animal which ranks between the weasels and the foxes. Other species are found—one in India and one in Java, and the latter produces part of the civet of commerce. The civet-cat, when wild, feeds upon birds, small quadrupeds, and reptiles, and generally takes its prey by surprise. It is very commonly kept in confinement for the sake of its perfume, which is removed from a glandular sac twice a week by means of a spatula, and is obtained most abundantly from the male, and especially after he has been irritated. A dram is a large quantity to obtain at a time. The civets kept for this purpose are fed on raw flesh, the young partly on farinaceous food. The town of Enfras, in Abyssinia, is a principal seat of the civet trade. The civet-cat of the South-western U. S. is of a different genus from the above. (See *BASSARIS*.)

**Civiale** (JEAN), a French surgeon, was born July, 1792. He was the inventor of lithotripsy. Died in June, 1867.

**Civida'le** (anc. *Forum Julii*), a walled town of Northern Italy, in the province of Udine, on the river Natisone, here crossed by a bridge, 10 miles E. N. E. of Udine. It has a fine Gothic church, said to be about 1000 years old; also manufactures of silk and cotton. Pop. 6838.

**Civ'il Death**, in law, is the cessation of legal rights while the physical life remains. Civil death occurs where a man by act of Parliament or judgment of law is attainted of treason or felony; he loses his civil rights and capacities, and becomes, as it were, *dead* in law. It also took place formerly where any man abjured the realm by the process of the common law, or went into a monastery and became there a professed monk, in which cases he was absolutely dead in law, and his next heir succeeded to the estate. In New York the sentence of a criminal to imprisonment for life causes civil death.

**Civ'il Engineer**, a person whose profession is the science or construction of bridges, railroads, aqueducts, harbors, canals, machinery, etc. (See *ENGINEERING*, by GEN. J. G. BARNARD, U. S. Army.)

**Civil'ian**, in general or in popular use, signifies a person whose pursuits and employment are civil—i. e. neither military nor clerical. As a legal term, it denotes a man learned in the civil or Roman law; also a person who is versed in the principles and rules in accordance with which civil rights may be freely, blamelessly, and successfully vindicated. In England the term is applied particularly to a member of the college of doctors of law exercent in the ecclesiastical and admiralty courts, in which the civil law is recognized.

**Civil'is** (CLAUDIUS), a heroic chief of the Batavi who served for many years in the Roman army. When Vespasian and Vitellius were contending in civil war for the imperial throne, the adherents of the former induced Civilis to make a feigned demonstration of hostility to the Romans, in order to detain in Gaul the Roman army, which was inclined to fight for Vitellius. Having raised a large army, Civilis revolted in earnest in 69 A. D., was joined by many Germans, and defeated the Romans in several battles. In 70 A. D. he was defeated by Cerealis, a general of Vespasian. Tacitus states that negotiations ensued between Cerealis and Civilis, but his history here ends abruptly.

**Civiliza'tion** [Fr. *civilisation*, from the Lat. *civilis*, "like a citizen" (*civis*), and hence "refined," "polite"], a term denoting a refined and improved state of society, as distinguished from a barbarous or savage condition. Whether civilization is an artificial condition, or the original state of mankind, from which the savage races have descended, is an interesting but still unsettled question. The idea that our civilization is the result of development from the rudest beginnings is a favorite one with many popular scientific writers. (See LUBBOCK's "Uncivilized Man.") The progress of our civilization from the barbarism of the Dark Ages affords one of the most interesting phases of history. (See GUIZOT's "History of Civilization," and DRAPER "On the Intellectual Development of Europe.")

**Civil Law**. See *LAW, THE CIVIL*, by JOHN NORTON POMEROY, LL.D.

**Civil Service and Civil Service Reform**. In its comprehensive sense, the civil service of a nation, State, or city embraces the whole body of officers who manage the civil affairs of its government. It could hardly include a person employed only as a laborer for the government, but it is very difficult in some cases to decide whether a person employed and paid by the government is an officer or simply a laborer. The whole public service of the civilized states is in three great divisions—the civil, the military, and the naval. Yet it is not easy in every instance to decide whether an officer should be classed in the mili-

tary or in the naval service, as he may serve in both. So various officers have both civil and military functions. The President is the head of one of the great branches of the civil service, but he is also commander-in-chief of the army and navy of the United States, and of the militia of the several States while in the actual service of the nation. The position of governors is analogous. The functions of the secretary of war and those of the secretary of the navy are, in part, but not wholly, civil. Office in every part of the public service is a trust the authority and functions of which should be executed at all times under a sense of both moral and legal obligation, solely for the public good, and therefore not in the interest of any party, faction, family, or individual. The duty to be faithful, efficient, and economical in every public office is as absolute as it is in any private station.

The civil service, under enlightened forms of government, is separated into three branches—the legislative, the judicial, and the executive.

1. We need not stop to notice the lower grades of officers in towns and villages, where legislative, executive, and in some degree judicial, functions are united in the same officer. The legislative branch is essentially representative. Everywhere—in theory, at least—it represents opinions, and, in greater or less degree, interests and property also. In republics it is also especially representative of numbers and localities; and in monarchies, of classes, of the State Church or religion, and of hereditary privileges. This representative function of legislators and the duty of adapting the laws of a people to their varied and changing interest and opinions make the views, interests, and, to some extent, the residence of candidates for legislative offices an important part of the proper tests of fitness for the places they seek. Such considerations also point to popular elections as the best means of selecting such officers. But very different considerations should prevail in the selection of the clerks and other subordinates of the two houses of Congress and of State legislatures. The functions of these subordinates, from the secretaries and chief clerks down to the copyists and the messengers, are in no sense representative. They owe no duty to members of one party that they do not as much owe to members of the other party. In no true sense are their political views material. To make them partisan workers for the dominant party is to mistake their functions and to practise despotism. That knowledge of forms and of details which such subordinates have learned by long practice is particularly valuable to new members and greatly facilitates the business of legislative bodies; yet nearly every State legislature and both houses of Congress, as well as almost every municipal council, are in the habit of treating these subordinate places as so much party patronage, to be grasped at the cost of long angry, sometimes ignominious controversies rather than as—what they are—mere business facilities in aid of the great work of legislation. It is plain that their selection should depend solely on their capacity for advancing the business portion of that work. There are various officers—of which Presidents, governors, and in a degree mayors, are examples—whose functions are in their nature both legislative and executive. Their duty of approving or vetoing bills is in kind wholly legislative. It is for this reason, and for the further reason that they are to carry out in their executive sphere the general policy approved by the people in their selection, that these offices also are properly made elective. It is plain that representative officers would soon cease to be such if their terms were made long. The same reason applies to some extent to Presidents and to governors, and they are, therefore, given a fixed term, though it should be longer than that of officers who are solely representative. In close analogy, in some of their duties, to Presidents and governors, are the heads of departments (generally members of the Cabinet) and councils of appointment. Being the confidential advisers of the chief executive, they need to have his confidence in a political sense, and to share his views in regard to the use of the veto power and execution of the policy to which he is pledged. Their political opinions, therefore, are important tests of their fitness, and their terms of office should not be much longer than that of the chief.

2. The judicial branch of the government is in no proper sense representative. A despot may make it such to entrench his despotism; an aristocracy may make it such to add strength to class-privileges; a party in a republic may make it such to perpetuate its power and reward its adherents. In each case it is a prostitution of judicial functions and a calamity to the state. To administer justice alike for every one, at all times and places, in the same spirit and without regard to political or religious opinion, is the supreme purpose of all judicial authority and the supreme duty of all judicial offices. Nowhere in a free and enlightened state are such opinions or any local or party interests

At tests for the selection of judicial officers. On the contrary, in whatever degree such opinions and interests are reflected in the conduct of such officers, and especially in that of judges, in that same degree are they unfit for and a disgrace to the positions they hold. To make judicial places the prizes of the party majority, to so place a candidate for the bench before the people as to teach them that his political views are more important than his legal learning and his sense of justice, is to make common the belief that justice depends on the politics of the judge and to make certain the degradation of the courts. And the case is all the worse when short terms of office are made to inculcate the pernicious doctrines that party patronage may safely be increased by more frequent elections, and that the opinions of the court may safely be made representative of party majorities. The judge, unbiased by the sympathies and unswayed by the frowns of public opinion, needs to stand firmly by the law as it is, and to administer justice which is the same for all citizens and for all localities. But how can he without a tenure, or without a common relation to all the people, which reinforces rather than tempts the weakness of human nature? It is too much to expect that judges who feel the need of conciliating voters for a re-election at the end of a short term will carry the scales evenly between a humble citizen who can control no vote but his own and a great corporation, or a great politician, who can control many hundred. It has been but the natural fruit of a short-term elective judiciary that clerks and other court officers have become a part of the spoils of party victories in many of the States and cities. And this is the view which has been causing so many States of the American Union to retrace—in part, at least—their disastrous advances in the direction of a short-term partisan judiciary.

3. In the executive department we find the vast majority of those civil officers by whom the government is carried on. There are more than a hundred thousand who serve in the executive department of the United States, without including those of the grade of mere laborers. Aside from the few of the higher grade already referred to, these officials are in no sense representative of either localities or opinions. There are 43,434 postmasters, with tens of thousands of clerks and carriers under them, engaged in receiving, forwarding, and delivering the public mails, and in the collection, care, and transmission of postage-money and postal-orders. In the whole country there is not a branch of private business to which, upon a true view of its nature and interests, party politics are more foreign or in which business methods are more essential than they are to the proper discharge of the functions of the post-office department. In the other six executive departments of the Federal government, as in this, official life is graded from the central authority down to the porters and the doorkeepers. An organization quite analogous exists in the executive department of the States, and, in some degree, of the cities. None of these latter officials are representative. In every grade it is their duty to obey the legal instructions of their superiors, and to do their work in the same manner whatever party is in power. With rare exceptions, they are doing work the success and the utility of which depend upon its being done wholly upon business principles. The bias of proscriptive party views and of active affiliation with the managers of politics is almost inevitably a hindrance to the well-doing of the public business. A custom-house, a land-office, or a navy-yard, as much as the counting-house of any merchant or the mills of any manufacturer, needs to be managed upon business principles, and consequently to be kept out of party politics. It was but natural, however, that in the struggle of parties for power and of politicians for place they should seek to fill these subordinate, administrative positions with their henchmen and favorites, who would become useful aids of their patrons at the public expense. Men thus placed in office are apt to feel it a duty, and are sure to feel it a matter of personal safety, to work for their benefactors. Both classes naturally accepted the theory that such offices should be treated as the just rewards of the class which has been servile in the hope of getting them, and that parties cannot be successful without the patronage of bestowing them. From such a view of the matter the step was but a short one to the practice of collecting an annual rent from such subordinate—under the name of political assessments upon salaries—for the purpose of paying the expenses of parties and great politicians. From that stage the next step to the making of salaries excessive that they might bear heavy assessments was easy and natural. The system which thus made offices perquisites, tens of thousands official servile partisans, and their salaries the source of a vast corruption fund for carrying elections, has long been known as the "spoils system." While its origin is in the selfishness of human nature, it has found much of its

support in that low view of the duties of public officers and in that false theory of parties which regard patronage and manipulation as the chief sources of their strength. But little developed before Jackson's time, that system first found a distinguished apologist in Senator Marcy of New York, who, commenting on patronage in a speech in the Senate in 1832, said, especially of New York politicians, who had enforced the system most extensively, "*They see nothing wrong in the rule that to the victor belongs the spoils of the enemy.*"

Though new in this country, the spoils system was the natural outgrowth of feudalism. It has been enforced for centuries in every aristocratic country. In England, in the spirit of that system, the lords, the bishops, and the great land-owners had long used the patronage of appointments in the civil, military, and naval service—and in the State-Church as well—in their own interests. Subservience to themselves and the acceptance of creed of their party and Church were long the political tests of office-holding under that government. When Parliament became the greater power in the government, its members demanded their share of the spoils of the offices. A patronage secretary was created for its apportionment, and regular accounts were kept with members of the places they had filled. Political assessments were not exacted, because the offices were sold for a full price at the outset.

It would be interesting to run the parallel between the usurpation of executive functions and the demoralizing traffic in patronage by members of the British Parliament and by members of Congress and of State legislatures in the United States. In both countries alike the practice has absorbed the time needed for legislation, has weakened the sense of responsibility on the part of the executive, has impaired confidence in legislative bodies, has foisted incompetent supernumeraries upon the public treasury, has prevented the investigation of abuses, and has tended in many other ways to corruption alike in party politics and in official life. Partisan and selfish influence and mere official favor have in large measure controlled appointments and removals. It has been in the great departments and offices and in the populous cities that the evils of this system have been most developed. In the Treasury Department at Washington, for example, there are nearly 2500 officials. In the post-office at New York City there are nearly 1500, and in the customs service there the number is still greater. The head of a small office can easily learn the character and the capacity of all who seek places, and of all who serve under him; but it is quite otherwise in the great offices and departments. He cannot there know the qualifications of one in ten of those who are pushed for places.

There is nothing peculiar, in this regard, under republican institutions, for the same conditions exist under monarchies. Under both forms of government alike it was long the custom for the appointing power to accept the recommendations of prominent officers—party-leaders and personal friends—as adequate evidence of capacity on the part of those seeking office. But such recommendations were generally based on party or selfish considerations, and hence were generally found untrustworthy. The next resort was to an examination as to qualifications of applicants. Nearly fifty years ago, for example, it was found necessary in Great Britain to aid the appointing power by requiring an examination as to the capacity and the attainments of the applicant before his appointment was decided upon. These first examinations—known as *pass*-examinations—defeated the most incompetent. They were upon subjects which those in the offices needed to understand. But such examinations allowed the monopoly of access to them to remain with the dominant party, or rather with those who should manage that party, who alone opened and shut the gates of such examinations. Only one person was examined at a time, and the recommendation of persons of influence in that party was a condition of being examined at all. That British precedent was the basis of the acts of Congress of 1853 and 1855 (see U. S. Rev. Stat., § 164), by which such examinations were made the condition of an appointment to any place in the four great classes of clerkships at Washington. These examinations were the first practical steps toward what is now designated "*civil service reform.*" It is plain that they can be extended only to that class of officers who are not representative in character.

These pass-examinations in Great Britain led to a general system of competitive examinations, or, in other words, to examinations open to all apparently qualified irrespective of recommendations and of political opinions. By thus putting in comparison, in those competitive examinations, the merits of all those who wish to work for the government for the salaries offered, the government was able to ascertain and select the best for its service. Competitive

examinations did more than this. By allowing every one so qualified to present himself, and by giving the appointments to those who showed the highest excellence, the applicant acted independently, and practically *put himself into the public service*, thus breaking up the old partisan and aristocratic monopoly of appointments to the executive offices. Arbitrary and partisan patronage in that service was thus in great measure extinguished. No man longer needed the consent of a great politician or a patronage-mongering member of Parliament to enable him to attend an examination or to win a place upon his own merits. This was the second great step in civil service reform.

Great Britain has for a generation enforced the competitive examinations for the selection of her administrative officials in British India. In 1870 she made these examinations general for the home offices; so that very few mere *pass*-examinations are left. Her larger post-offices, her customs-offices, and nearly the whole of her executive service, with no small part of her military and naval service, have by these means been taken out of party politics and official favoritism, and placed on a basis of personal merit. (See EATON'S "Civil Service in Great Britain," etc.)

Between 1872 and 1874 President Grant, aided by a clause in an Appropriation bill (now the 1753d section of the Revised Statutes of the U. S.), enforced a system of competitive examinations in the departments at Washington. He appointed a civil service commission to take charge of them. They brought superior persons into the public service, and were rapidly suppressing the evils of patronage. For this very reason they encountered the hostility of many members of Congress, who saw they could no longer effectively promise places for votes or foist their dependents upon the public treasury. Notwithstanding a special message of President Grant in April, 1874, setting forth the beneficial results of these examinations, requested an appropriation for continuing them—a request repeated in his next annual message—Congress in 1874 and 1875 refused all appropriations. Competitive examinations were, as a necessary consequence, suspended. The old *pass*-examinations were renewed; congressional patronage again flourished. But there was a large class of citizens who condemned this partisan and selfish action of Congress, and an agitation of the subject began.

Competitive examinations were, however, established by President Hayes at the post-office and the custom-house at New York City, and they were continued there by Presidents Garfield and Arthur. Their beneficial results there obtained and the growth of the reform sentiment of the country led to the passage of the Civil Service act by Congress on the 16th of January, 1883. This act contains stringent provisions for the suppression of political assessments and provides for a system of competitive examinations. The act has already arrested the grosser abuses connected with political assessments. Under it President Arthur appointed a civil service commission, and has approved and promulgated a series of civil service rules. Since July 16, 1883, these rules have been enforced, and all places in that part of the civil service to which the act (at first) and the rules extend have been filled by those who have stood highest in the competitive examinations. These places are in number a little more than 14,000, of which 5652 are in the departments at Washington, 2573 are in the twenty-five custom-offices, and the residue are in the twenty-three post-offices, to which the act and the rule at present apply. The parts of the service thus brought within the act are designated the *classified civil service*. The post-offices and the customs-districts therein embraced are those in which there are as many as fifty clerks, but the President has the authority to extend the rules to smaller offices. Between July 16, 1883, and Jan. 16, 1884, 516 persons were appointed to the classified from among those examined.

The State of New York enacted a civil service law similar to that of Congress, May 4, 1883, under which a state commission has been appointed. Competitive examinations are now being enforced as qualifications for admission to the civil service of that State, and also for the municipal service of the cities of New York and Brooklyn. DORMAN B. EATON, *Civil Service Commissioner*.

**Civil War of the United States.** See CONFEDERATE STATES, by HON. HORACE GREELEY, LL.D.

**Civitali** (MATTEO), an eminent Italian sculptor, born about 1435, died in 1501. He was a native of Lucca, and most of his works are found there; but very little is known of his life. The story that he was a barber by trade and did not discover his talent for sculpture until he was over thirty years old seems to be mythical. Nor is it probable that he was a pupil of Jacopo della Quercia, though Vasari says so and his style shows a considerable influence

from that artist. His masterpiece is the monument of Pietro di Noceto, secretary to Nicholas V.; died in 1472. Another great work of his is the statue of San Sebastian, one of the first nude figures of a man executed after the revival of art. Both of these works are in the cathedral of Lucca. In the cathedral of Genoa are six large marble statues by him which are much admired, especially that of Abraham. Civitali also acted as an architect; the Bernardino palace at Lucca was built by him.

**Ci'vita Vec'chia** (anc. *Centum Cellæ* and *Trajanus Portus*), a city and fortified seaport of Italy, in the province of Rome, 36 miles W. N. W. of Rome by railway. It is enclosed by walls and well built, has a large church, an arsenal, a theatre, and a lighthouse. The harbor was constructed by the emperor Trajan, and is formed by two large moles, and a breakwater which protects shipping from a heavy sea. It is a free port, and is regularly visited by steam-packets from Genoa, Marseilles, Naples, etc. It is connected by a railway with the city of Rome. Pop. in 1881, 11,980.

**Civoli** (LUDOVICO), a celebrated Italian painter, born in 1559, died in 1613. He was a native of Cigoli in Tuscany, and a pupil of Alessandro Allori, though he seems to have formed his style on studies of Michael Angelo, Correggio, and Andrea del Sarto. He became insane either on account of the persecutions of his enemies or because he was poisoned by a corpse after which he modelled. His mental alienation lasted for three years. After a prolonged visit to Lombardy he settled in Florence, and there he spent most of the remainder of his life. His masterpiece is an "Ecce Homo," which was brought by Napoleon to France and placed in the Louvre, but after 1815 was returned to the grand duke of Tuscany. In Rome are "The Holy Apostle curing the Lame," in the church of St. Peter; "The Conversion of Saul," in the church of St. Paul; "The History of Psyche," painted *afresco* in the villa Borghese; etc. He also painted the cupola of the chapel of St. Paul in the church of Santa Maria Maggiore, but an ill-chosen disposition of the perspective spoiled the picture, and the painter died from chagrin.

**Clackman'nan**, the smallest county of Scotland, has an area of 47 square miles. It is bounded on the S. by the river Forth, and on the N. by the Ochil Hills. It consists chiefly of the romantic valley of the North Devon. The soil is partly fertile. Coal, ironstone, copper, sandstone, and greenstone are found here. The chief articles of export are coal and iron. Capital, Clackmannan. Pop. in 1881, 25,680.

**Clackmannan**, the capital of the above county, is on the river Devon, near its entrance into the Forth, 9 miles E. of Stirling. This town is noted for its ale. King David Bruce resided here in 1330. Pop. in 1881, 3614.

**Cladras'tis**, a genus of leguminous trees represented in the U. S. by the *Cladrastis tinctoria* of the Southern States, a small tree somewhat resembling the common locust. It is called yellow locust, yellow wood, fustic, and yellow ash. Its wood is yellow and its bark is cathartic.

**Claf'lin** (LEE), a distinguished philanthropist of Boston, Mass., born in 1791. He acquired wealth in the manufacture of shoes, and bestowed munificent gifts of money upon the Wesleyan academy at Wilbraham, Mass., the university at Middletown, Conn., and the Boston Theological Seminary. Died Feb. 23, 1871.

**Claf'lin** (WILLIAM) LL.D., born at Milford, Mass., Mar. 6, 1818, was governor of Massachusetts from 1869 to 1871. He has been for many years a prominent leather-merchant in Boston.

**Clag'gett** (JOHN THOMAS), D. D., the first Protestant Episcopal bishop of Maryland, was born in Maryland Oct. 2, 1742. He graduated at Princeton in 1764, became bishop of Maryland in 1792, and died Aug. 2, 1816.

**Claiborne, Clayborne, or Cleborne** (WILLIAM). See APPENDIX.

**Claiborne** (JOHN HERBERT), A. M., M. D. See APPENDIX.

**Claiborne** (WILLIAM CHARLES COLE), an American lawyer and statesman, born in Virginia in 1773, was a member of Congress from Tennessee (1797-1801), governor of Mississippi Territory (1802), governor of Louisiana Territory (1804), and of the State of Louisiana (1812-16). He was chosen U. S. Senator in the latter year, and died Nov. 23, 1817.

**Claim** [from the Lat. *clamo*, to "call," to "call for," to "demand"], a demand of a right; the act of demanding from another person something due; a right to claim or demand; a title to any debt or privilege. The term is sometimes applied to the thing claimed, as land or other property. In law, claim is a challenge of interest in any-



thing that is in possession of another, or at least out of the possession of the person who claims it.

**Claims, Court of,** a court of the U. S. for the relief of those persons who have claims against the government. Before the year 1855 such claims could be settled only by act of Congress. In that year this court was created, consisting of three judges appointed by the President with the advice and consent of the Senate. (See, for further information, *COURTS*, by GEORGE CHASE, LL.B.)

**Clairaut** (ALEXIS CLAUDE), a French geometer, born in Paris May 7, 1713, died there May 17, 1765. He was a precocious genius. When only twelve years old, he read a paper on curves of double curvature before the Academy of Sciences, and in his eighteenth year he was admitted as a member of that institution. He accompanied Maupertuis to Lapland in order to measure a degree of the meridian, and on his return he published his celebrated treatise on the figure of the earth (1743). That, however, which made him most famous was his prediction of the return of Halley's comet in 1759.

**Clairon**, MADEMOISELLE, a famous French actress, born at Saint-Wanon de Conde, in Flanders, in 1723, died in Paris Jan. 18, 1803. She was educated in Paris, and so precocious were her passion and her talent for the stage that in her thirteenth year she made a brilliant *début* in the Théâtre Italien as soubrette. In 1743 she made her *début* in the Théâtre Français as Phèdre, and from that period down to 1765 she represented all the tragic characters of Du Belloy, Saurin, Marmontel, Voltaire, and the other dramatists of the time. She was put in prison for some insignificant insubordination, and she declared that she would never tread the stage again unless she received due satisfaction; but no satisfaction was ever offered, and she remained in retirement. Her private life will not bear examination. (See "Histoire de Frétilion," a scandalous pamphlet.) During the Revolution she lost her fortune, and died in very straitened circumstances. Her "Memoirs" appeared in 1799.

**Clairvaux**, a village in the department of Aube, France, about 10 miles above Bar-sur-Aube, stands on the left bank of the river Aube, and is noteworthy as the site of the famous Cistercian abbey of Clara Vallis. It was founded in 1114 by St. Bernard, who was its abbot till his death, in 1153, and who threw such a glory over the place that in 1143 the kingdom of Portugal declared itself a fief of the abbey of Clairvaux—an extravagancy which later on, in 1578, was not altogether without influence on the affairs of the country. In time its revenues rose to 120,000 livres a year, and its church was a masterpiece of architecture. During the Revolution the convent was closed, and the splendid buildings were transformed into a workhouse.

**Clairvoyance** [Fr., from *clair*, "clear," and *voir*, to "see"]. Hitherto, the nature of spirit has been discussed theologically and metaphysically. Its scientific investigation has been considered either impracticable or undesirable. In this border-land between the known and unknown ignorance and charlatanism have held high carnival. Science, purely material, is entirely occupied with matter and its inherent force, and beyond the retort and crucible has no place for spirit. Belief in spiritual being outside of physical existence is superstition. The mention of a fact bearing in that direction provokes a smile of scornful pity. When the oil is exhausted the flame no longer burns; when the fuel is spent the fire goes out; when the instrument is destroyed the music is not heard; when the complex co-ordination of conditions called a living being is subverted, life, intelligence, spirit are no more. Such are the illustrations of material science. The spiritual realm has remained unknown, or rather, its existence has been denied.

These reflections are rendered pertinent by the consideration that whatever else of pretence and folly be blown away, the central fact of clairvoyance remains undisturbed; and clairvoyance is a super-sensuous perception depending on the spiritual nature of man, without which it would be impossible. In the present state of psychological knowledge the facts are ill-observed, loosely recorded, and theories out of place. The world of spirit, to which "force" furnishes the key, perhaps may at some future time broaden into as wide a field as the physical world now presents. Superstition will then have no place for concealment. Ghosts, witchcraft, visions, trance, ecstasy, and the innumerable phases of spiritual phenomena will be co-ordinated, the chaff blown away, the vital facts preserved, and a true science of the soul, based on accurate observation and discriminating research, founded.

The existence of a somnambule or sleep-walking state, induced by unknown causes and accompanied by peculiar phenomena, is generally admitted. It is also admitted

that a state similar to, if not identical with, these can be induced by artificial means, usually by fixing the attention in gazing intently into a "magic mirror" or "crystal," repeating formulae, by incantations, fasting, drugs, or by an operator making what are termed magnetic passes. The interference of a second person is not essential, and perhaps without exception distorts the result. This admission by no means endorses the theories which have sprung fungus-like therefrom, of mesmerists, biologists, magnetists in an endless array, best known by their barbarous terminologies.

The trance or clairvoyant state has been observed in all ages and among all races of mankind—Chinese, Hindoos, Turks, as well as Christians. It has in seasons of great religious excitement become epidemic, the devotee falling in convulsions, becoming cataleptic, and after hours, days, or even months of apparent death, awakening with mind overwrought with visions of the strange world in which it had dwelt during its apparent unconsciousness. The records of clairvoyance are as old as history. If prophecy, the "clear-seeing" of the future, be its fruit, the prophets and sages of the past were all more or less endowed with this gift. Socrates and Apollonius predicted and were conscious of events transpiring at remote distances. Cicero mentions that when the revelations are being given some one must be present to record them, as "these sleepers do not retain any recollection of them." Pliny, speaking of the celebrated Hermotinus of Clazomenae, remarks that his soul separated itself from the body and wandered in various parts of the earth, relating events occurring in distant places. During the periods of inspiration his body was insensible. The day of the battle of Pharsalia, Cornelius, a priest of renowned piety, described, while in Padua, as though present, every particular of the fight. Nicephorus says that when the unfortunate Valens, taking refuge in a barn, was burned by the Goths, a hermit named Paul in a fit of ecstasy cried out to those who were with him, "It is now that Valens burns!" Tertullian describes two females celebrated for their piety and ecstasy, that they entered that state in the midst of the congregation, revealed celestial secrets, and knew the innermost hearts of persons. Saint Justin affirms that the Sibyls foretold events correctly, and quotes Plato as coinciding with him in that view. Saint Athenagoras says of the faculty of prescience that "It is proper to the soul." Volumes might be readily filled with quotations like the foregoing, showing that clairvoyance has been manifested and received as a truth by profound thinkers in every age. Swedenborg, Zschokke, and Davis are not peculiarities of modern times, but are repetitions of Socrates, Apollonius, and countless other sages who deeply impressed their personality on their times.

Perhaps for purposes of investigation the artificially induced mesmeric state has advantages over the spontaneous, which presents itself at indeterminate times, although its spontaneous exhibition is more reliable in its results. Its natural manifestation requires a finely developed nervous system. It is not always, though at times it may appear to be, the result of disease. The more perfect the health the more reliable the results. The visions produced by disease, like those by drugs, bear to true clairvoyance the same relations that the dreams of indigestion do to those of refreshing sleep.

Clairvoyance must be regarded as a peculiar state of the mind, in which it is in a greater or lesser degree independent of the physical body. It presents many gradations from semi-consciousness to profound and death-like trance. However induced, the attending phenomena are similar. The condition of the physical body is that of deepest sleep. A flame may be applied to it without producing a quiver of the nerves; the most pungent substances have no effect on the nostrils; pins or needles thrust into the most sensitive parts give no pain; surgical operations can be made without sensation. Hearing, tasting, smelling, feeling, as well as seeing, are seemingly independent of the physical organs. The muscular system is either relaxed or rigid; the circulation impeded in cases until the pulse becomes imperceptible; and respiration leaves no stain on a mirror held over the nostrils.

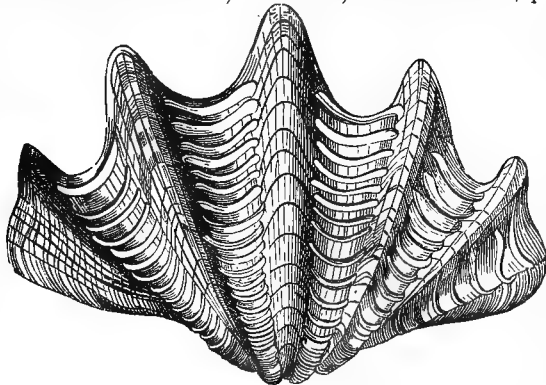
In passing into the clairvoyant state the extremities become cold, the brain congested, the vital powers sink, a dreamy unconsciousness steals over the faculties. There is a sensation of sinking or floating. After a time the perceptions become intensified. We cannot say the senses, for they are of the body, which for the time is insensible. The mind sees without physical organs of vision, hears without organs of hearing, and feeling becomes a refined consciousness which brings it *en rapport* with the intelligence of the world. The more death-like the condition of the body the more lucid the perceptions of the spirit or mind, which for the time owes it no fealty. If, as there is

every reason to believe, clairvoyance depends on the unfolding of the spirit's perceptions, then the extent of that unfolding marks its perfection. However great or small this may be, the state itself is the same, differing only in degree, whether observed in the Pythia of Delphic oracles, the vision of Saint John, the trance of Mohammed, the epidemic catalepsy of religious revivals, or the illumination of Swedenborg or Davis. The disclosures made have also a general resemblance, but they are so colored with surrounding circumstances that they are extremely fallible. The tendency of the clairvoyant is to make objective the subjective ideas he has acquired by education—if a Christian, to see visions of Christ; if a Moslem, of Mohammed—somewhat as dreams reflect the ideas of wakefulness. Yet there is a profound condition which sets all these aside, and the mind appears divested of all physical trammels, and to come in direct contact with the thought-atmosphere of the world. Time and space have no existence, and matter becomes transparent.

If there is an independent spiritual existence after the death of the physical body, the clairvoyant in this independent stage closely approximates to that existence. It may be an open question whether the spirit leaves the body and actually visits the remote places it describes, or gains such knowledge by intensity of perception that annuls space, as it does time, in its retrospection and prevision. The many authentic instances of "double-presence" which have been observed lead to the former conclusion.

Baron Reichenbach, in his "Dynamics," has investigated the sensitiveness of the clairvoyant to refined emanations of force, and Denton, in his "Soul of Things," has carried the investigation still farther, though in a somewhat similar direction. The field is broad as the spirit of man, and its threshold has been scarcely crossed. Clairvoyance is no miraculous power, but an inherent faculty, a foregleam in this life of the next spiritual life. For if man exists as a spirit after the dissolution of the physical body, his present life is that of a spirit clad in flesh, and should manifest some of the characteristics of the next untrammelled condition. HUDSON TUTTLE, *Berlin Heights, O.*

**Clam**, a name applied to many bivalve mollusks of various genera. Perhaps the most noteworthy of these is the *Tridacna gigas*, which is said to possess the largest shells known. A single pair of these has been found to weigh over 500 pounds. The flesh is used as food. Two of these valves are used in the church of St. Sulpice, Paris, to contain the holy water. This species is found in the Pacific and the South Sea, and the shell, which is described



Giant Clam (*Tridacna gigas*).

as "perhaps the most beautiful of bivalves, whether in regard to form, texture, or color," is much used for ornamental purposes. It is transversely ovate, ventricose, ribbed, and roughened with scaly inequalities. Its color is white, with red and purple spots and a high degree of lustre. Various shades occur, though the ground-colors do not vary. The common clam of the U. S. (*Mya arenaria*) is much used as food, and is very important as furnishing bait for the fisheries. It is found also in Europe and Asia, and on the shores of Alaska. The round clam, or quahog, has the name of *Venus mercenaria*, because its shells were made into *wampum* by the North American Indians, and used as money. The fresh-water clams are properly muscels. The genus *Chama* comprises numerous species, which are perhaps those to which the name is most appropriately given.

**Clamecy**, a town of France, department of Nièvre, on the river Yonne, about 24 miles S. of Auxerre, was formerly fortified. It has several Gothic churches, a fine modern château. Vol. II.—7

teau, and manufactures of paper and earthenware. Pop. in 1881, 5536.

**Clan** [Irish and Gaelic, *clann*; Manx, *claan*, "children," i. e. descendants of a common ancestor], a body of men confederated together by common ancestry. It is applied especially to the communities of the Scottish Highlanders, divided from each other by distinctive surnames. It has sometimes been applied to the great Irish sept, but these were completely broken down by the power of the English before the word came into use in the English language. In Scotland it was used to designate the freebooters of the Border as well as the Celtic tribes. There were characteristics common to both—such as predatory habits and their distribution into communities, each with a common surname. It was long the policy of Scotland to require all the Highland clans to have some representative who should be security at court for their behavior. Clans that could find no such security were called "broken clans," and their members were outlaws. The Macgregors were a broken clan, whom the law followed for centuries with cruel ingenuity. The clans are never treated in the old acts otherwise than as nests of thieves. The clans cannot be better understood than by keeping in view some peculiarities which set them in contrast with feudal institutions. Feudality has a relation to land, from the serf bound to the soil, through the vassal who possesses it, up to the feudal lord. Among the Highlanders the relation was patriarchal, and had no connection with land. It often happened that the head of a clan and the feudal lord of the estates occupied by it were different persons.

**Clancarty**, EARLS OF (1803), Viscounts Dunlo (1807), Barons Kilconnell (Ireland, 1797), Viscounts Clancarty (1823), Barons Trench (1815, United Kingdom), and Marquesses Heusden in the Netherlands, a noble family of England.—WILLIAM THOMAS LE POER TRENCH, third earl, born Sept. 21, 1803, succeeded his father Dec. 8, 1832.

**Clanricarde**, MARQUESSSES OF (1825), Barons Dunkel-in (1543), Viscounts Burke (1629, Ireland), Barons Somerhill (United Kingdom, 1826).—ULICK JOHN DE BURGH, first marquess, K. P., P. C., born Dec. 28, 1802, was ambassador to St. Petersburg 1835–40, postmaster-general 1846–52, lord privy seal 1857–58, succeeded his father as earl of Clanricarde July 27, 1808.

**Clanton**, on R. R., capital of Chilton co., Ala. (see map of Alabama, ref. 4-D, for location of county). Pop. of beat in 1870, 1859; in 1880, 2407.

**Clanton** (JAMES H.) studied law and practised his profession in Montgomery co., Ala., which in 1855 sent him to the House. From 1861 to 1865 he served as a general in the Confederate army, but after the end of the war he returned to his old profession. He died Sept. 27, 1871.

**Clap** (ROGER), born at Sallom, in Devonshire, England, April 6, 1609, settled at Wareham, Mass., in 1630, and was afterwards one of the founders of Dorchester, Mass. He held prominent public offices, and served (1665–86) as captain in Castle William, now Fort Independence. He wrote for his children valuable memoirs of the prominent men of New England. These have been several times reprinted. He was eminent for piety. Died Feb. 2, 1691.

**Clap** (THOMAS), a Congregational divine, born at Scituate, Mass., June 26, 1703, graduated at Harvard in 1722. He was president of Yale College from 1739 to 1766. He was an eminent natural philosopher and astronomer. He published "The Nature and Foundation of Moral Virtue" (1765), a "History of Yale College" (1766), and other works. Died Jan. 7, 1767.

**Clapp** (THEODORE), an eloquent Unitarian minister, born in Easthampton, Mass., in 1792. He preached in New Orleans for about thirty-five years. Died in 1866.

**Clapperton** (HUGH), CAPTAIN, a Scottish traveller and explorer of Africa, was born at Annan in 1788. In 1823 he accompanied Dr. Oudney and Denham in an expedition to Lake Tchad. Having returned to England in 1825, he soon renewed the enterprise in company with Richard Lander and others. His chief object was to discover the course of the Niger. He entered Africa at the Bight of Benin and penetrated to Saccatoo, where he was detained nearly a year by the sultan. He died near that place in April, 1827. (See R. LANDER, "Records of Captain Clapperton's Last Expedition," 1830.)

**Clauqua'to**, former capital of Lewis co., Wash. Ter. (see map of Washington Territory, ref. 4-B, for location of county), on Newaukum River. Pop. not in census.

**Claque**, clâk [a French word signifying the noise made in clapping the hands], a body of persons called "claqueurs," employed for securing the success of a performance

by bestowing applause upon it, and thus giving a false notion of the impression it has made. This artifice came first into operation in theatres and concert-rooms, and arose from friendly or party motives. It was in Paris that it was first turned into a trade. One Sauton, in 1820, established an office for the insurance of dramatic success, and was thus the organizer of the Parisian claques. The directors or managers of a theatre send an order to the office for whatever number of "claques" they think necessary. Although no public offices of the kind have yet been established in the U. S., the artifice is extensively practised.

**Clare**, a maritime county of Ireland, in Munster, is bounded on the N. W. by Galway Bay, on the E. and S. by the Shannon River, and on the W. by the Atlantic Ocean. Area, 1200 square miles. The surface is mostly hilly; the soil of the valleys is fertile. This county contains many small lakes. The principal rock is carboniferous limestone. Coal, copper, lead, and marble are found here. The staple products of the soil are oats, potatoes, wheat, and barley. Capital, Ennis. Pop. in 1881, 141,210.

**Claremont**, on R. R., Sullivan co., N. H. (see map of New Hampshire, ref. 8-D, for location of county), about 48 miles W. by N. from Concord. It has manufactures of cotton and wool. Claremont junction is 2 miles farther west. Claremont township is bounded on the W. by the Connecticut River. It has paper-mills, a furnace, a water-wheel manufactory, a high school, and a library of 4000 volumes. Pop. of township in 1870, 4053; in 1880, 4704.

**Clarence**, Duke of, a name sometimes given to the younger princes of the royal house of England. The title was derived from Clare or Clarence (Lat. *Clarentia*) in Suffolk. Some authorities, however, say it was derived from Clarenza in the Morea, of which an English knight was duke during the Crusades.

**Clarenceux**, or **Clarencieux**, anciently **Surroy**, the first of the two provincial kings of arms in the English college of heralds, the second being **Norroy**. The jurisdiction of Clarenceux extends to the Trent, that of Norroy comprehending the portion N. of that river. Clarenceux is named after the duke of Clarence, third son of King Edward III. It is his duty to visit his province, to survey the coat-armor within it, to register descents and marriages, and to marshal funerals which are not under the direction of Garter king of arms, who is his superior, or of Bath king of arms, who manages the heraldry of the order of the Bath, and who has heraldic duties in Wales. Clarenceux also grants arms with the approval of the earl-marshal.

**Clarendon**, R. R. junction, capital of Monroe co., Ark. (see map of Arkansas, ref. 8-E, for location of county), on White River, 60 miles E. of Little Rock. Pop. in 1880, 400.

**Clarendon**, on R. R., Rutland co., Vt. (see map of Vermont, ref. 7-B, for location of county), 6 miles S. of Rutland. Clarendon has mineral springs, which are visited for the cure of kidney and skin diseases and other complaints. Pop. of township in 1870, 1173; in 1880, 1105.

**Clarendon, Constitutions of**, a name given to certain laws made by a general council (or parliament) of the English barons and prelates at Clarendon, in Wiltshire, in 1164, whereby King Henry II. checked the power of the Church, and narrowed the exemption which the clergy had claimed from secular jurisdiction. These ordinances, sixteen in number, defined the limits of the patronage and jurisdiction of the pope, and provided that the crown should be entitled to the election to vacant dignities in the Church. But the most characteristic of all the stipulations—that one which most pointedly indicated the new idea of the relation between State and Church which was dawning upon men's minds—was that concerning the exemption of the clergy from the secular jurisdiction. It was agreed that in criminal cases the clergy should be amenable to the common courts, and it was evident that this law, if properly enforced, would produce a complete reform of the life of the clergy. There were robbers, murderers, adulterers, among the priests, and the punishment which they incurred from the ecclesiastical courts might properly be called an encouragement of crime. The constitutions were unanimously adopted, and Becket, the primate, reluctantly signed them. But they were at once rejected by Pope Alexander III. when sent to him for ratification, and Becket thereupon retracted his consent, and imposed upon himself the severest penances. This, and the other measures adopted by the archbishop to vindicate the independence of the clergy, led to disputes between him and the monarch. (See *Becket*.) Notwithstanding the humiliation to which the king submitted after Becket's death, most of the provisions of the constitutions of Clarendon continued permanent.

**Clarendon**, EARLS OF (1776), Barons Hyde (1756, Great Britain).—EDWARD HYDE VILLIERS, fifth earl of this line, born Feb. 11, 1846, was M. P. for Brecon district 1869-70. He succeeded his father June 27, 1870.

**Clarendon** (EDWARD HYDE), FIRST EARL OF, an eminent English statesman and historian, born at Dinton, Wiltshire, Feb. 18, 1609. He was educated at Oxford, and studied law under his uncle, Nicholas Hyde, who became chief-justice. He was a member of the Long Parliament, which met in 1640, and he acted at first with the popular party, but when the civil war broke out in 1642 he attached himself to the royalist cause. He wrote several able state papers, which defended the policy of the king against the Parliament. In 1643 he was appointed chancellor of the exchequer and privy councillor. He accompanied Charles, prince of Wales, to Jersey in 1645-46, and served him as counsellor while he was an exile in France and Holland. On the restoration of Charles II. in 1660, Hyde became prime minister and lord chancellor of England, and in 1661 he was created earl of Clarendon. He opposed popery, and was more moderate than many of the royalists. In Aug., 1667, he was removed from office and impeached by the House of Commons, which condemned him to perpetual banishment. He died at Rouen Dec., 9, 1674. His daughter, Anne Hyde, was married to the duke of York (James II.). He left a "History of the Rebellion and Civil Wars" (1702). A complete edition with annotations by Bishop Warburton was published at Oxford in 1826. (See "Life of Edward, Earl of Clarendon," by himself, 1759; T. H. LISTER, "Life of Lord Clarendon," 3 vols., 1838.)

**Clarendon** (GEORGE WILLIAM FREDERICK VILLIERS), FOURTH EARL (of the Villiers family), born Jan. 12, 1800, was the eldest son of the Hon. George Villiers, who was a son of the earl of Clarendon. He was sent as ambassador to Madrid in 1833, and succeeded to the earldom on the death of his uncle in that year. In 1840 he became lord privy seal in the Whig ministry, which he resigned in 1841. He was president of the board of trade in the new ministry formed by Lord John Russell in 1846, and was appointed lord lieutenant of Ireland in 1847. He exhibited moderation, tact, and energy in the government of that island, which was then much agitated. Having been recalled in 1852, he entered the ministry of Lord Aberdeen in Jan., 1853, as secretary of foreign affairs. He retained this office in the cabinet of Lord Palmerston, who became premier early in 1855, and acquired a high reputation as a diplomatist. The French alliance and the success of the Crimean war were, indeed, the results of his great diplomatic skill. The emperor Nicholas I. calculated that the alliance between France and England would not last three months, but it lasted three years; and at the conquest of Paris Lord Clarendon's ideas succeeded. He resigned with his colleagues in Nov., 1865. The Liberal ministers resigned in consequence of the defeat of the Reform bill in June, 1866. Lord Clarendon was appointed secretary of foreign affairs by Mr. Gladstone in Dec., 1868. D. June 27, 1870.

**Clarendon Press**, a celebrated printing and publishing establishment connected with Oxford University, England. It was founded in 1672, and took its name from the fact that the printing-house, erected in 1711, was built from the profits arising from the sale of Clarendon's "History of the Rebellion," of which work the university has a perpetual copyright.

**Clar'et** [Fr. *vin de Bordeaux*], a name given in England and the U. S. to red French wines produced near Bordeaux. The French *clairnet* signifies "pale wine."

**Clarinda**, R. R. junction, capital of Page co., Ia. (see map of Iowa, ref. 7-E, for location of county), on the Nodaway River, 62 miles S. E. of Council Bluffs. It has a woollen factory. Pop. in 1870, 1022; in 1880, 2011.

**Clarinet**, or **Clarinet** [Fr. *clarinette*], a wind-instrument invented in Nuremberg in 1690. Its tone is produced by a thin piece of reed nicely flattened and fixed on the mouth-piece. On the body of the instrument there are holes and keys for the fingers of the performer. In fulness and variety of tone the clarinet is the most perfect of wind-instruments. Its construction, however, does not admit of every key in music being played on the same instrument.

**Clarion**, or **Clar'in**, a species of trumpet more shrill in tone than the ordinary trumpet; also the name of an organ-stop.

**Clarion**, on R. R., capital of Wright co., Ia. (see map of Iowa, ref. 3-G, for location of county), about 85 miles N. of Des Moines. Pop. in 1870, 37; in 1880, 147.

**Clarion**, on R. R., capital of Clarion co., Pa. (see map of Pennsylvania, ref. 3-C, for location of county), is on the Clarion River, about 75 miles N. N. E. of Pittsburgh. Car-

rier Seminary, a large institution of learning, is located here. The county of Clarion now produces a large amount of oil, and the county-seat is improving rapidly. Pop. of Clarion borough in 1870, 709; in 1880, 1169.

**Clarion River**, of Pennsylvania, rises in McKean co., flows nearly S. W. through Elk and Clarion counties, and enters Alleghany River. Entire length, about 130 m.

**Clark, Dak.** See APPENDIX.

**Clark (ABRAHAM)**, an American patriot, born at Elizabethtown, N. J., Feb. 15, 1726. He was chosen a delegate to the Continental Congress in 1776, and signed the Declaration of Independence. He was re-elected to Congress. Died Sept. 15, 1794.

**Clark (ALEXANDER)**, D. D., born in Columbiana co., O., Mar. 10, 1834; educated in the common schools and by his father, a classical scholar. At the age of seventeen he became a teacher, and while so occupied started the "School-day Visitor," which was afterward consolidated with "St. Nicholas." In 1861 he was ordained a minister in the Protestant Methodist Church. He preached in Philadelphia and Cincinnati, and went to Pittsburgh as pastor of the First Protestant Methodist church in 1866. In 1870 he was elected editor of the official papers of his denomination—the "Methodist Recorder" and "Our Morning Guide"—which position he held at the time of his death. He had a high reputation as an author, editor, and poet. Among his works are the "Old Log Schoolhouse," "Work-day Christianity," "The Gospel in the Trees," and "Starting Out." Died at Atlanta, Ga., July 7, 1879.

**Clark (ALONZO)**, M. D., an eminent physician of New York City, graduated A. B. at Williams College 1828, took the degree of M. D. in the College of Physicians and Surgeons of New York in 1835, was for a time professor of pathology and materia medica in the Vermont Medical College at Burlington, professor of physiology and pathology in the New York College of Physicians and Surgeons from 1848 to 1855, professor of pathology and practical medicine in the same institution in 1855, which place he still holds. He was appointed physician to the Bellevue Hospital, New York, in 1855, and to St. Luke's Hospital, New York, in 1861. In 1853 he was elected president of the New York State Medical Society. No member of the profession in New York State or City enjoys a more honorable reputation. Dr. Clark has published valuable professional papers.

**Clark (ALVAN)**, born at Ashfield, Mass., Mar. 8, 1804, was an ingenious farmer's boy who became in youth an engraver for calico print-works at Lowell, Mass. He possessed native skill in portrait-painting, an art which he practised with great success, but when over forty years old he took up, with his sons, the construction of refracting telescopes. He was the first American who successfully made large achromatic lenses. In this department, and in the field of astronomical observation, he won great fame at home and abroad. He invented a valuable double eyepiece for measuring small arcs, and received in 1863 the La Lande prize of the French Academy of Sciences for his discoveries.

**Clark (CHARLES E.)**, U. S. N., born Aug. 10, 1843, in Vermont, graduated at the Naval Academy, an ensign in 1863, became a master in 1866, a lieutenant in 1867, a lieutenant-commander in 1868, and afterward commander. He was attached to the steamer Ossipee from 1863 to 1865, participating in the battle of Mobile Bay, Aug. 5, 1864, and was commended for "zeal and energy" by his commanding officer, Commander William E. Leroy.

FOXHALL A. PARKER.

**Clark (DANIEL)**, an American jurist, born at Stratham, N. H., Oct. 29, 1809, graduated at Dartmouth in 1834, was U. S. Senator from New Hampshire (1857-66), and judge of the U. S. district court in 1866.

**Clark (REV. DANIEL A.)**, a Congregational preacher of uncommon pungency and power, born at Rahway, N. J., Mar. 1, 1779. Among other places he was settled for four years (1820-24) in Amherst, Mass., and rendered valuable service in starting the college there. His sermons were published in 3 vols. 12mo, 1836-37. Died in New York City Mar. 3, 1840.

**Clark (DAVIS WASGATT)**, D. D., a bishop of the Methodist Episcopal Church, born in Maine Feb. 25, 1812, graduated at Wesleyan University in 1836, became distinguished as a preacher, editor, and author. Was elected editor of the *Ladies' Repository* in 1852, which position he held twelve years. Became a bishop in 1864. He published an "Algebra" (1843), "Mental Discipline" (1848), "Man all Immortal" (1864), and other works. D. May 23, 1871.

**Clark (GEORGE WHITEFIELD)**, D. D., an American clergyman, born Feb. 15, 1831, at South Orange, N. J., graduated at Amherst College in 1853, and at Rochester The-

ological Seminary in 1855. He was ordained Oct. 31, 1855, and became pastor of the Baptist church at New Market, N. J. In 1859 he accepted the pastorate of the First Baptist church at Elizabeth, N. J. About 1868 he became pastor at Ballston Spa, N. Y. In 1870 he published his "New Harmony of the Four Gospels" and his "Notes on Matthew," and near the close of 1872 "Notes on Mark." He is now engaged in preparing "Notes on the Gospels of Luke and John."

**Clark (HORACE F.)**, LL.D., born at Southbury, Conn., Nov. 29, 1815, was a son of the Rev. D. A. Clark. He graduated at Williams College in 1833, was admitted to the New York bar in 1837, and became a leading lawyer. He married in 1848 a daughter of Cornelius Vanderbilt. He was a Democratic member of Congress from New York City (1856-61), after which he was a prominent and successful railroad president, banker, and stock operator. He was distinguished for energy, liberality, and agreeable social qualities. He also took a prominent part in the reform movement in N. Y. City in 1871-72. Died June 19, 1873.

**Clark (SIR JAMES)**, BART., K. C. B., F. R. S., a physician, born at Cullen, Scotland, Dec. 14, 1788. He studied medicine at Edinburgh. About 1826 he settled in London, where he attained eminence as a physician. In 1829 he published an able work "On the Sanative Influence of Climate." He was appointed physician in ordinary to Queen Victoria in 1837. His "Treatise on Pulmonary Consumption" (1835) is highly esteemed. Died June 29, 1870.

**Clark (DR. JOHN)**, born in Bedfordshire, England, Oct. 8, 1609, emigrated to Massachusetts, but was driven to Rhode Island in 1638, and in the same year founded the first Baptist church at Newport. This church claims to be older than the first church at Providence, and therefore the first of that faith in the New World. Clark visited England in company with Roger Williams, and together they obtained from Charles II. the charter which secured civil and religious liberty to Rhode Island. Callender, in his history of that State, classes Clark with the ablest projectors and legislators of that commonwealth. While he was pastor at Newport he preached once at Lynn, Mass., for which he was imprisoned and fined twenty pounds, under the act of Nov. 15, 1644. Died April 20, 1676.

**Clark (LABAN)**, D. D., a Methodist Episcopal minister, born at Haverhill, N. H., July 19, 1778, began to preach in 1800. He was one of the founders of the Wesleyan University at Middletown, Conn., and was for many years an able and influential preacher. Died Nov. 28, 1868.

**Clark (LEWIS)**, U. S. N., born in 1845 in Connecticut, graduated at the Naval Academy in 1863, became a master in 1866, a lieutenant in 1867, a lieutenant-commander in 1868, and afterward commander. While attached to the steam-sloop Richmond he participated in the battle of Mobile Bay, Aug. 5, 1864, and was commended for "coolness and courage" by his commanding officer. Died June 7, 1885.

FOXHALL A. PARKER.

**Clark (LEWIS GAYLORD)**, an American writer, born at Otisco, N. Y., in 1810. He was for many years editor of the "Knickerbocker Magazine." He was a writer of much humor and pathos. His style was admirable and his temper genial. Died Nov. 3, 1873.

**Clark (LINCOLN)** was born in Massachusetts, but removed to Alabama, where he settled first in Pickens, then in Tuscaloosa, which, in 1845, sent him to the House. In 1848 he removed to Dubuque, Ia., from which he, in 1851, was elected to Congress.

**Clark (MYRON)**, born at Hoosick, N. Y., Sept. 12, 1790, became a tanner of Bennington and Manchester, Vt., was (1824-29) an assistant judge of the county court, and became one of the governor's council (1829-31), judge of probate (1831-34), and State senator (1862-64). He was much interested in railroad affairs. Died March 9, 1869.

**Clark (RUSH)**, b. at Schellsburg, Bedford co., Pa., Oct. 1, 1834; graduated at Jefferson College, Pa., 1853; studied law; admitted to the bar at Iowa City; member of the general assembly of Iowa in 1860, and Speaker of the House in 1863-64; on staff of governor of Iowa and aided in raising troops; was Representative in 45th and 46th Congresses. D. at Washington, D. C., Apr. 28, 1879.

**Clark (THOMAS MARCH)**, D. D., LL.D., Cantab., Protestant Episcopal bishop of Rhode Island, was born at Newburyport, Mass., in 1812, graduated at Yale in 1831, received holy orders in 1836, became bishop in 1854. He has published several religious works, and is a popular and influential preacher.

**Clark (WILLIS GAYLORD)**, an American poet, born at Otisco, N. Y., in 1810, was a twin-brother of Lewis Gaylord, noticed above. He wrote for the "Knickerbocker Magazine" a series of amusing articles called "Ollapodiana."

Among his poems is "The Spirit of Life" (1833). In the latter part of his life he was the chief editor of the "Philadelphia Gazette." Died June 12, 1841.

**Clarke (ADAM)**, LL.D., a celebrated Wesleyan divine and commentator, was born at Moybeg, Ireland, in 1760 or 1762, his own mother being uncertain which. He was educated at Wesley's Kingswood school, sent out by Wesley as an itinerant preacher in 1782, president of the Wesleyan Conference in 1806, 1814, 1822, became eminent for his Oriental and biblical learning, and published a "Bibliographical Dictionary" (6 vols., 12mo, 1802); "Bibliographical Miscellany" (2 vols., 1806); "Succession of Sacred Literature" (1808); "Commentary on the Bible" (1810-25); "Rymer's Fœdera" (1819); "Wesley Family"; sermons and miscellaneous works, published since his death, 13 vols. 8vo. Died Aug. 26, 1832.

**Clarke (Sir ANDREW)**. See APPENDIX.

**Clarke (DORUS)**, D. D., a Congregational minister, born in Westhampton, Mass., Jan. 2, 1797, graduated at Williams College in 1817, and became an influential and able editor and author of religious and denominational literature. Died Mar. 8, 1884.

**Clarke (GEORGE ROGERS)**, an American general, born in Virginia Nov. 19, 1752. He took a British fort at Vincennes in 1779, and served against Benedict Arnold in Virginia in 1780. He became a brigadier-general in 1781, and after peace was concluded in 1783 settled in Kentucky. Died Feb. 13, 1818.

**Clarke (HENRY F.)**, an American officer, born in 1820 in Pennsylvania, graduated at West Point in 1843, and became, May 20, 1882, assistant commissary-general of subsistence, with the rank of colonel, and colonel A. D. C. Sept. 28, 1861, U. S. volunteers, having been in the artillery till 1857. He served at seaboard posts 1843-45; in military occupation of Texas 1845-46; in war with Mexico 1846-48, engaged at Palo Alto, Resaca de la Palma, Monterrey, Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusco, Molino del Rey (wounded), Chapultepec (brevet captain), and the city of Mexico; as assistant instructor at the Military Academy 1848-51; in Florida hostilities 1851-52; as adjutant Second Artillery 1852-55; as instructor of artillery and cavalry at the Military Academy 1855-56; as chief of commissariat on Utah expedition 1857-60; and assistant in commissary department at Washington, D. C., 1860-61. In the civil war was chief commissary of the department of Florida 1861, engaged in defence of Fort Pickens; of Army of Potomac in its various operations 1861-64 (brevet colonel and brigadier-general); as purchasing commissary at New York, in charge of subsistence supplies for the States of Connecticut, New York, and New Jersey 1864-67. Brevet major-general Mar. 13, 1865, for faithful and meritorious services in the subsistence department. GEORGE W. CULLUM.

**Clarke (JAMES FREEMAN)**, D. D., an eminent American Unitarian preacher, editor, and author, born at Hanover, N. H., April 4, 1810, was settled in Louisville, Ky., 1833-40, since 1841 settled in Boston, Mass. Besides other works he has published "Service-Book and Hymn-Book for the Church of the Disciples" (1844-56), "Christian Doctrine of Forgiveness" (1852), "Christian Doctrine of Prayer" (1854), "Orthodoxy" (1866), "Steps of Belief" (1870), "Ten Great Religions" (1871), "Events and Epochs in Religious History" (1881).

**Clarke (JOHN A.)**, D. D., an Episcopalian divine, born at Pittsfield, Mass., May 6, 1801, graduated at Union College in 1823, became rector of St. Andrew's Church, Philadelphia, and was a popular pulpit orator and writer of religious works. Died Nov. 27, 1843.

**Clarke (MARY COWDEN)**, an English authoress, a daughter of Vincent Novello, the composer, was born in London June 22, 1809. She was married in 1828 to Charles Cowden Clarke. Among her works are "The Complete Concordance of Shakspeare" (1846), a work remarkable for completeness and accuracy, and "World-Noted Women" (1853). She annotated an edition of Shakspeare in 1869.

**Clarke (RICHARD H.)**, LL.D., born at Washington, D. C., in 1827, graduated at Georgetown College, D. C., in 1846. He has been a lawyer and *littérateur* of Washington, D. C., and of New York. As a writer he has given much labor to the preparation of biographies of American Roman Catholics; his principal work is "The Lives of the Deceased Bishops" of his Church in this country (2 vols. 8vo, 1872).

**Clarke (SAMUEL)**, D. D., an English philosopher and theologian, born at Norwich Oct. 11, 1675. He was educated at Cambridge. He published in 1704 his "Demonstration of the Being and Attributes of God," his chief work. He became in 1706 chaplain to Queen Anne and rector of St. James, London. In 1712 he published "The

Scripture Doctrine of the Trinity," on which point his opinions were semi-Arian. He defended the Newtonian philosophy against Leibnitz, with whom he corresponded. The correspondence was published in 1717. His edition of Homer, with a Latin version and notes, was extensively used by students. Died May 17, 1729. (See HOADLEY, "Life of S. Clarke"; WILLIAM WHISTON, "Historical Memoirs of Samuel Clarke," 1748.)

**Clarke (WILLIAM)**, an American general and explorer, born in Virginia Aug. 1, 1770, was a brother of George Rogers Clarke. Associated with Captain Lewis, he conducted an exploring expedition across the continent to the mouth of the Columbia River in 1804. He was afterward raised to the rank of brigadier-general, and was governor of Missouri Territory 1813-20. Died Sept. 1, 1838.

**Clarke (WILLIAM COGSWELL)**, born at Atkinson, N. H., in 1810, graduated at Dartmouth in 1832, and at the Law School in Cambridge, Mass. He practised law at Laconia and Manchester, N. H. He held, among other offices, that of judge of probate and attorney-general of New Hampshire. Died April 25, 1872.

**Clarke (WILLIAM TRAVIS)**. See APPENDIX.

**Clarke River**, or **Flathead River**, rises in the Rocky Mountains, in the W. part of Montana. It flows north-westward, traverses the northern part of Idaho, and enters Washington Territory. Near the northern boundary of Washington it enters the Columbia. Length, about 650 miles. Gold is found near this river in Montana.

**Clarksville**, capital of Habersham co., Ga. (see map of Georgia, ref. 2-H, for location of county), is on R. R. and the Chattahoochee River near its source, about 85 miles N. E. of Atlanta. Pop. in 1870, 263; in 1880, 291.

**Clarksville**. See CLARKSVILLE.

**Clarksburg**, R. R. junction, capital of Harrison co., W. Va. (see map of West Virginia, ref. 3-D, for location of county), on the Monongahela, at the confluence of the Fork and Elk Rivers. It is in a coal-region, and has two academies and many manufactories. Pop. in 1880, 2307.

**Clarkson (ROBERT A.)**, BISHOP. See APPENDIX.

**Clarkson (THOMAS)**, an English philanthropist, born at Wisbeach, in Cambridgeshire, Mar. 28, 1760. He was educated in the University of Cambridge, where he wrote in 1786 a Latin prize-essay on the question, "Is Involuntary Servitude Justifiable?" He was so deeply interested in that subject that he resolved to devote his life chiefly to the abolition of the slave-trade and the relief of the oppressed. He became an associate of William Dillwyn, George Harrison, and other members of the Society of Friends, who had previously formed themselves into an anti-slavery committee. Mr. Wilberforce co-operated, and was the chief advocate of the cause in Parliament. Clarkson diligently collected and diffused information about the slave-trade. Their efforts excited violent opposition, and were several times defeated in Parliament, but finally an act to abolish the slave-trade was passed in Mar., 1807. He published in 1808 "The History of the Abolition of the Slave-Trade." In 1823 he was chosen president of the Anti-Slavery Society. Among his works is a "Memoir of the Life of William Penn" (1813). Died Sept. 26, 1846.

**Clarks'town**, Rockland co., N. Y. See NEW CITY.

**Clarksville**, on R. R., capital of Johnson co., Ark. (see map of Arkansas, ref. 2-B, for location of county), about 3 miles N. of the Arkansas River and 100 miles W. N. W. of Little Rock. Pop. in 1870, 466; in 1880, 656.

**Clarksville**, city, capital of Montgomery co., Tenn. (see map of Tennessee, ref. 5-E, for location of county), on R. R. and the Cumberland River, 199 miles N. E. of Memphis and 50 miles N. W. of Nashville. It has a male and female academy, various manufactories, several tobacco warehouses, and ships 15,000 hogsheads of tobacco a year. There are iron-mines here. Pop. in 1870, 3200; in 1880, 3880.

**Clarksville**, on R. R., capital of Red River co., Tex. (see map of Texas, ref. 2-J, for location of county), is the oldest town in Northern Texas. It has several schools and churches, Protestant and Catholic. It is 350 miles N. of Galveston, in the N. E. corner of the State, and is the centre of a very rich country. Pop. in 1870, 613; in 1880, not in census.

**Clarksville**, Mecklenburg co., Va. (see map of Virginia, ref. 7-3, for location of county), on the Roanoke River at the junction of the Dan and Staunton, 102 miles S. W. of Richmond. It has several tobacco warehouses. Pop. in 1880, 582.

**Clary** (*Salvia Solarea*), a plant of the order Labiatae, and of the same genus with sage; it is a native of Southern Europe, and cultivated in gardens for its aromatic proper-



ties. The seed is sown in spring, and the plants flower in the second year. Clary is stimulating and antispasmodic. It has an odor resembling that of balsam of Tolu, and is used for seasoning soups and for flavoring.

**Class** [Lat. *classis*], a term applied in natural history to a large group of plants or animals formed by the reunion or association of several orders. Classes, orders, genera, and species are common to all methods of classification. The term *class* is also used to denote a portion of society separated from other portions by some distinction of rank, fortune, or more intrinsic qualities. (For the well-defined classes of the Hindoos, see **CASTE**.)

**Class'ic**, or **Class'ical** [Lat. *classicus*, from *classis*, a "rank" or "class"], pure, refined; conformed to the best and most perfect standard; also pertaining to the ancient Greek or Latin authors, or rendered famous by association with ancient writers, as "classic ground." The ancient Roman people were divided into six classes, and the persons of the first or highest class were called *classici*. Hence the term came to signify the highest and purest class of writers in any language, though formerly it was applied only to the most esteemed Greek and Latin authors. The epithet "classical," as applied to ancient writers, is determined less by the purity of their style than by the period at which they wrote. The classical age of Greek literature begins with Homer, the earliest Greek writer whose works are extant, and extends perhaps to the time of the Roman emperor Antonine, but signs of decadence appeared about 300 B. C. The Latin classical period is shorter; its earliest writer is Plautus, and it ended about 200 A. D. Some critics, however, include Claudian, who was born about 365 A. D., among the classics.

**Classification** [from the Lat. *classis*, a "class," and *facio*, to "make"], literally, the "making of classes" or the act of classifying, has various applications in science and art. In natural history it is the grouping of the various species under their proper genera, families, orders, classes, etc. Thus, all material bodies are arranged under the three kingdoms—viz., animal, vegetable, and mineral (the last-named kingdom including every inorganic substance found in a state of nature, comprising not merely what are popularly termed minerals, but also air and water).

Again, for the sake of illustration, we will consider the classification of the animal kingdom. This is usually divided by naturalists into four great sections, termed "grand divisions"—namely, Vertebrata (or vertebrates), Articulata (or articulate), Mollusca (or mollusks), and Radiata (or radiates). Each of these grand divisions is subdivided into classes. Thus, all the vertebrates are sometimes grouped under four great classes—namely, mammals, birds, reptiles, and fishes, while each of these classes is further divided into orders, families, genera, and species.

In geology, classification denotes the grouping of the various kinds of rock, either according to their composition or according to the period in which they are supposed to have been formed. (See **GEOLOGY**.)

In æsthetics, classification is an arrangement by which works of art are distributed into certain classes; as, for instance, in galleries of paintings the works should be arranged according to the schools, each school being subject to a chronological order of the masters. In numismatology the coins should be arranged by countries, and these again by the chronological order of the monarchs; and so with other branches of the arts.

**Class'is** [Lat., a "class"], in the Reformed churches in America and in Holland a church court corresponding to the presbytery in Presbyterian churches. It is composed of the pastors and a number of elders of a certain district. The classis hears appeals from the consistories, and appeal from the classis is to a particular synod. The classis also confirms and dissolves pastoral connections, ordains and deposes ministers, sends two ministers and two delegates to the synod, and three ministers and three delegates to the general synod.

**Claude** (**JEAN**), an eminent French Protestant theologian, born near Agen in 1619. He was distinguished for eloquence and wisdom, and had several doctrinal disputes with Bossuet. In 1666 he became pastor of the Protestant church at Charenton, near Paris. Among his works is a "Defence of the Reformation" (1673). When the Edict of Nantes was revoked (1685) he removed to the Hague, where he died in 1687.

**Claude Lorrain**. See **GELÉE** (**CLAUDE**).

**Claudia'nus** (**CLAUDIUS**), a Latin epic poet, born at Alexandria about 365 A. D. He became a resident of Rome, and gained the favor of Stilicho. His poems were so popular that a statue was erected to him in Rome by the senate and the emperor. Among his works are "The Rape of Proserpine," "The Battle of the Giants," and a "Eulogy

of Stilicho" ("De Laudibus Stilichonis"). Died after 408 A. D. He had a fertile imagination, and is regarded as the last of the classical Latin poets. The best edition of his works is that by JEEP (1872). There is an English translation by ABRAHAM HAWKINS (London, 1817), but it is of slight merit.

**Claud'ius**, or, more fully, **Tiberius Claudius Drusus Nero**, the fourth emperor of Rome, was born at Lugdunum (Lyons) in 10 B. C. He was a son of Drusus Nero, and a nephew of the emperor Tiberius. He was naturally infirm in body, and his education was neglected. He was lame and paralyzed, and by nature so diffident and timid that he was generally considered half imbecile, and by his family he was treated as an object of scorn. On the death of Caligula (who was his nephew) he was proclaimed emperor by the army in 41 A. D., and was unwillingly recognized by the senate, who preferred a republic. He began his reign with a show of clemency, but his wife, the infamous Messalina, acquired great power, which she abused by acts of cruelty. When she finally pushed her recklessness so far as to marry one of her lovers, Claudius had her put to death; but her successor, Agrippina, was even worse. Claudius wrote several historical works, but they have all perished. He built a great aqueduct called Aqua Claudia, and successfully invaded Britain in person. He was poisoned in 54 A. D. by his wife Agrippina. (See **SUTONIUS**, "Claudius;" **TACITUS**, "Annales.")

**Claudius** (**APPIUS**), surnamed **CRASSUS**, a Roman patrician and decemvir, was elected consul in 451 B. C. He rendered himself infamous by an attempt to enslave and dishonor Virginia. For this offence he was imprisoned. According to Livy, he committed suicide. (See **ARNOLD**, "History of Rome.")

**Claudius** (**MARCUS AURELIUS**), surnamed **GOthicus**, an emperor of Rome, was born in Illyricum in 214 A. D. He was proclaimed emperor by the army on the death of Gallienus (268 A. D.), and their choice was ratified by the senate. He defeated the rebel Aureolus in the same year, and gained a victory over the Goths or Scythians in Servia in 269. He died at Sirmium in 270 A. D., and was succeeded by Aurelian.

**Claudius** (**MATTHIAS**), born at Rhinefeld, near Lübeck, Aug. 15, 1740, died in Hamburg Jan. 21, 1815, spent most of his life at Wandsbeck in a banking-office. He published the "Wandsbecker Bote," a periodical, and afterward a collected edition of his works, verse and treatises (1812, 8 vols.). Though not a theologian, he exercised great influence on the religious life of Germany by his quaint writings, half humorous and half sentimental. He attacked both the old barren orthodoxy and the new fashionable rationalism, and produced a deep impression. His "Life" was written by HERBST (Gotha, 1857).

**Claud'ius Cæ'cus** (**APPIUS**), a Roman patrician who was censor about 310 B. C. He constructed the great road called Via Appia from Rome to Capua. He was afterward consul, and became blind (hence his name Cæcus). He wrote a legal work and a poem.

**Claud'sen** (**HENRIK NICOLAI**), an able Danish theologian and liberal statesman, born in the island of Laaland April 22, 1793. He became in 1820 professor of theology in the University of Copenhagen, and wrote, besides other works, "Romanism and Protestantism" (1825), "Popular Discourses on the Reformation" (1836), a commentary on the synoptical Gospels, and "Christian Dogmatics" (1867). In 1840 he was chosen a deputy to the States, and near the end of 1848 was appointed a member of the cabinet. Died March 28, 1877.

**Claud'sewitz, von** (**KARL**), a Prussian general and writer on war, was born at Burg June 1, 1780. He served on the staff of the Russian army in 1813, and wrote an "Account of the Campaign of 1813" (1814). He died Nov. 16, 1831, and his posthumous works were published in 10 vols. (1832-37; 3d ed. 1869).

**Claud'sius** (**RUDOLF JULIUS EMANUEL**), a prominent physicist, born Jan. 2, 1822, became in 1855 professor at the Polytechnic Institution of Zurich, in 1867 at the University of Würzburg, and in 1869 at that of Bonn. He obtained distinction by mathematical calculations based upon the dynamical theory of heat—calculations which, it is claimed, show the necessity of a Creator and the possibility of miracles. These calculations have received the approval of many scholars.

**Claus'thal**, a town of Germany, in the province of Hanover, is situated on a hill 1740 feet above the level of the sea, and about 56 miles S. S. W. of Hanover. It is the chief mining town of the Hartz, and has a mint, a mining academy, a gymnasium, and a valuable museum; also manufactures of camlet and other fabrics. Silver and lead are mined in the vicinity. Pop. in 1880, 13,397.

**Clavicle** [from the Lat. *clavicula*, a diminutive of *clavis*, a "key" (perhaps because it "locks" or "makes fast" the scapula with the sternum)], or **Collar-bone**, a bone which, with the scapula and the head of the humerus, forms the shoulder. In man it is horizontal and immediately above the first rib, and articulates internally with the sternum or breast-bone, and externally with the acromion process of the scapula. Its office is to keep the shoulders apart, and to afford a fulcrum by which the muscles give lateral movement to the arm. It is absent in those animals in which the movement of the fore limbs is only backward and forward, as in the ox, the horse, etc.; it is present in all Quadrupeds and in those Rodentia in which the anterior extremities are used for prehension, as the squirrel; it exists in the bat, mole, and hedgehog. In the mole it is a cube, very short, broad, and of extreme strength. In many Carnivora the clavicle is a small bone suspended (like the hyoid bone) amongst muscles, and not connected with the sternum or the scapula. In birds, to counteract the tendency of the pectoral muscles to approximate the shoulders, the clavicles are large, and united at an angle in the median line into a single bone, the "furculum," popularly called the "merry-thought" or "wish-bone." In this class of animals additional support to the anterior extremity is afforded by the extension of the coracoid process of the scapula into a broad thick "coracoid bone." This bone presents various modifications in reptiles, fishes, and certain mammals.

In man the ossification of the clavicle takes place sooner than that of any other bone, commencing the thirtieth day after conception; and at birth it is ossified in nearly its whole extent; but the sternal end is not complete till the eighteenth or nineteenth year. The clavicle in transcendental anatomy is considered to be the hæmaphysus of the atlas.

**Clavijo** (RUY GONZALES DE), a Spanish traveller, died in 1412, was a native of Madrid, and was by Henry III. sent as ambassador to Timur. He started from Seville in 1403, reached Samarcand *viâ* Constantinople, Trebizond, Tabreez, and Teheran, and returned in 1406. His itinerary was published at Seville in 1582, "Historia del gran Tamerlan e itinerario," etc., and again in 1782. There is an English translation of the work by Clements Markham, published by the Hakluyt Society in 1860.

**Clay** [Ang.-Sax. *clæg*; Fr. *argille*; Lat. *argilla*], a term applied to those kinds of earth which when moist have a notable degree of tenacity and plasticity. Clays are not easily definable as minerals, but they appear to owe their origin to the decomposition of other minerals, such as felspar, etc., and consist largely of alumina, with silica and water. They owe their plasticity to the alumina which they contain. (See ALUMINA and KAOLIN.) Common clay, when sufficiently plastic, is used for bricks, tiles, etc. (See BRICK.) Clay is used in plastic art as a means of adjusting the form which is to be given to any work in the more enduring material of which it is ultimately to be composed. As modelling clay is apt to crack, it must be kept damp by sprinkling it or by covering it with a wet cloth when the artist is not at work. Clays of the finer sorts are much used in making pottery, porcelain, etc. These are called *fictile* clays.

Argillaceous earth not unfrequently contains 40 per cent. of alumina, but generally the proportion is much smaller. The felspar which yields the alumina of clay soils contains also soda and potash, substances essential to vegetation, and which render clays fertile under cultivation. A mixture of calcareous matter exercises a favorable influence on crops. Thorough drainage has greatly increased the value of clay soils under cultivation. Wheat, beans, and clover are crops which they yield in great perfection. Chemical investigations have shown that clay soils have remarkable powers for absorbing ammonia and other substances which constitute the food of plants. On account of these powers dry argillaceous earth is an excellent disinfectant.

**Clay** (CASSIUS MARCELLUS), an American statesman, born in Madison co., Ky., Oct. 19, 1810. He graduated at Yale in 1832. He opposed the annexation of Texas to the Union, advocated the abolition of slavery, and made speeches in the Northern States in 1844 in support of Henry Clay as a candidate for the presidency. In 1845 he became the editor of the "True American," an anti-slavery paper issued at Lexington, Ky. He was attacked by mobs, against which he defended himself bravely in several bloody conflicts. He served as a captain in the Mexican war (1846-47), supported Abraham Lincoln in 1860, and became a brigadier-general in 1861. He was minister to Russia 1862-69.

**Clay** (CLEMENT COMER, JR.), born in Madison co., Ala., in 1819, is the son of C. C. Clay (1789-1866), who was for

many years a prominent official of the U. S. and of Alabama. The younger Clay became a lawyer in 1840, a judge in 1844, was U. S. Senator from Alabama from 1854 to 1861, in which latter year he entered the Confederate Senate. After the war he was accused of complicity in the murder of President Lincoln, but after a short imprisonment was fully acquitted. D. Jan., 1882.

**Clay** (HENRY), an American lawyer, orator, legislator, and statesman, thrice a candidate for President, and once very nearly elected, was born near "The Slashes" in Hanover county, not far from Richmond, Va., April 12, 1777. His father was a poor Baptist preacher, who died in 1782; his mother—a woman of noble character and fervid piety—married again ten years afterwards, and migrated to Kentucky, leaving this son (the fifth of seven children) a clerk in a retail store in Richmond, which he soon left for employment as a copyist in the office of Mr. Peter Tinsley, clerk of the high court of chancery, whom he served four years, passing thence to the office of Mr. Robert Brooke, then attorney-general, afterwards governor. Licensed as a lawyer in 1797, though not yet of age, he followed his mother to Kentucky, opened a law-office at Lexington, and soon achieved a lucrative practice. Kentucky, separating from her parent, Virginia, soon called a convention to frame a State constitution, and young Clay publicly besought her to provide therein for a gradual abolition of slavery, but was sternly overruled, as he was half a century later, when, in the fulness of his fame, he renewed this counsel on the revision of the State constitution in 1849-50.

Kentucky strongly sympathized with her mother State in its opposition to John Adams's administration, with its Alien and Sedition acts, and idolized Mr. Jefferson, Virginia's oracle, for whom she cast her first presidential vote in 1800. Young Clay was one of her favorite orators in that excited canvass, and was first chosen to represent his county (Fayette) in the legislature of 1803-04. Late in 1806, when scarcely eligible, he was chosen by the legislature of his State to fill a vacancy in the U. S. Senate caused by the resignation of General John Adair. His term expired with his first session, but he had already made his mark as a champion of the policy of internal improvement by the construction of roads, bridges, etc. He was again chosen to the legislature in 1807, and elected Speaker of the House. He now proposed that each member should clothe himself wholly in American fabrics, which was stigmatized by Mr. Humphrey Marshall as the project of a demagogue—language which led to a duel wherein both parties were slightly wounded. At the session of 1809, Mr. Clay was again chosen to fill a vacancy in the U. S. Senate—this time for two years. In Aug., 1811, he was elected to the House, and on the first day of his service was chosen its Speaker—an extraordinary proof of his ability and popularity. This Congress, in June, 1812, declared war against Great Britain, Mr. Clay being one of its foremost advocates, as he remained throughout the struggle, until despatched to Europe by President Madison as one of the negotiators of peace—a service which he rendered at Ghent with eminent ability. Returning to his country in Sept., 1815, he was received as a victor, and, having been re-elected to the House in his absence, he was rechosen Speaker without opposition. He had been conspicuous in defeating the recharter of the first bank of the U. S. in 1811; he was equally active and influential in promoting the charter of the second in 1816. He was now, as he had been, a champion of protection to home industry, and of national internal improvements; and he was foremost in effecting the compromise whereby Missouri was admitted as a slave State, on condition that all Federal territory north of latitude 36° 30' should be consecrated to free labor. Having favored, in 1816, an increase of the pay of members of Congress from eight dollars per day to fifteen hundred dollars per annum, Mr. Clay was formidably opposed in his next canvass by John Pope, afterwards Jackson's governor of Arkansas Territory, but saved his seat by a vigorous effort.

In 1821 five candidates were started for President—William H. Crawford of Georgia, who had the caucus nomination; John Quincy Adams of Massachusetts, then President Monroe's secretary of state; General Andrew Jackson of Tennessee, then a U. S. Senator; John C. Calhoun of South Carolina, then secretary of war; and Henry Clay of Kentucky, then Speaker of the House. Mr. Calhoun soon withdrew, and was made Vice-President by pretty general consent, while Jackson, Adams, and Crawford (no one having a majority) were the three highest on the electoral vote, which compelled the House to choose between them. Mr. Clay, having received the votes of Kentucky, Ohio, and Missouri only, with four of those cast from New York, was four votes behind Mr. Crawford, and so could not be voted for in the House. He and his friends cast their votes for Mr. Adams, electing him by the vote of thirteen States, to seven for Jackson and four for Crawford,

Mr. Adams made Mr. Clay his secretary of state; whereupon a cry of "Bargain!" was raised, and General Jackson was at once proposed for next President. He was elected over Mr. Adams, Mr. Calhoun being again chosen Vice-President. At the next choice of President (1832) Mr. Clay was run against General Jackson, and was badly defeated by him. He had just been returned to the U. S. Senate, in which he played a leading part for many years ensuing, especially in the tariff compromise of 1833, whereby a conflict with South Carolina was averted, and in resistance to the new financial policy propounded by Mr. Van Buren in 1837, whereby the treasury was to be divorced from all connection with banks and their notes. Mr. Clay was again a candidate for President, before the first Whig national convention held at Harrisburg in Dec., 1839, but General Harrison was nominated and triumphantly chosen. His death and Tyler's course brought Mr. Clay forward as the unanimous choice of his party in 1844, when a desperate effort was made to elect him, but without success, James K. Polk of Tennessee carrying both the great States of New York and Pennsylvania by a handful of votes, when New York alone would have elected Clay. The annexation of Texas and the resulting war with Mexico were fruits of this election.

Mr. Clay's name was once more, and for the last time, presented to the Whig national convention of 1848, but General Taylor was nominated over him and elected. Mr. Clay had in 1842 bidden farewell to the Senate, but was persuaded to return to it after 1844, and bore a leading part in effecting the slavery compromise of 1850. He returned to Washington from Kentucky for the last time near the close of 1851, and was soon prostrated by disease, under which he gradually sank until his death, June 29, 1852, in the seventy-sixth year of his age.

Though not successful as an aspirant to the presidency, he was a gallant party chief, an admirable orator, a skillful legislator, wielding unequalled influence, not only over his friends, but even over those of his political antagonists who were subjected to the magic of his conversation and manners.

HORACE GREELY.

**Clay** (HENRY, JR.), son of the distinguished orator and statesman of the same name, an American officer and lawyer, born April 10, 1811, in Ashland, Ky., graduated at West Point 1831; resigned Nov. 1, 1831. Counsellor-at-law 1833-46; member of the Kentucky house of representatives 1835-37; and lieutenant-colonel Second Kentucky Volunteers in the war with Mexico 1846-47, engaged at Buena Vista, where, while gallantly leading a charge of his regiment, he was mortally wounded, and in that condition lanced to death, Feb. 23, 1847, aged thirty-six.

GEORGE W. CULLUM.

**Clay** (JAMES B.), brother of the preceding, born in Kentucky in 1817, chargé d'affaires to Lisbon 1849, elected to represent his father's district in Congress 1857; espoused the Confederate cause, and died in Montreal, Canada, Jan. 26, 1864.

G. C. SIMMONS.

**Clay Cen'tre**, city and R. R. junction, capital of Clay co., Kan. (see map of Kansas, ref. 4-G, for location of county), on the Republican River, about 125 miles W. of Leavenworth. Pop. in 1880, 1753.

**Clay Centre**, capital of Clay co., Neb. (see map of Nebraska, ref. 7-J, for location of county). Pop. in 1885, 182.

**Clay Court-House**, or **Marshall**, capital of Clay co., West Va. (see map of West Virginia, ref. 5-C, for location of county), on the Elk River, 50 miles E. N. E. of Charleston. Pop. in 1880 not in census.

**Claymore** [from the Gaelic *claidheamh-mor*, a "broad-sword"], sometimes spelled **Glaymore**, the Gaelic name of a kind of broadsword which is not much used at present. It had a double-edged blade about forty-two inches long and two inches wide. The handle was often 12 inches long.

**Clay Slate**. See SLATE.

**Clayton**, on R. R., capital of Barbour co., Ala. (see map of Alabama, ref. 6-E, for location of county), 75 miles S. E. of Montgomery, in a fruit and grain growing district. Pop. in 1880, 761.

**Clayton**, Ga. See APPENDIX.

**Clayton**, Jefferson co., N. Y. (see map of New York, ref. 2-G, for location of county), on R. R. and the St. Lawrence River, by the Thousand Islands. It is a summer resort, and has a good harbor. Shipbuilding and rafting are carried on. Pop. in 1870, 1020; in 1880, 880.

**Clayton** (JOHN), an English botanist, born in Kent in 1686, emigrated to Virginia in 1705. He wrote on the natural history of Virginia. Linnaeus and Gronovius published in 1739 a "Flora of Virginia, exhibiting the Plants which J. Clayton has collected." Died Dec. 15, 1773.

**Clayton** (JOHN MIDDLETON), LL. D., an American states-

man, born in Sussex co., Del., July 24, 1796, graduated at Yale in 1815, studied law, which he practised in Delaware, and gained a high reputation. He was elected a Senator of the U. S. in 1829, joined the Whig party, and was re-elected to the Senate in 1835. In 1845 he was again chosen to represent Delaware in the national Senate, and in Mar., 1849, he became secretary of state in the cabinet of President Taylor. He negotiated with the British government the Clayton-Bulwer Treaty in 1850. Having resigned on the death of President Taylor in July, 1850, he was chosen a U. S. Senator for six years (1851-57). Died Nov. 9, 1856.

**Clayton** (POWELL), an American Senator, was before the late civil war a lawyer of Leavenworth, Kan. In 1862 he became lieutenant-col. of the Fifth Kansas Cavalry, and afterwards a brigadier-general, serving with ability, chiefly in Arkansas. He was governor of Arkansas 1866-71, and in the latter year was chosen U. S. Senator for six years.

**Clayton** (THOMAS), an American jurist, born in Delaware in 1778, was a Whig member of Congress from his native State (1813-17), and U. S. Senator (1823-26), and again (1837-47). He was for a time chief-justice of the court of common pleas and of the supreme court of Delaware. Died Aug. 21, 1854.

**Clayton-Bulwer Treaty**. See APPENDIX.

**Clayto'nia** [named in honor of John Clayton, noticed above], or **Spring Beauty**, a well-known genus of American and Asiatic flowers of the order Portulacaceæ. These beautiful flowers open in early spring, and are common in most of the U. S., one species being found in Alaska. The tubers of the *Claytonia tuberosa* are eaten in Siberia. Some of the species are naturalized in Europe.

**Clazom'ena** [Κλαζόμενα], a Greek city of Ionia, situated on a bay of the Ægean Sea, near Smyrna, was the birthplace of Anaxagoras.

**Clearfield**, capital of Clearfield co., Pa. (see map of Pennsylvania, ref. 4-D, for location of county), on R. R. and the West Branch of the Susquehanna River. It has a public park, an academy, a machine-shop, foundry, lumber manufactories, etc. Pop. in 1870, 1361; in 1880, 1809.

**Clearing-House**, the place where the exchanges of the banks are made.

*The New York Clearing-House.*—The clearing-house system was first established in London about the beginning of the present century. It was introduced into this country by the banks of the city of New York, which established the New York Clearing-House by organizing an association and commencing operations on the 11th of Oct., 1853. At that time it consisted of fifty-two banks, five of which were soon closed by their inability to meet its requirements. Clearing-houses have since been established in the cities of Boston, Philadelphia, Chicago, St. Louis, Hartford, Providence, Baltimore, Cincinnati, San Francisco, Pittsburgh, New Orleans, Louisville, Milwaukee, Detroit, Memphis, Cleveland, Indianapolis, Kansas City, New Haven, Columbus, Peoria, Lowell, Worcester, Springfield (Mass.), Syracuse, St. Joseph's, Norfolk, St. Paul, Portland (Me.), and Minneapolis.

There are now (May 1, 1884) in the city of New York seventy-three banks, with an aggregate capital of \$64,137,700 and a surplus of \$42,521,800, many of them situated at remote distances from others. Each in its daily dealings receives large amounts of bills of, and checks on, other banks, so that at the close of the day's business every bank has in its drawers various sums thus due it by other banks. It is in like manner itself the debtor of other banks, which have during the day received its bills and checks drawn upon it. Before the establishment of the clearing-house it was necessary for each bank every morning to make up its account with every other bank, and to send its porter to present the bills and checks so received to the debtor banks for payment. The balances of their indebtedness were adjusted by payments in gold, which became so laborious, dangerous, and complicated that the balances were settled only weekly, on Friday, instead of daily—a course that induced much evil. This was obviated by the clearing-house system, through which the settlements are so simultaneously and almost instantly effected that the transactions adjusted through it have amounted in one day to the enormous sum of \$295,821,422.37, in adjusting which the exchanges were settled in the space of an hour. The establishment of the clearing-house system closed 2500 bank ledger accounts, with numerous daily entries in each; enabled the banks to settle every day with each other without delay or loss through the clearing-house, they now having no direct business with each other except through that medium; and with comparatively little trouble brought each officer into intimate and friendly relations with the others, thus enabling them by united action to aid and strengthen each other in times of ex-

citement and financial danger, and to exert by their combined power a salutary influence upon the banking business of the country at large.

It is doubtful if without the aid of the banks of the city of New York the U. S., upon the breaking out of the civil war in 1861, could have raised the loans necessary to carry on the war in time to have prevented the success of the enemies of the Union. It is certain that without the Clearing-House Association, the banks could not have furnished the funds which at once established the credit of the government, and enabled it, by the restoration of confidence, to negotiate its bonds to the enormous amount of over \$2,000,000,000. During those exciting times the machinery of the Clearing-House worked with regularity and exactness; the banks, united as one, daily equalized their resources, and presented to the world a most important as well as practical proof that in "union is strength."

The panic of 1873 was only checked by similar action, as also in May, 1884, the experience of the war enabling the banks to act with such promptness in combining their entire resources by the use of over \$25,000,000, loan certificates, as to sustain themselves against a panic, the serious results of which were greatly modified by their action.

The transactions of the Clearing-House to the 1st of Dec., 1883, a period of thirty years and two months, shows the total transactions to amount to the sum of \$725,555,057,805.91, an average of \$77,948,309.19 per day for the entire period. The largest average daily transactions for any one year was for the year ending Oct. 1, 1881, amounting to \$165,055,201.22. Of this vast business so exact and complete is the system that no difference of any kind exists in any of its books or accounts; neither has a loss occurred from its organization to the present time.

During the war the government issued "certificates of indebtedness" bearing interest, which were found to be desirable as a reserve for the banks. Accordingly, an arrangement was made for the issue of special certificates bearing interest, and available only to banks, members of the Clearing-House Association, and which were recognized in the national banking act of 1864 as part of the lawful reserve for a national bank. The principal of these certificates was made payable on demand, in legal-tender notes, at the office of the assistant treasurer of the U. S. in New York, and the interest to the manager of the Clearing-House and chairman of the Clearing-House committee jointly. This interest was payable semi-annually. The certificates were made available by a vote of the association for the settlement of balances at the Clearing-House, and were so used, thus changing daily the amounts held by each bank, and frequently (by the presentation of them by individual banks to the U. S. treasury for payment) changing the aggregate amount issued. The interest was collected and disbursed to the several banks by the Clearing-House regularly every six months, and each bank received the exact amount of interest due it, notwithstanding the amounts held by it for the whole period had changed daily.

The apparent intricacy of the calculations necessary to arrive at such results troubled some of the banks in other cities, who were desirous of availing themselves of the privileges offered by the use of these certificates; and in one or two instances committees were sent to New York to ascertain the process of computation in use, the simplicity of which, when explained, not only astonished them, but confirmed them in the opinion of the usefulness of an institution capable of adjusting with so much ease calculations which, at first sight, appeared so difficult. The largest amount of Clearing-House certificates in use in the city of New York at any one time was \$36,000,000.

The Clearing-House is located at No. 14 Pine street, the building being owned by the association. The clearing-room is provided with a continuous line of desks, sixty-four in number, one for each bank, each desk bearing the name and number of the bank by which it is occupied; the banks being numbered according to the date of their organization, the oldest (the Bank of New York) being No. 1, etc. etc. Each bank is represented every morning by two clerks—one a messenger, who brings with him the checks, drafts, etc. that his bank has received the day previous upon the other banks, which are called the "exchanges," and are assorted for each bank and placed in envelopes. On the outside of each envelope is a slip on which are listed the amounts of the various items which it contains. These envelopes are arranged in the same order as the desks for the several banks. The messengers, sixty-four in number, take their places in a line outside of the line of desks, each opposite the desk assigned to his bank, while on the other or inside of the desk is a clerk with a sheet containing the names of all the banks arranged in the same order, with the aggregate amounts his messenger has against each bank.

The hour for making the exchanges or general delivery is 10 o'clock A. M. Just previous to that time the manager takes his position at an elevated desk and calls the house to order. At a signal from a bell struck precisely at ten o'clock, each messenger moves forward to the desk next his own, and delivers the envelopes containing the checks, etc. for the bank represented by that desk to the clerk on the inside, together with a printed list of the banks in the same order, with the amount opposite each bank. The clerk receiving it signs and returns it to the messenger, who immediately passes to the next desk, delivering the exchange for the bank represented by that desk, and so on until he has made the circuit of the room and reached his own desk, the starting-point, having delivered to each bank the exchanges he had for it, and consequently delivering his entire exchanges for all the banks. Every other messenger does the like, the whole moving on at the same time. In other words, each messenger has visited every bank and delivered to each, everything his bank has received the day previous from it, taking a receipt for the same, consequently the entire exchanges are delivered; while each clerk upon the inside has of course received from every other bank the amounts each had against his bank. This operation occupies exactly ten minutes, and accomplishes what could not otherwise be done in less than six or eight hours.

Besides the saving of time gained by this method, each bank is enabled to know the exact balance for or against it at once, as the clerks, after receiving the envelopes containing the checks, etc., immediately enter from the slips, upon their own sheets, the aggregate amount from each bank; the difference between the total amount they have received and the total amount brought by them being the balance either due to or from the Clearing-House to each bank.

The messengers then receive from their several clerks the various envelopes containing the exchanges, and return to their banks, reporting their condition, debtor or creditor as the case may be. The clerks then report to the assistant manager the amount they have received, they having reported the amount each brought upon first entering the room. These amounts are entered in separate columns on what is termed a "proof sheet," and if no errors have been made the manager, finding that both columns agree, announces that the "proof is made," and the clerks return to their respective banks. If, however, any error has been made by any of the sixty-four clerks, it is indicated on the proof sheet, and the clerks are then required to revise and examine their work; and not until every error has been discovered and corrected are the clerks allowed to leave.

The clerks are allowed thirty-five minutes after the delivery of the exchanges to enter, report, and prove their work. If any errors are discovered after that time, fines are imposed for each error, which are collected monthly by drafts on the banks fined.

Various and ingenious methods are resorted to for discovering errors, and the manager, from long experience, generally is enabled to anticipate the nature of the error, whether in entry, footing, or transposition, and thereby facilitate its discovery by applying at once the best method of examination. When it is remembered that there are sixty-four sheets, each containing 120 entries, in all 8064 entries, the difficulty in discovering where the error is in the shortest possible time is apparent.

The entire business of the morning is usually accomplished in one hour. The debit banks are required to pay to the manager in legal-tender notes or coin, previous to half-past one o'clock the same day, and the credit banks receive immediately after that hour, the amounts due by or to them respectively, thus by one process settling exactly the entire transactions of all the banks of the day previous.

A record is kept of the daily transactions of each bank, and a statement of the loans, specie, legal tenders, deposits, and circulation made weekly to the manager of the Clearing-House, so that the movement of each bank can be determined and its condition pretty accurately estimated.

WILLIAM A. CAMP, *Manager of N. Y. Clearing-House.*

**Clearing-nut**, the seed of *Strychnos potatorum*, a small tree of the same genus with that producing the nuxvomica, abundant in India, and much used for clearing water. These seeds being rubbed on the inside of a vessel, any muddy water put into it very quickly becomes clear, all impurities settling to the bottom. The tree has ovate, pointed leaves, and a shining, black, edible, pulpy fruit, with one seed. The wood is very hard.

**Clear Lake**, in Lake co., Cal., is 112 miles N. of San Francisco, and is nearly 24 miles long. The width varies from 2 to 6 miles. It is surrounded by a picturesque region, which is frequented by tourists and hunters. Deer, bears, panthers, and foxes abound here. Fish of various kinds are found in this lake.

**Clear Lake**, Cerro Gordo co., Ia. (see map of Iowa, ref. 2-H, for location of county), on R. R. and E. shore of Clear Lake, 10 miles W. of Mason. It is a summer resort. The lake is about 6 miles long, and is traversed by steamboats. Pop. in 1870, 775; in 1880, 1095.

**Cleaveland** (PARKER), LL.D., an American mineralogist and chemist, born in Rowley, Mass., Jan. 15, 1780. In 1805 he was chosen professor in Bowdoin College, and in all the fifty-three years of his connection with the institution missed on his own account only three recitations. His admirable work on "Mineralogy and Geology," which earned for him the title of "father of American mineralogy," was published in two volumes in 1816, and passed to a second edition in 1822. D. in Brunswick, Me., Oct. 15, 1858.

**Cleaveland**. See CLEVELAND.

**Cleburne**, R. R. junction, capital of Johnson co., Tex. (see map of Texas, ref. 3-H, for location of county). Pop. in 1870, 686; in 1880, 1858.

**Cleburne** (PATRICK R.), a general, born in Ireland Mar. 17, 1828, removed to Arkansas, where he was a lawyer before the civil war. He commanded a division of the Confederate army at the battle of Stone River, which ended Jan. 2, 1863, and at Chickamauga in September of that year. He was killed at the battle of Franklin, Tenn., Nov. 30, 1864. He was a daring and popular officer.

**Clef** [a word originally French, from the Lat. *clavis*, a "key"], a character placed on the musical staff, by which the names of the notes are fixed. There are three clefs—viz. the G or *treble* clef (on the second line); the F or *bass* clef (on the fourth line); and the C clef, which is placed on the fourth line for the *tenor*, and on the third line for the *alto*. The G and F clefs are now in most general use, both in vocal and instrumental music. And though a *tenor* part with the G clef is really an octave out of place, yet this is understood by the singer.

**Clem'atis** [Gr. *κλήματις*, from *κλήμα*, a "shoot of the vine," so called from its resemblance to a vine], a genus of herbs and shrubs of the order Ranunculaceæ, having four colored sepals, no corolla, and for fruit numerous one-seeded achenia with long, persistent feathery styles. These render some species ornamental in fruit as well as in blossom. The white-flowered species, such as *Clematis flammula* of Europe and *C. Virginiana* of the U. S., have the popular name of virgin's bower. The very large-flowered blue and purple species, recently introduced into common cultivation, are varieties of *C. florida* and *C. patens*, natives of Japan. There are about twenty species indigenous to the U. S. The herbage abounds in the acrid and vesicant watery juice which is common in the family, and has been used as a rubefacient in rheumatism. Some species of the U. S., such as *C. viorna*, have very thick and leathery sepals, whence the name of "leather-flower." From its free growth and neat foliage, as well as handsome flowers, clematis is a favorite for arbors or for covering walls. It climbs by its leaf-stalks.

**Cle'menceau** (EUGÈNE), born at Mouilleron-en-Pared, in the Vendée, Sept. 28, 1841, studied medicine at Nantes and in Paris, and began to practise as a physician in the eighteenth arrondissement (Montmartre) of Paris in 1865. His popularity soon became unbounded. On Sept. 4, 1870, he was elected mayor of the arrondissement, and Feb. 8, 1871, he was elected member of the National Assembly. Unable to prevent the execution of the generals Lecomte and Clement Thomas, Mar. 18, 1871, and to bring about a reconciliation between the Commune and the Versailles government, he resigned his position as mayor. In the National Assembly he voted for the continuation of the war. Elected a member of the Chamber of Deputies, Feb. 20, 1876, he took his seat on the extreme left, and has since been the acknowledged leader of the radical republican party. He pronounced in favor of full and general amnesty, he was one of the 363 deputies belonging to the united Left who refused give the cabinet of Broglie a vote of confidence, and he was also a member of the committee of eighteen charged by the republican majority with watching the proceedings of the anti-parliamentary cabinet, and with directing the resistance against them.

**Clem'ens** (HON. JEREMIAH), an American politician, born at Huntsville, Ala., Dec. 28, 1814, became a lawyer in 1834, distinguished himself in State politics and in the affairs of Texas in 1842. He served with distinction in the Mexican war, and was rapidly promoted in the army, and became colonel in 1848. He was U. S. Senator from Alabama (1849-53). He held office under the Confederacy, though not a warm friend of the Southern cause. He advocated the re-election of Lincoln in 1864. Died at his native town in 1865. Col. Clemens was an eminent lawyer and the author of several works of fiction.

**Clemens** (SAMUEL LANGHORNE), better known as MARK TWAIN, an American humorist, born in Monroe co., Mo., Nov. 30, 1835. "Mark Twain" was the *nom-de-plume* of Capt. Isaiah Sellers, who furnished river news for the New Orleans "Picayune." He died in 1863, and Clemens took up his *nom-de-plume*. He became a journalist at Virginia, Nev., in 1862, and subsequently followed the same profession at San Francisco and at Buffalo, N. Y. He has published "The Jumping Frog" (1867), "The Innocents Abroad" (1869), "Huckleberry Finn," etc.

**Clemens Romanus**. See CLEMENT I.

**Clem'ent** [Lat. *Titus Flavius Clemens* or *Clemens Alexandrinus*] of **Alexandria**, an eminent Father of the Christian Church, is supposed to have been a native of Athens, and originally a pagan. He passed the greater part of his life at Alexandria, where he became a disciple of Pantænus, a Christian philosopher. He was ordained a presbyter, and in 202 A. D. retired to Palestine to escape persecution. About 206 he returned to Alexandria, and was a teacher of catechumens. He succeeded Pantænus at the death of the latter, and acquired a high reputation for wisdom and virtue. Origen was one of his pupils. Clement was more addicted to speculative philosophy than most of the Fathers of the Church. Among his extant works (written in Greek) are "Pædagogus" and "Stromata" (Gr. *Στρωματίς*), which is a medley of religious thoughts, anecdotes, and maxims of philosophy. Died about 220 A. D. (See KAYE, "Account of the Writings, etc. of Clement of Alexandria," 1835; REINKENS, "De Clemente Presbytero Alexandrino," 1851.)

**Clem'ent I.** (or **Cle'mens Roma'nus**), the earliest of the Apostolic Fathers, a bishop, accounted by Roman Catholic writers as fourth in the order of succession at Rome. Origen (254) identifies him with the Clement of Phil. iv. 3, but this may be only a conjecture. Irenæus (202) makes him the third after the apostles Peter and Paul, Linus being the first and Cletus (or Anaclethus) the second. Eusebius says he died in the third year of Trajan, "having for nine years superintended the preaching of the Divine word." Accordingly, he presided over the Church from 91 or 92 to 100 or 101 A. D. His Epistle to the Corinthians was written about 95 A. D., consists of sixty-five short chapters, and in bulk is about one-half larger than Saint Paul's First Epistle to the Corinthians. It used to be read in many ancient churches, but was not included in any of the ancient lists of authoritative books. Other writings ascribed to Clement are not his. (See CLEMENTINES.)—**CLEMENT II.**, a native of Saxony, was elected pope in 1046. He crowned the emperor Henry III., and died in 1047. He was the first of the six German popes.—**CLEMENT III.**, a native of Rome, was elected pope in 1187. He promoted the third crusade against the Saracens. Died in 1191. There was also an anti-pope of this title, who died in 1100.—**CLEMENT IV.** (GUY FOULQUES) was born in France. He succeeded Pope Urban IV. in 1265, and died in 1268.—**CLEMENT V.**, POPE, was a Frenchman named BERTRAND DE GÖT. He was chosen pope in 1305, as successor to Benedict XI. To gratify Philippe le Bel, king of France, he resided at Avignon, which became the capital of the popedom. This innovation gave much offence, and caused a long schism in the Church. He suppressed, in 1311, the order of Templars. He died in 1314, and was succeeded by John XXII.—**CLEMENT VI.** (PIERRE ROGER), born at Limousin, in France, succeeded Benedict XII. as pope in 1342. He reigned at Avignon, the sovereignty of which he purchased from Joanna of Naples. He died in 1352, and was succeeded by Innocent VI.—**CLEMENT VII.** (ROBERT COUNT OF GENEVA), ANTIPOPE, was bishop of Cambray when in 1378 he was elected antipope in the time of Urban VI. With him began the great Western schism. Died in 1394.—**CLEMENT VII.** (GIULIO DE' MEDICI), a cousin of Leo X., succeeded Adrian VI. as pope in Nov., 1523. He joined Francis I. of France and the Venetians in a league against Charles V., whose army, commanded by Constable Bourbon, took Rome by assault in 1527. The pope then became a prisoner for several months. He refused to gratify Henry VIII. of England by granting him a divorce from Queen Catharine, and issued a famous bull against him in 1534. He died in the same year, and was succeeded by Paul III.—**CLEMENT VIII.** (IPOLITO ALDOBRANDINI), POPE, a native of Fano, in Italy, was chosen in place of Innocent IX. in 1592. He annexed the duchy of Ferrara to the Papal States. He died in 1605, and was succeeded by Leo XI.—**CLEMENT VIII.** (EGIDIO MUÑOZ), ANTIPOPE, was canon at Barcelona, and was in 1424, after the death of Benedict XIII., elected pope by three cardinals. His resignation in 1429 ended the great schism of the West.—**CLEMENT IX.** was born at Pistoja in 1600, and was chosen pope in June, 1667, as the successor of Alexander VII. He died in Dec., 1669, and was succeeded by Clement X.—



**CLEMENT X.** (EMILIO ALTIERI) was a native of Italy. He was nearly eighty years old when he became pope in 1670. He died in 1676, and was succeeded by Innocent XI.—**CLEMENT XI.** (GIOVANNI FRANCESCO ALBANI) was born at Pesaro, in Italy, in 1649. He succeeded Innocent XII. in 1700. In 1713 he issued the famous bull *Unigenitus*, which condemned 101 propositions of Quesnel's work on Grace and Predestination. This bull was approved by the Jesuits and opposed by the Jansenists. Clement aided the Pretender in his effort to seize the British crown in 1715. Died in 1721. Innocent XIII. was his successor. (See LAFITAU, "Vie de Clément XI," 1752).—**CLEMENT XII.** (LORENZO CORSINI) was born at Florence in 1652. He became pope in 1730, as the successor of Benedict XIII. He died in 1740, and was succeeded by Benedict XIV.—**CLEMENT XIII.** (CARLO REZZONICO) was born in Venice in 1693, and succeeded Benedict XIV. as pope in 1758. He offended the French and Spanish monarchs by impolitic attempts to assert his prerogative. He issued a bull in favor of the Jesuits, who had been expelled in 1767 from France and Spain. He died in 1769, and was succeeded by Clement XIV.—**CLEMENT XIV.** (GIOVANNI VINCENZO ANTONIO GANANELLI), an eminent and learned pope, was born near Rimini in 1705. He succeeded Clement XIII. in 1769. He took measures to conciliate several Catholic powers which Clement XIII. had offended. He was more liberal than many of the popes, and had a good reputation for ability and virtue. Among the important events of his pontificate was the suppression of the order of the Jesuits, which he formally decreed on July 21, 1773. He founded the Clementine Museum in Rome. Died in Sept., 1774. (See CARACCIOLI, "Vie de Clément XIV.," 1775; THEINER, "Geschichte des Pontificats Clements XIV.," 3 vols., 1853.)

**Clemen'ti** (MUZIO), an excellent Italian pianist and composer, born at Rome in 1752. He was patronized by Mr. Beckford, who took him to England about 1765. At the age of eighteen he composed his "Opera 2," which is regarded as the basis on which the whole fabric of modern sonatas for the piano has been founded. He composed numerous sonatas and wrote "Gratus ad Parnassum," a collection of *études* which, in a higher degree than any other book of the kind, combines artistic beauty with usefulness for the purpose of teaching and self-practice, and which has exercised great influence on the style of modern piano-playing. Died Mar. 10, 1832.

**Cleom'brotus** [Gr. Κλεόμβροτος], a Spartan general, was a brother of Leonidas, who fell at Thermopylae. He commanded the army in 480 B. C., after the death of Leonidas. He was the father of Pausanias, who defeated the Persians at Platea.

**Cleombrotus I.**, king of Sparta, a grandson of the preceding, began to reign in 380 B. C. He commanded the Spartans at Leuctra, where he was defeated by Epaminondas and killed in 371 B. C. He left two sons, Agesipolis II. and Cleomenes II.

**Cleome'des** [Gr. Κλεομένης], an ancient Greek astronomer whose native place and period are unknown. He wrote a remarkable treatise on astronomy entitled "The Circular Theory of the Heavenly Bodies," which is extant and has been printed. This contains several scientific truths, as the spherical figure of the earth and the revolution of the moon about the earth. The refraction of light was noticed by him.

**Cleomenes**, or **Kleomenes** [Gr. Κλεομένης], I., king of Sparta, succeeded his father, Anaxandrides, about 518 B. C. He liberated Athens from the domination of the Pisistratidae in 510, but he afterwards attempted to restore Hippias. He procured the dethronement of Demaratus, who had reigned jointly with himself. He died in 489 B. C., and was succeeded by his half-brother, the heroic Leonidas.

**Cleomenes III.**, king of Sparta, of the Agidae line, was a son of Leonidas II. He began to reign in 236 B. C., and resolved to restore the ancient Spartan virtue and discipline. He declared war against the Achaean League, and defeated Aratus at Megalopolis in 226 B. C. He put to death all the ephori except Agesilaus (who escaped), made a new division of land, and restored the old social system. Antigonus, king of Macedon, who was an ally of the Achaeans, defeated Cleomenes at Sellasia in 222 B. C. Cleomenes fled to Egypt, and killed himself in 220 B. C. (See PLUTARCH, "Cleomenes" and "Aratus.")

**Cle'on**, or **Kleon** [Gr. Κλέων], an Athenian demagogue distinguished for his insolence and venality, was a tanner in his youth. He is first mentioned in history about 428 B. C. He was a leader of the democracy or lower classes. In 425 B. C., Cleon and Demosthenes conducted a successful expedition against Sphacteria. He commanded an army which was sent against the Spartan general Bras-

idas in 422 B. C. Cleon and Brasidas were both killed in the battle of Amphipolis, where the Athenians were defeated. His character is depicted with great exaggeration in Aristophanes, "The Knights," and even the narrative of Thucydides is hardly just in this point.

**Cleopatra** [Gr. Κλεοπάτρα], a celebrated and fascinating queen of Egypt, born in 69 B. C., was a daughter of Ptolemy Auletes. She was distinguished for her personal charms, was richly endowed with mental gifts, and was mistress of the Greek and other languages. Her father, dying in the year 51, left the throne to her in partnership with her brother Ptolemy. The latter deprived her of royal power, but Julius Caesar interposed in 48 B. C., and restored her to the throne after her brother Ptolemy had been killed in battle. She captivated the affection of Caesar, and accompanied him to Rome in the year 46. After he had been killed in 44 B. C., she returned to Egypt. Soon after the battle of Philippi (42 B. C.) she was summoned by Antony to appear before him in Cilicia. He was fascinated by her charms, and became so infatuated that he neglected his interests and public affairs, and spent much time with her in Alexandria. Her fleet fought against Augustus at the naval battle of Actium, at which she was present, 31 B. C. She was the first to order a retreat on this occasion, and was eventually taken prisoner by Augustus, who intended to exhibit her in a triumphal procession in Rome. She died in 30 B. C. That she killed herself by the poison of an asp is now considered improbable.

**Cleopatra's Needle**, an Egyptian obelisk of red granite, is about 3500 years old, and was first erected, about 1600 B. C., at Heliopolis, a city of Egypt near the delta of the Nile, by Thothmes III., a famous Egyptian monarch, to commemorate his power. The obelisk is covered with hieroglyphics, each side having three perpendicular lines of them, the central one on each side referring to Thothmes, and the others to Ramesses II., the supposed Sesostris; it was dedicated to the god Ra, or the Sun, and stood before the temple of Tum in Heliopolis till removed to Alexandria in Egypt, and set up there 23 B. C., where it remained till it was transported to Central Park, New York, in 1880, having been presented to the U. S. by Ismail Pasha, a former khedive of Egypt. The obelisk bears its popular name, "Cleopatra's Needle," on account of a false tradition that it was brought to Alexandria in the time of Cleopatra; it is about 70 feet high, exclusive of the pedestal, about 7 feet square at the base, and has a sharply-pointed pyramidal top; weighs 196 tons, and is all in one piece; its pedestal, 6 feet 10 inches high and about 9 feet square, is in one piece and weighs 44 tons. Its foundation-stone in Central Park was laid Oct. 9, 1880, with imposing Masonic ceremonies. (See also the articles ALEXANDRIA, and OBELISK.)

**Clep'sydra**, or **Clepsy'dra** [Gr. κλέπτω, to "steal," and ὕδωρ, "water," because the water seems to steal away imperceptibly], an instrument for measuring time by the gradual flow of water through a small orifice. Two kinds have been used—one wherein the fluid is allowed to escape through the orifice; the other, in which uniformity of flow is secured by maintaining the fluid at a constant level. The clepsydra is supposed to have been used among the Chaldeans. The Greeks and Romans employed it extensively. Pendulum and spring clocks have superseded it, though it is still used in China. It anciently had in some instances a musical attachment by which attention was called to the hour, as by the stroke of a bell in our clocks.

**Clerc** (LAURENT), a celebrated deaf-mute, born at La Balme, near Lyons, France, Dec. 26, 1785. When one year of age he lost his hearing in consequence of a severe burn. At the age of twelve he became a pupil of the abbé Sicard at Paris, and in 1805 was a teacher of deaf-mutes under that eminent instructor. He came to the U. S. in 1816 with Gallaudet, and was one of the founders of the Hartford asylum for the deaf and dumb, which was opened in 1817. He was a laborious and successful teacher of deaf-mutes. Died at Hartford, Conn., July 18, 1869.

**Cler'gy** [from the Gr. κληρος, originally meaning an "inheritance;" Lat. *clerus*], a collective term applied to the ministers of the Christian religion in contradistinction to the laity. This use of the term is ancient, and gradually became prevalent as the ministers of religion more and more exclusively were regarded as God's "heritage." In the Church of Rome the distinction between the clergy and the laity became more marked through the multiplication of titles among the priesthood, the ascription to them of peculiar privileges, their assumption of peculiar official insignia, and the doctrine of celibacy. In harmony with this distinction is that of an indelible character derived from ordination, so that a renunciation of the clerical office is either viewed as an impossibility or apostasy. In the Protestant churches the distinction between clergy and

laity is less wide. Among the rights asserted by the clergy in the Middle Ages, and which caused much dispute, was exemption from lay jurisdiction, even in cases of felony. The clergy were distinguished into the *higher clergy* and the *lower clergy*, the latter including janitors, acolytes, exorcists, etc. The term *secular clergy* is the designation of priests of the Church of Rome who are not of any religious order, but have the care of parishes. Monks who are in holy orders are designated regular clergy, because they obey a monastic rule (*regula*).

**Clerk (JOHN)** a Scottish naval tactician, born at Eldin about 1730. He is said to have been the inventor of the manœuvre in naval tactics called "breaking the line." This plan was first tried by Lord Rodney in April, 1782, when he gained a victory over the French admiral de Grasse. Clerk published in 1782 an "Essay on Naval Tactics." Died May 10, 1812.

**Clerk to the Signet.** See WRITER TO THE SIGNET.

**Clermont**, a city of France, capital of the department of Puy-de-Dôme, is finely situated on an eminence 203 miles S. by E. from Paris, with which it is connected by a railway. It is near a range of extinct volcanoes, and is surrounded by remarkable scenery. It has some manufactures, and a considerable trade with Paris in the products of the surrounding country. It has a Gothic cathedral of the thirteenth century, a college, a public library of 1600 volumes, a theatre, a normal school, and a botanic garden. Clermont occupies the site of the ancient capital of the Arverni, which was originally called *Nemosus*, and afterwards *Augustonemetum*. It became a bishop's see about 250 A. D. The great council in which the Crusades originated was held here by Pope Urban II. in 1095. Clermont was the capital of Auvergne for several centuries. Pop. in 1881, 43,033.

**Clermont**, a town of France, department of Oise, on the Railway du Nord, about 50 miles N. of Paris. It has a college and a public library. Pop. in 1881, 5628.

**Clermont-l'Hérault**, a town of France, department of Hérault, 25 miles W. of Montpellier. It has a communal college and an old ruined castle; also manufactures of woollen cloth. Pop. in 1881, 5450.

**Cleveland**, a wild mountainous district, with some picturesque and fertile valleys, forming the E. part of the North Riding of Yorkshire, England. It includes Gisborough, Stokesley, and the Moors. It is 30 miles long from E. to W. and 15 miles wide from N. to S.

**Cleveland**, capital of White co., Ga. (see map of Georgia, ref. 2-H, for location of county), about 85 miles N. N. E. of Atlanta. Pop. in 1870, 145; in 1880, 197.

**Cleveland**, Oswego co., N. Y. (see map of New York, ref. 3-G, for location of county), on the N. shore of Oneida Lake, and on R. R., 41 miles S. E. of Oswego, has glass-factories, large tannery, saw-mills, grist-mills, and boat-yards. Pop. in 1870, 895; in 1880, 724.

**Cleveland**, an important R. R. and commercial centre, the second city of Ohio in extent and population (see map of Ohio, ref. 2-H, for location of county), is situated upon the S. shore of Lake Erie, at the mouth of the Cuyahoga River, in lat. 41° 30' 5" N., and lon. 81° 42' 6" W., and constitutes the seat of government for Cuyahoga co. Its railroad distance from Columbus, the capital of the State, is 138 miles. Its area exceeds 27 square miles, more than 17,000 acres of territory being included within its limits.

**Commerce.**—With railroads converging from all directions except the north; with the chain of great lakes opening communication with the rich iron and copper mines of Lake Superior, and affording cheap transportation for merchandise and products of all descriptions; with the Ohio Canal traversing the interior of the State, connecting Lake Erie with the Ohio River at Portsmouth, opening a passage to all the principal markets of the South, and, with its tributary, the Ohio and Pennsylvania Canal, penetrating the extensive coal-fields of Ohio and Pennsylvania, —the commercial facilities of Cleveland are second to no city in the West. Its harbor is considered the most commodious and safe of any upon Lake Erie. It consists of two piers, each extending from the mouth of Cuyahoga River 1200 feet into the lake, between which is a channel 200 feet wide, and of sufficient depth for the safe entry of the largest vessels. The U. S. government is engaged in constructing a harbor of refuge at this point for the protection of shipping upon the S. shore of the lake. It will enclose 300 acres of still water, afford perfect protection and ample anchorage for a large number of vessels, and will cost about \$1,000,000. The number and tonnage of vessels entered and cleared from the Cuyahoga district in the coastwise trade during 1878 were—entered, 2658; tonnage, 1,197,651; crew, 29,566; cleared, 2664; tonnage, 1,191,298; crew, 29,344.

**Finances.**—The assessed valuation of the city Jan. 1, 1879, was \$70,139,639; the total bonded and floating debt at the commencement of 1879 was \$9,539,836.84; the property owned by the city was valued at \$8,225,422.25, including a sinking fund of \$1,816,690.53. The disbursements by the city government during 1878 were \$4,248,349.74.

**Manufactures.**—Cleveland had in 1880, 1055 manufacturing establishments; capital, \$19,430,989; hands employed, 21,724; wages paid, \$5,502,935; value of products, \$48,604,050, exclusive of fishery products and petroleum-refining. The value of iron and steel products in 1880 was \$2,339,042; foundry and machine shop products, \$1,961,038; clothing, \$2,687,409. The most vital elements in the growth and prosperity of Cleveland are found in her numerous manufacturing interests. The petroleum-refining interest requires an investment of \$3,000,000, and affords employment to about 3000 men. The summer pork-packing business exceeds that of any other city in the State.

**Education.**—The Cleveland Medical College was established in 1843. Its library contains 1240 volumes, and its museum several hundred anatomical and pathological preparations, models, and drawings; the Cleveland Eye, Ear, and Throat Institute is conducted under its sanction. The Cleveland Homœopathic College was founded in 1850. Volumes in library, 2000; its museum is stored with extensive collections pertaining to the science. The medical department of the University of Wooster was established in Cleveland in 1864; its library contains 2000 volumes, and it possesses a museum of great value. The public schools of the city are organized in accordance with the provisions of the State law. There are 4 high schools. The Catholic parochial schools are 16 in number. The convents contain 45 teachers. There are 11 extensive and well-conducted private schools and seminaries for boys, misses, and young ladies. The Cleveland Public Library was opened Feb. 18, 1869, with 6300 volumes, the present number being 26,000; it is supported by a tax of one-fourth of a mill on the assessed valuation of the city; its income is about \$18,000. The Case Library Association, chartered in 1848, and subsequently united with the Mercantile Library, enjoys an endowment of \$23,000, and possesses the title to the building which it occupies, valued at \$300,000; its library contains 12,000 volumes. The Cleveland Law Library was established in 1870 by a joint-stock company; capital stock, \$20,000, any person purchasing two shares, of \$25 each, being a member. It contains 4500 volumes. It is supported by dues from members and an income of \$500 per annum derived from fines assessed by the police court on State cases. In addition to these are the libraries of the Western Reserve Historical Society, Kirtland Society, Y. M. C. A., and the Bethel Free Reading-room. There are 7 English and 2 German daily papers, 3 tri-weekly, 3 English and 2 German Sunday, 20 weeklies, and 25 monthly, semi-monthly, and miscellaneous publications.

**Churches and Benevolent Institutions, etc.**—The churches of Cleveland are about 150 in number, the Methodists having the most. Charity (St. Vincent's) Hospital was opened in 1866, and was built by general subscription and donations. It has capacity for 220 patients. It is supported by donations and the revenue derived from paying patients. The City Infirmary is maintained at an annual cost of \$49,197.29. The Cleveland City Hospital, to which the first patient was admitted July 23, 1866, has no endowment. In the year 1875 it was consolidated with the U. S. Marine Hospital. It has an income of \$15,416, derived from the rental of beds to railroad companies and individuals, donations from the charitable, and compensation from the U. S. government for the care of marine patients. The Foundling Hospital, established in Jan., 1873, is without endowment and is supported by donations. The House of Maternity was also established in Jan., 1873, and is managed in connection with the Charity Hospital. The Homœopathic Hospital was founded in 1868 as an adjunct to the Cleveland Homœopathic College. A beneficent institution known as the Women's and Children's Free Medical and Surgical Dispensary was founded Jan. 17, 1878, by the lady physicians of the city, and during its first year extended assistance to 1175. It relies upon the charity of ladies for support. The U. S. Marine Hospital was opened in 1852, and consolidated with the Cleveland City Hospital in 1875. The patients are supported by the U. S. government at the City Hospital, and have a U. S. surgeon provided for them.

The city is conspicuous for its benevolent institutions. The Bethel Home for the Destitute provides a home, food, and temporary shelter for needy sailors, residents of the city and strangers. Its buildings are substantial and commodious; it is sustained by donations, and its good deeds cannot be expressed in figures. The Temporary

Home for Friendless Women and Girls, the Newsboys' and Bootblacks' Home, the Open Door, a temporary home for women, the Clothing Dispensary, the Temporary Home for Working Girls, conducted by the Young Ladies' Temperance League, are other beneficent charities. The Children's Aid Society, established in 1857, receives no State, county, or municipal aid, but relies upon contributions from the generous. It conducts the Industrial School and Home, and extends its provident care to destitute children in the city and vicinity over four and less than sixteen years of age. It has secured homes for over 1700, and assisted more than 7000 needy children. The Cleveland Protestant Orphan Asylum was organized Feb. 22, 1852, and chartered Feb. 22, 1853. It enjoys an endowment of \$50,000, its income being \$9000 per annum. The Home for the Aged Poor was founded in 1870 by the Little Sisters of the Poor. It has no endowment, and is supported by solicited charity. The Walnut Street Boarding-house was opened in Nov., 1869, and enlarged in 1872. It is conducted by the Women's Christian Association, and is without endowment, but the association owns the buildings and grounds, valued at \$40,000, a present from a philanthropic gentleman of the city. Its object is to furnish a home of refining influences to respectable young ladies dependent upon their own labor for support, and at a cost corresponding to their means. Its income from boarders is about \$6000 per annum, and it is essentially self-sustaining. The Retreat is also conducted by the Women's Christian Association. It was opened in June, 1867, and in Nov., 1873, took possession of an extensive building presented to it by generous friends. It shelters and aids betrayed women and seeks to reform the fallen. The Home for Aged Women is under the same management. The commodious building was erected in 1876, and the title conveyed to five trustees by a wealthy citizen, who also provided an annual income of \$1000. It was formally opened July 14, 1877. Trinity Church Home is conducted and supported by the congregation of Trinity Episcopal Church. St. Mary's Female Orphan Asylum was founded in 1851 with a small endowment. It extends its care to female orphans from five to eighteen years of age. St. Joseph's Female Orphan Asylum is tributary to St. Mary's, and is devoted to the care of a younger class of orphans; it was founded in 1859, has no endowment, and averages 90 inmates. St. Vincent's Male Orphan Asylum, founded in 1852, without endowment, is supported by funds held throughout the diocese and contributions; its average number of inmates is 180. The Jewish Orphan Asylum was founded in 1868, without endowment, but receives strong support from the order of I. O. B. B., districts Nos. 26 and 27, private subscriptions, and donations. Its average number of inmates is 220, and the total number admitted to Jan. 1, 1879, 528. The Northern Ohio Insane Asylum, a State institution, is also located at Cleveland.

**Parks.**—Noted as is the "Forest City" for its shady streets and avenues, its cool summer breezes, and general healthfulness, the subject of public parks naturally receives attention. With these the city is liberally provided. The Public Square contains 10 acres, is centrally located, and beautifully adorned with fountains, lawns, walks, rustic houses, and numerous shade trees. It is graced with an elegant monument to Commodore Perry in commemoration of his victory on Lake Erie in 1813. It is illuminated with electric lights. Lake View Park comprises 8½ acres; it is situated upon the shore of the lake, and cost \$285,000. The South Side Park was purchased at a cost of \$50,000; it contains 8 acres. There are also several less important public parks, and many elegant and extensive private parks.

**The Viaduct** is a bridge and elevated street built by the city, and is one of the most remarkable structures of the kind in existence. It spans the valley of the Cuyahoga, connecting the E. and W. sides of the city. Its length is 3211 feet, width 64 feet, 42 feet of roadway and 11 feet of sidewalk upon each side; the pivot span, or draw, which is 332 feet in length and 68 feet above the ordinary water-surface of the river, is narrowed to 46 feet width, with roadway 32 feet and sidewalks of 7 feet each. The structure consists of iron trusses, girders, walls of masonry, and stone arches. The work was first commenced Aug. 7, 1874; the corner-stone was laid May 20, 1875, by the mayor; the last stone was placed in position Aug. 21, 1878, and the completed viaduct was accepted by the city on the 27th of Dec., 1878, and dedicated by a grand public demonstration. The cost of the structure, including paving, railing, etc., was \$1,600,000; cost of the viaduct to Jan. 1, 1879, including payments for damages, right of way, etc., \$2,135,000; amount of viaduct fund and resources, Jan. 1, 1879, \$2,162,387.18. The city is abundantly supplied with pure water from Lake Erie by extensive waterworks, upon which there had been expended to Jan. 1, 1879, \$2,472,978.63, there being in use at that time 113½ miles of pipes. To

avoid the impurities imparted to the water by the drainage of the city, a tunnel is employed extending 1½ miles into the lake; the cost of the lake portion of the tunnel was \$320,351.72, and of the shore end—½ mile in length—\$52,742.66.

**History.**—Cleveland was founded in 1796, a survey being completed in October of that year by Gen. Moses Cleaveland, one of the directors of the Connecticut Land Company, in whose honor the city was named. No permanent settlement was accomplished earlier than 1800, although several attempts were made to establish a colony upon what was at that time considered the site of a future city. Dec. 23, 1814, an act was passed by the legislature incorporating the village of Cleveland, the limited government being vested in a president, recorder, and three trustees. In 1836 a city charter was obtained and the first mayor elected. In 1855 a union was effected with Ohio City, which had sustained a separate existence upon the W. side of Cuyahoga River, at the expense of many jealousies and disputes, requiring the intervention of the courts.

**Population.**—The history of Cleveland for each decade exhibits a remarkable increase in population, as well as in material wealth and prosperity. The number of inhabitants in 1810 was 57; in 1820, 350; in 1830, 1000; in 1840, 6071; in 1850, 17,034; in 1860, 43,417; in 1870, 92,829; and in 1880, 160,146, the populous villages of East Cleveland and Newburg having been added since 1870.

F. H. BRADNER,

COMMERCIAL EDITOR "CLEVELAND LEADER."

**Cleveland**, R. R. junction, capital of Bradley co., Tenn. (see map of Tennessee, ref. 7-H, for location of county), 29 miles E. by N. from Chattanooga. A branch R. R. 27 miles long connects it with Dalton, Ga. It has a female institute. Pop. in 1870, 1658; in 1880, 1874.

**Cleveland** (CHARLES DEXTER), LL.D., an American scholar and writer, born at Salem, Mass., Dec. 3, 1802, graduated at Dartmouth in 1827; prof. of Latin and Greek in Dickinson Coll., Pa., in 1830, and of Latin in Univ. of New York in 1832. He opened in 1834 a seminary for young ladies in Phila.; published a "Compendium of American Literature" (1858), and a "Compendium of Classical Literature" (1861), etc. Died Aug. 18, 1869.

**Cleveland** (CHAUNCEY F.), LL.D., an American lawyer, born at Hampton, Conn., in 1799. He was admitted to the bar in 1819, was governor of Connecticut in 1842 and 1843, and member of Congress (1849-53).

**Cleveland** (GROVER), born in Caldwell, Essex co., N. J., Mar. 18, 1837, obtained a good common-school education, and at the age of seventeen he went to Buffalo, where he was received as a student in the law-office of Messrs. Rogers, Bowen & Rogers. He was admitted to practice in 1859, and was assistant district attorney for Erie County in 1863. In the fall of 1870 he was elected sheriff of Erie County, an office which he held three years. He has always been a pronounced and consistent Democrat, and was mayor of Buffalo 1881; nominated in 1882 by the Democrats for governor of New York, and elected; nominated July 11, 1884, for President of the U. S., by the Democratic National Convention, at Chicago, Ill., and elected Nov. 4, 1884.

**Cleveland** (JOHN FITCH), born at French Creek, Chautauqua co., N. Y., Feb. 4, 1819; received a common-school education; was connected with the "New York Tribune" 1843-76, on which he held the important position of financial editor; was for many years compiler of the "Tribune Almanac;" from 1862 to 1870 held the office of assessor of internal revenue. Died in New York Oct. 9, 1876.

**Cleveland** (ORESTES). See APPENDIX.

**Clevenger** (SHOBAL VAIL), an American sculptor, born at Middleton, O., in 1812; worked for some time in Boston, and afterward visited Italy, where he passed several years. He made statues of Daniel Webster and Henry Clay and a bust of Edward Everett, etc. Died in 1843.

**Cleves**, a town of Rhenish Prussia, 3 miles S. W. of the Rhine and 50 miles N. W. of Düsseldorf, was formerly the capital of the duchy of Cleves. It has a fine old castle, a Protestant gymnasium, and a collegiate church of the fourteenth century; also manufactures of cotton, silk, and woollen fabrics, hosiery, etc. Pop. in 1881, 10,059.

**Clichy**, a town of France, department of Seine, is 4½ miles N. W. of Paris, of which it is a suburb. Pop. in 1881, 24,320.

**Clifford** (JOHN HENRY), LL.D., an American lawyer, born at Providence, R. I., Jan. 16, 1809, graduated at Brown University in 1827, was governor of Massachusetts (1853-54), and attorney-general of that State (1849-53 and 1854-58). Died in New Bedford, Mass., Jan. 2, 1876.

**Clifford** (NATHAN), LL.D., an American jurist, born at Rumney, N. H., Aug. 18, 1803, became a citizen of Maine

in 1827, member of Congress (1839-43), U. S. attorney-gen. (1846-47), was subsequently U. S. minister to Mexico. He became a justice of the U. S. Supreme Court in 1858, and was the author of two volumes of "U. S. Circuit Court Reports" (1869). D. July 25, 1881.

**Clifford** (THOMAS), LORD, an English politician, born in 1630. He entered Parliament in 1660, and was appointed a commissioner of the treasury in 1668. In 1671 he became a member of the cabinet called the CABAL (which see). He obtained the title of baron in 1672. Died in 1673.

**Clifton**, a beautiful town and fashionable watering-place of England, in Gloucestershire, is a western suburb of Bristol. Here are tepid springs which contain carbonic acid and salts of magnesia, and have a temperature of 73° F. Pop. in 1881, 28,695.

**Clifton**, a post-village of Stamford township, Welland co., Ontario (Canada), on the Niagara River at the suspension bridge, 1 mile below the Niagara Falls. It is the E. terminus of the Great Western Railway, and is on the Erie and Niagara Railway. It has a very large export trade to the U. S. and a large museum. Pop. in 1881, 26,152.

**Clifton**, Ariz. See APPENDIX.

**Clifton**, Dak. See APPENDIX.

**Clifton Springs**, on the Auburn branch of the New York Central R. R., situated in Manchester and Phelps townships, Ontario co., N. Y. (see map of New York, ref. 5-E, for location of county). It has copious sulphur springs, and is the seat of "Clifton Springs Sanitarium," a noted resort. Pop. in 1870, 746; in 1880, 902.

**Climate** [from the Gr. *κλίμα*, "slope," "inclination," "exposure"], the condition of any place with respect to the temperature, the moistness or dryness, and the currents of the atmosphere, that vast ocean of air at the bottom of which we live. Enveloping both land and water, the atmosphere absorbs the heat and moisture generated on both by the rays of the sun. By the winds this most mobile of the elements carries from the sea to the parched lands invisible vapors and fertilizing rains. In this wonderful medium alone the highest forms of vegetable and animal life, and man himself, thrive and find the amount of oxygen, heat, and water which is indispensable to organic life. The atmosphere thus performs the part of a universal mediator between land and water, and between inorganic nature and living beings. These physical agencies, fostering life and acting through the atmosphere, constitute climate.

Heat and water are the two elements of which every plant and animal requires a certain share. The laws of the distribution of heat and rain are therefore the most important topics of the science of climate. To them we must add the course of the winds, which play a prominent part in both. The temperature may be considered as the most fundamental of the phenomena of climate, for the winds are essentially due to differences of temperature, and the rains are regulated both by changes of temperature and the course of the winds. The distribution of heat, the course of the winds, and the distribution of rains, therefore, is the order in which they have to be considered.

**Distribution of Heat.**—All heat available for the purposes of organic life comes from the sun. Its distribution over the globe, however, depends upon both *astronomical* and *physical* causes. Though this mighty orb pours its life-giving rays in a uniform and uninterrupted stream upon the face of the earth, the spherical form of our planet, and its movements of daily rotation on its axis and annual revolution around the sun, establish permanent differences of temperature in every latitude between the poles and the equator, and periodical ones between day and night and the various parts of the year. The first give the great zones of climate, torrid, temperate, and frigid; the other, the daily periods and the seasons. To these causes we have to trace the groundwork of climate and its fundamental laws, which are summed up under the name of "astronomical climate." These laws, again, are variously and often greatly modified by physical agencies, such as the different absorbing power of land and water for heat, the action of the winds and marine currents, and the elevation above the level of the sea. The astronomical climate, modified by these secondary causes, is the "physical climate," which is in fact the actual climate.

**Astronomical Climate.**—The most general law in the distribution of heat is its gradual decrease from a maximum at the equator to a minimum at the poles. The cause of this inequality, so fruitful in consequences, is the spherical form of the earth. The rays of the sun fall most thickly and produce their full effect when perpendicular, as in the equatorial regions; less thickly and with diminished intensity when slanting, as in the intermediate latitudes; when tangent, as at the poles, they lose their heating power. Each day testifies to this fact. The horizontal rays of the rising and setting sun have but little heating

power; the heat increases with the ascending sun; it is greatest at noon, when the sun is highest. The torrid, temperate, and frigid zones correspond to the noon, the declining, and the setting sun of the day. It is, therefore, to the geographical form of our globe that we must trace those permanent differences of temperature which carry with them corresponding differences in the systems of winds and rains that characterize the great climatic zones.

**The Seasons.**—Again, while the sun shines, the earth receives more heat than it emits by radiation; during the night it loses more than it receives. When the days and nights are of equal length, the gain and loss correspond to each other, and the average temperature is constant. But long days and short nights give a season of accumulated heat higher than the annual average, or the summer; long nights and short days a season of cold below the average temperature, or the winter.

If the axis of the earth were perpendicular on the plane of its orbit, the sun would always be opposite the equator, and the line separating the lighted from the shaded hemisphere pass through the poles, cutting all parallels into two equal parts. The days and nights being then equal at all times on all parallels, no annual seasons of heat and cold would exist. But the axis being inclined 23½°, and always remaining parallel to itself while the earth revolves around the sun, an ever-varying inequality of days and nights and of temperature is the consequence. Only twice a year, on the 20th of March and the 22d of September, is the sun opposite the equator. It is then the time of the equinoxes and average temperature. On the 21st of June, the north pole being inclined 23½° towards the sun, the sun's rays fall perpendicular on the Tropic of Cancer, and the border of the lighted hemisphere reaches the opposite side of the Arctic Circle, 23½° beyond the pole. This is the time of the solstice, or of the longest day and shortest night and of the highest sun in all the northern hemisphere. It is therefore the summer season, while the southern hemisphere has the shortest day, the longest night, the lowest sun, and the winter season. On the other solstice, the 21st of December, the reverse takes place.

The following table, giving the duration of the longest day and shortest night on the 21st of June, with their differences in various latitudes of the northern hemisphere, shows the increasing inequality of days and nights from the equator to the poles. The fractions are decimals of an hour:

Table of the Longest Days in Various Latitudes.

Latitude.	Longest Day. Hours.	Shortest Night. Hours.	Difference. Hours.
Equator.....	12.0.....	12.0.....	0.0
10°.....	12.7.....	11.3.....	1.4
20°.....	13.3.....	10.7.....	2.6
North Tropic.....	13.5.....	10.5.....	3.0
30°.....	14.0.....	10.0.....	4.0
35°.....	14.5.....	9.5.....	5.0
40°.....	15.0.....	9.0.....	6.0
45°.....	15.6.....	8.4.....	7.2
50°.....	16.3.....	7.7.....	8.6
55°.....	17.3.....	6.7.....	10.6
60°.....	18.7.....	5.3.....	13.4
Arctic Circle.....	24.0.....	0.0.....	24.0
67.5.....	1 month.....	0.0.....	} No night.
69.5.....	2 ".....	0.0.....	
73.3.....	3 ".....	0.0.....	
78.3.....	4 ".....	0.0.....	
84.....	5 ".....	0.0.....	}
North Pole.....	6 ".....	0.0.....	

From this table we see that the difference in the length of days and nights increases very slowly in the tropical regions, then more and more rapidly to the Arctic Circle, where the sun does not set on the 21st of June.

Beyond that limit to the pole the sun makes the circuit of the horizon without disappearing for months in succession, and at the pole the year is divided into one day and one night of six months each. The reverse again occurs in the opposite season.

Thus in the tropical regions the temperature is nearly constant throughout the year, while the increasing inequality of days and nights towards the pole causes an increasing difference between the temperature of summer and winter.

The length of the days, however, in the high latitudes compensates for the diminished intensity of the sun's rays, and so it happens that the accumulated heat of a long summer day in the temperate regions may be equal to, or greater than, that of a day in the tropical regions. A summer day in Labrador or St. Petersburg may be as warm as a day under the equator, but these northern latitudes have only a few such days in the year.

Towards the equator the number of warm days gradually increases. Thus the polar regions have short summers and long winters, passing rapidly from one to the other with great differences of temperature. In the temperate regions summer and winter are about of equal length, with long transition seasons of spring and autumn and variable

temperature. An everlasting summer with constant heat reigns in the tropical regions. Though the intensity of the sun's rays is greatest at the time of the solstice, their full effect is produced only somewhat later, and the atmosphere attains its highest temperature in July. It is the same with the daily periods; the highest temperature is felt not at noon, but about two o'clock, and the lowest a little before sunrise.

**Physical Climate.**—According to the laws of astronomical climate, we should expect the same average temperature and the same periodic changes in all places situated on the same parallel of latitude, but thermometric observations prove it to be quite otherwise. On the western side of the Atlantic Ocean, Labrador has a frozen and treeless climate, while on the other side, in the same latitude, we are greeted by the mild atmosphere, rich verdure, and fertile fields of the British Isles. New York with its icy winter is in the same latitude as Naples with its orange groves. On the western coast of our continent, San Francisco, with its mild, snowless winters and cool summers, is on the parallel of Washington, with a frozen Potomac in the cold season and a burning summer sun.

**Isothermal Lines.**—To render visible to the eye the actual distribution of heat, as given by observations of the thermometer, Humboldt introduced the *isothermal lines*, or lines which connect together all places having the same mean temperature, either of the year, of a season, or of any particular month. The annual isothermal lines show the average amount of heat belonging to each place; the monthly and season isothermals, its distribution throughout the year. A glance at Map No. VI. will teach us many important laws of this distribution.

To read the map aright, let us remember that when the lines in either hemisphere bend away from the equator towards the poles, they indicate a heating influence; when they bend from the poles towards the equator, they indicate a cooling influence. It is evident, again, that the greater the difference between the isothermal lines and the parallels, the greater also the deviation from the astronomical temperature arising from physical causes. To eliminate the local influence of the elevation, the temperatures have been reduced to what they would be at the level of the sea in the same place.

The principal facts that we note in this review are the following:

On the whole, the greater disturbances occur in the northern hemisphere, which has the most land; the isothermal lines are far more uniform in the southern hemisphere, which has most water.

The greatest deviations are found on the opposite coasts of the Atlantic Ocean. The isothermal line of 50° Fahrenheit of temperature, which passes near New York in the fortieth degree of latitude, reaches Ireland and London, on the other side of the Atlantic, eleven degrees of latitude farther north. The isothermal of 40°, which passes through Central Canada and Nova Scotia about the forty-sixth degree of latitude, touches the southern part of Iceland and the coast of Norway in the sixty-fourth degree of latitude, or eighteen degrees farther north. The isothermal of 30° passes through Central Labrador, and Cape North in Europe, though their latitudes differ by twenty-one degrees. In higher latitudes the difference is still greater.

From these remarkable deviations of the isothermal lines, we see that not only Western Europe is a great deal warmer than Eastern America in the same latitude, but that the difference increases more and more towards the pole. It is also evident from the bending of the lines that the heating influences bear towards the north-east.

Similar modifications of the annual isothermal lines take place in the North Pacific. Here also the eastern (or Asiatic) is colder than the American coast, and the climate of California and Oregon much milder than that of a corresponding latitude in Asia; but all these differences are reduced to nearly one-half of what they are on the opposite coasts of the Atlantic.

It can thus be accepted as a law that in the two great land masses of the northern hemisphere the western coasts are warmer than the eastern coasts. Moreover, while the average temperature of the oceans is higher, the bending of the lines southward in the interior of these continents shows a lower temperature than that due to their latitude.

In the southern hemisphere the law of the temperature of the opposite coasts seems to be reversed. In America and in Africa the western is colder than the eastern coast, and in this hemisphere the average temperature of the continents is rather higher than that of the ocean.

**Climatic Zones.**—There are four parallels, usually made prominent in globes and maps, which are peculiar limits in the distribution of light on the surface of the earth. Two are traced at the distance of about 23½° on each side of the equator, and are called on the north the *Tropic of Can-*

*cer*, and on the south the *Tropic of Capricorn*. The other two, 23½° from either pole, are the *North Polar* and the *South Polar Circles*, also called the *Arctic* and *Antarctic Circles*. The two tropics mark the extreme limits of the central region where the sun, in its yearly course, can be seen vertical, the sun being vertical on these parallels on the longest days of the year—viz. the 21st of June in the northern, and the 21st of December in the southern hemisphere. The polar circles are the parallels on which the longest day is twenty-four hours, and mark the limits of the circular area around the poles within which the summer sun does not set every day. The globe is thus divided into six bands, or *zones*, in three groups, which, from the general character of their temperature, are termed the warm or *torrid*, the *temperate*, and the *frigid* zones. The portion of the earth's surface occupied by each of the zones is very unequal. Their comparative area, in English square miles, is as follows:

North tropical zone.....	39,109,628	} Warm regions.....	78,219,256
South tropical ".....	39,109,628		
North temperate zone.....	51,110,763	} Temperate regions.....	102,221,526
South temperate ".....	51,110,763		
North polar ".....	8,229,748	} Cold regions.....	16,459,496
South polar ".....	8,229,748		
The whole globe.....	196,900,278	English square miles.	

It is thus seen that, by a wise arrangement of Providence, the temperate regions, most favorable to man's development, are the most extensive; next are the warm regions; while the frigid zones, unfit for man's progress, cover but an inconsiderable portion of the earth's surface.

**True Zones of Climate.**—It is evident that the astronomical zones of climate, whose limits are determined by the distribution of light, do not coincide with the zones of actual temperature. Taking as the limits of the true tropical zone the isothermal lines of 70° on both sides of the equator, which nearly coincide with the boundaries of climate, plants, and animals characterizing the tropical regions, and for those of the frigid zone the isothermal line of 30° in both hemispheres, we obtain zones of irregular shape, which are marked on the map by different colors.

The tropical zone is broadest in Africa, the north temperate in Europe, and we can judge at a glance that Africa is the warmest of the tropical, and of all the continents of the globe, and Europe the warmest of the temperate continents. The highest and lowest temperatures are found in the largest continents—the warmest in Central Africa, the coldest in Northern Asia.

The maps of the isothermal lines of January and July, representing the extreme winter and summer temperatures, show how much greater are the variations in the interior than on the coast. While in January the lines in the interior indicate a lower temperature, those of July, strongly bent northward, betoken a much higher temperature than in the shore region.

Thus, as a rule, the coast of the continent has more equable, the interior more excessive, season temperatures.

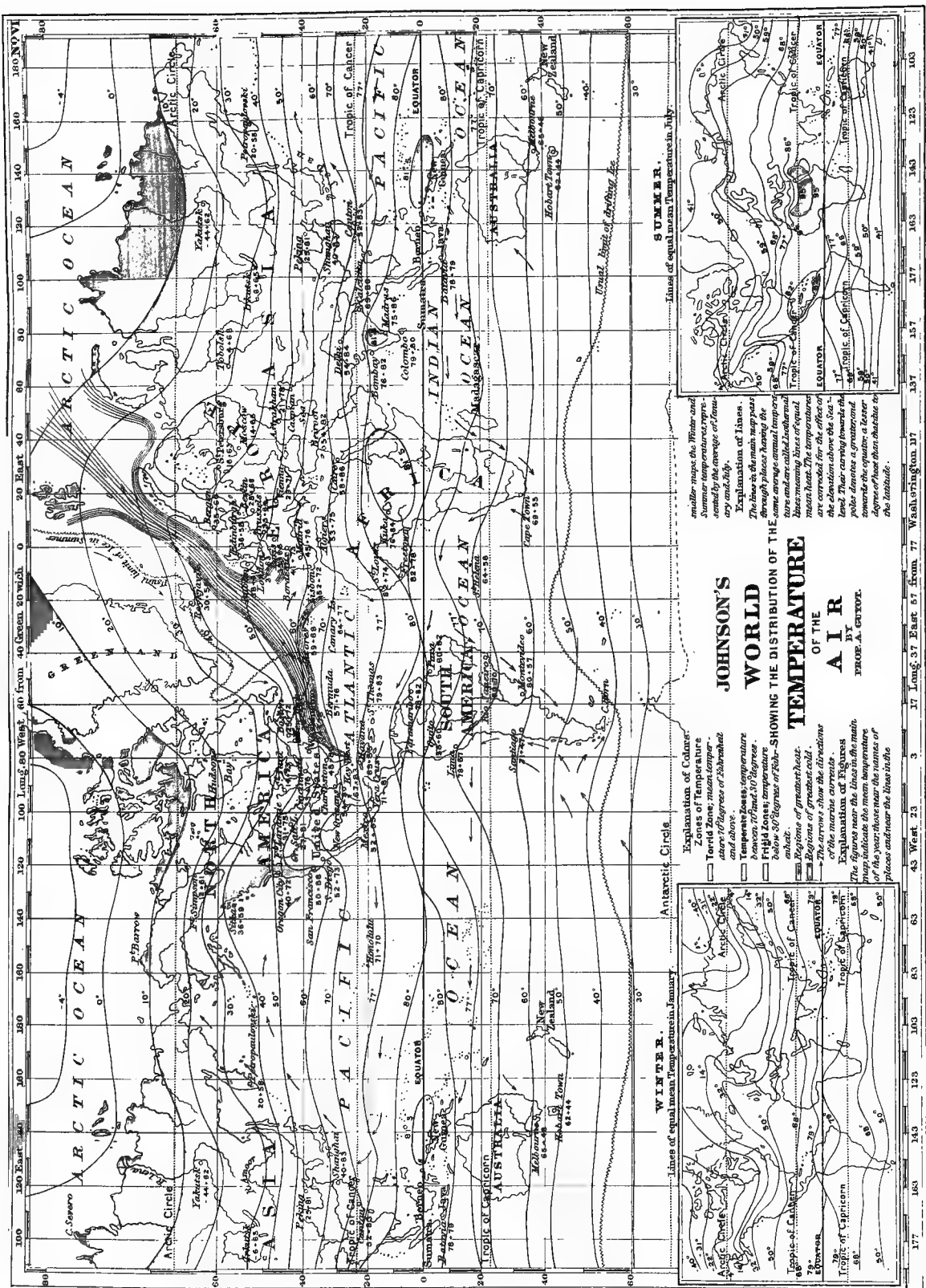
This wide departure of the actual from the astronomical temperature is a most striking fact, the principal causes of which are to be found in the different manner in which land and water are affected by the solar rays and in the action of the great currents of the atmosphere and the sea.

**Land and Sea Climates.**—Water has a great capacity for heat, but a feeble conducting power; it grows warm slowly in the rays of the sun, and never rises to a high temperature. It is the same in cooling; it gives up its heat slowly, and the surface layer growing cool falls lower by its weight, and gives place to the warmer molecules of the inferior strata. Thus the heating and cooling are slow, and do not reach extremes. Land rapidly absorbs the solar rays; the surface layer is quickly heated and soon attains a high temperature, but loses it by radiation with equal rapidity. It reaches, therefore, great extremes of heat and cold. The sea or oceanic climate, therefore, is characterized by equableness, without extremes of temperature; the land or continental, by great extremes; it is excessive. This is clearly shown by a few examples, in which the temperatures of the coldest and the warmest months are compared in places situated in the same latitude, but more or less under the influence of the sea or of land:

*Differences of Temperature between the Coldest and Warmest Months in Similar Latitudes.*

Name of places.	Lat.	Jan. Fahr.	July. Fahr.	Difference.
Faroe Islands.....	62°	39.0	61.7	22.7
Bergen, Norway.....	60°	34.9	60.3	25.4
St. Petersburg, Russia.....	60°	15.6	62.6	47.0
Yakutsk, Siberia.....	62°	— 43.8	62.2	106.0
Penzance, S. W. Eng.....	50°	42.6	62.0	19.4
Banaul, Siberia.....	53°	— 4.7	67.1	71.8
Eastport, Me.....	45°	22.5	62.4	39.9
Fort Snelling, Minn.....	45°	13.1	73.4	60.3
Bermudas, Atlantic.....	32°	62.6	84.2	21.6
Natchez, Miss.....	32°	52.2	81.3	29.1
Madeira, Africa.....	32°	63.5	73.8	10.3
Cairo, Egypt.....	30°	56.3	86.6	30.3







We see by the rapid increase of the differences how the variations augment as we advance from the sea into the interior of the continents. The absolute extremes of temperature differ even more. The highest degree of heat ever observed at the Faroe Islands is only  $56^{\circ} 3' F.$ , and it freezes but little there, while the meteorological annals of St. Petersburg indicate heats of  $92^{\circ}$ , and cold of  $40^{\circ}$  below zero  $F.$ , or extremes of  $132^{\circ} F.$  apart. It is at once the cold of the poles and the heat of the tropics. At Yakutsk the mercury often remains frozen for weeks, implying a continued cold of at least  $40^{\circ} F.$  below zero. Further south and near the tropics the differences between the seasons become naturally less, but the influence of the ocean and of the continent is always very marked. The difference between the extreme temperatures, which at Madeira is only from  $20^{\circ}$  to  $27^{\circ}$ , reaches in Egypt  $56^{\circ} F.$  In the Sahara ice has been known to form by the intensity of radiation, and heat to rise to the enormous height of  $140^{\circ}$ .

The course of the isothermal lines of January and July is thus easily explained: while the interior, overheated by rapid absorption during the long summer days, is warmer than the coast, it is colder in winter by more rapid radiation. All this shows how great is the influence of the sea upon the distribution of temperature in the different seasons of the year. It tends to bring the extremes together, and to maintain at all times that equality of temperature which, with the abundant moisture, is the distinctive quality of the sea climate.

This difference in the land and sea climates tells even upon the average temperature of the whole earth.

Owing to a great preponderance of land, the northern hemisphere has a warm summer, while the southern hemisphere, having more water, has a mild winter, giving together a high average. In the opposite season the northern hemisphere has a cold winter, and the southern hemisphere a moderate summer, giving a low average. Prof. Dove has calculated that the average temperature of the whole earth in July, during the northern summer, is  $62^{\circ}.4 F.$ , while in January, during the southern summer, it is only  $54^{\circ}.3$ , or  $8^{\circ}.1$  lower than in July.

But if the action of the solar rays on land and water explains some season changes of temperature, other causes are required to account for the permanent deviations of the annual isothermal lines.

**Influence of Winds and Marine Currents.**—Our daily experience in northern latitudes teaches us that most of the changes not due to the declination of the sun are connected with changes of the wind. Equatorial winds from the south bring us a share of heat from the tropics; polar winds, the chilling breath of a northern atmosphere. If, from any cause, one of these great currents becomes prevailing throughout the year in a particular region, a certain amount of heat or cold is added to or subtracted from the solar heat, considerably modifying the astronomical temperature. The great marine currents perform the same functions, carrying tropical and polar temperatures far into the middle latitudes. Thus it is that the south-westerly winds, which blow almost two-thirds of the year over Western Europe, and the constant flow of the warm waters of the Gulf Stream, greatly increase the average temperature of that continent, and strongly deflect the course of its isothermal lines. (See articles WINDS and CURRENTS, MARINE.)

ARNOLD GUYOT.

**Climax** [Gr. *κλίμαξ*, a "staircase"], a Latin term used in rhetoric to denote a figure by which several propositions or several objects are presented in such an order that the proposition or object adapted to produce the least impression shall strike the mind first, and the others rise by successive gradations of impressiveness. A sentence in which the order is reversed is called an *anti-climax*.

**Climbers** (in ornithology). See SCANSORES.

**Climbing Fern** (*Lygodium palmatum*), a rare species of fern of the sub-order Osmundineæ, is remarkable for its habit of climbing or twining upon shrubs and weeds. It occurs in the U. S. from Massachusetts to Florida and westward.

**Climbing Perch.** See ANABASIDÆ.

**Climbing Plants, or Climbers**, the popular term for those plants which seek support from other objects in order to ascend from the earth, as the vine, etc. This end is accomplished in different ways. Some climb by means of rootlets growing from the stem, as the ivy; some by the coiling of their petioles or leafstalks, as *Clematis* and *Nasturtium*; some by means of tendrils, as the grapevine and passion-flower; and some tendrils, instead of taking hold by their coiling tips, adhere by expanded disks, as the Virginia creeper. In twiners the stem itself coils around the support, either from right to left (against the sun), as in the pole-bean, or from left to right, as the hop-vine. Tendrils are sometimes of the nature of leaves or

parts of leaves; more commonly they are transformed branches. It is only recently that the movements through which plants climb in these various ways have come to be understood. (For a clear explanation of the subject, see DARWIN on "Climbing Plants," and GRAY, "How Plants Behave.")

**Clinch** (DUNCAN L.), an American general, born about 1798 in North Carolina, entered the army as first lieutenant in 1808, and rapidly rose by promotion. He was especially distinguished in the Florida war (1835–36), but resigned his commission in the latter year. He was a member of Congress from Georgia (1843–45), and died Nov. 27, 1849.

**Clinch River** rises in the S. W. part of Virginia, flows south-westward, and enters East Tennessee. Pursuing the same general direction between two ridges called Clinch Mountain and Powell Mountain, it unites with the Holston at Kingston to form the Tennessee River. The whole length is estimated at 300 miles.

**Clingman** (THOMAS LANIER), b. in Surrey co., N. C.; graduated at the University of North Carolina, 1832; served in both branches of the State legislature; was sent to Congress in 1843, and six times re-elected; twice chosen U. S. Senator; entered the Confederate service as colonel, and for three years held the rank of brigadier-general; has given much attention to geology, mineralogy, the height of mountains, and other scientific subjects.

**Clingman's Dome**, in Jackson co., N. C., is the highest peak of the Great Smoky Mountains, between North Carolina and Tennessee. It rises to 6660 feet above the sea, and is the second in height in the Appalachians. It was named after Thomas L. Clingman, who ascended it in 1858.

**Clin'ic, or Clin'ical** [from the Gr. *κλίνη*, a "bed"], belonging to a bed; and hence performed (or pursued) at the bedside, as clinical medicine, clinic (as a noun), or clinique, etc.

**Clink'stone** is a felspathic rock of a grayish-green color, having so remarkable a tendency to lamination that it sometimes furnishes tiles for roofing. It is a compact, homogeneous rock, passing gradually into gray basalt. The slab gives a metallic ring or "clink" when struck with a hammer, whence its name. It is found in volcanic districts.

**Clinometer** [from the Gr. *κλίμα*, to "lean," and *μέτρον*, a "measure"], an instrument used by geologists to determine and measure the dip of a stratum. It consists of a compass furnished with a small spirit-level, and on the lid—which can be fixed at right angles to the compass-box—there is a graduated quadrant and plumb-line.

**Clinton**, a post-village of Huron co., Ontario (Canada), on the Buffalo and Goderich branch of the Grand Trunk Railway, 13 miles from Goderich. It has extensive trade and manufactures. Clinton also contains valuable salt-wells, and a vein of rock-salt twenty feet thick. Pop. in 1881, 2606.

**Clinton**, capital of Van Buren co., Ark. (see map of Arkansas, ref. 2-C, for location of county), on the Little Red River, about 65 miles N. by W. from Little Rock. Pop. in 1880, 166.

**Clinton**, capital of Jones co., Ga. (see map of Georgia, ref. 4-H, for location of county), about 15 miles N. E. of Macon. Pop. in 1870, 362; in 1880, 294.

**Clinton**, city and R. R. junction, capital of De Witt co., Ill. (see map of Illinois, ref. 6-E, for location of county), 23 miles S. of Bloomington. Pop. in 1870, 1800; in 1880, 2709.

**Clinton**, a city and R. R. centre, capital of Clinton co., Ia. (see map of Iowa, ref. 5-K, for location of county), on the Mississippi River, 42 miles above Davenport, and 138 miles by railroad W. of Chicago. The river is here crossed by an iron bridge which is about 4000 feet long, and cost \$600,000. The cars of the Chicago and North-western R. R. pass over this bridge. Clinton contains the repair-shops of the railroad company, foundries, sash-and-blind factories, a paper-mill, eight saw-mills, etc. Pop. in 1870, 6129; in 1880, 9052.

**Clinton**, on R. R., capital of Hickman co., Ky. (see map of Kentucky, ref. 5-B, for location of county), about 300 miles W. S. W. of Frankfort. Pop. in 1870, 272; in 1880, 506.

**Clinton**, capital of East Feliciana parish, La. (see map of Louisiana, ref. 9-E, for location of parish), 32 miles N. of Baton Rouge. A railroad 25 miles long connects it with Port Hudson on the Mississippi. It has good female schools. The parish ships yearly 30,000 bales of cotton. Pop. in 1870, 930; in 1880, 1129.

**Clinton**, R. R. centre, Worcester co., Mass. (see map of Massachusetts, ref. 3-F, for location of county), on the Nashua River, 45 miles W. by N. from Boston and 16 miles

N. E. of Worcester. It has manufactures of gingham, combs, Brussels and Wilton carpets, wire-cloth, machinery, etc. The Lancaster mills of this place employ about 1200 hands, operating on 950 looms, and producing annually nearly 7,000,000 yards of gingham and plaids. Pop., including township, in 1870, 5429; in 1880, 8029.

**Clinton**, on R. R., Hinds co., Miss. (see map of Mississippi, ref. 7-F, for location of county), is the seat of Mississippi College. Pop. in 1880, 569.

**Clinton**, R. R. junction, capital of Henry co., Mo. (see map of Missouri, ref. 5-E, for location of county), 40 miles S. W. of Sedalia. It is called the "model town" of Western Missouri. Pop. in 1870, 640; in 1880, 2868.

**Clinton**, on R. R., Hunterdon co., N. J. (see map of New Jersey, ref. 3-C, for location of county), on the S. branch of the Raritan River, about 10 miles N. of Flemington. It has carriage manufactures and a large trade. Iron and manganese mines have been opened in the neighborhood. Pop. in 1870, 785; in 1880, 842.

**Clinton**, R. R. junction, Oneida co., N. Y. (see map of New York, ref. 4-H, for location of county), 9 miles W. by S. of Utica, and on the Chenango Canal. It has one seminary for boys, and four for young ladies. It is also the seat of Hamilton College. In the vicinity are large quarries of good building-stone. There are also various manufactures. Pop. in 1870, 1640; in 1880, 1236.

**Clinton**, capital of Sampson co., N. C. (see map of North Carolina, ref. 4-H, for location of county), 35 miles E. of Fayetteville. Pop. in 1870, 204; in 1880, 620.

**Clinton**, capital of Anderson co., Tenn. (see map of Tennessee, ref. 6-I, for location of county), on R. R. and Clinch River, 18 miles N. W. of Knoxville. Pop. in 1870, 325; in 1880, 263.

**Clinton**, capital of De Witt co., Tex. (see map of Texas, ref. 6-H, for location of county), is on the Guadalupe River, about 95 miles S. by E. from Austin. Pop. in 1870, 217; in 1880, 190.

**Clinton**, R. R. junction, Rock co., Wis. (see map of Wisconsin, ref. 7-E, for location of county), 78 miles N. W. of Chicago. It has some manufactures. Pop. of Clinton township in 1870, 1943; in 1880, 2126.

**Clinton (CHARLES)**, the father of George Clinton (1739-1812), was born in Longford co., Ireland, in 1690, of English stock. His grandfather William, an officer in the army of Charles I., settled in Ireland. In 1729 he emigrated to America, but the passengers were starved and robbed by the ship's master, who landed them on Cape Cod, where many of them died. Clinton settled in Ulster co., N. Y., became a judge, and a lieutenant-colonel in the French and Indian wars, and was the founder of the distinguished Clinton family of New York State. Of four sons, Alexander was a physician, Charles was a surgeon, James was a major-general, and George was Vice-president of the United States. Died Nov. 19, 1773.

**Clinton (DE WITT)**, an eminent American statesman, born at Little Britain, Orange co., N. Y., Mar. 2, 1769, was a son of General James Clinton, and a nephew of Governor George Clinton. His mother's name was Mary de Witt. Having graduated at Columbia College, N. Y., in 1786, he studied law, and became in 1790 private secretary to his uncle, then governor of New York. He was a man of ardent temperament, dignified manners, inclined to reserve, and of noble personal appearance. He married about 1796 Maria Franklin of New York City. He entered public life as a Republican or Anti-Federalist, and was elected a member of the lower house of the State legislature in 1797, and of the State senate in 1798. He took an active part in political movements, and soon became the most influential leader of his party in the State of New York; he also devoted much attention to natural sciences. In 1801 he was elected a Senator of the U. S., in which capacity he distinguished himself as an eloquent debater. Prof. Renwick states that "he was on all sides looked up to as the most rising man in the Union" when he was appointed, in 1803, mayor of the city of New York. This office was then appointed by the governor and council, and had more extensive powers than the mayor has at the present time. Having been reappointed, he held the office of mayor for nearly eleven years, and rendered important services to the city. He also served as lieutenant-governor of New York for two years (1811-13), and was one of the commissioners appointed in 1810 to examine and survey a route for a canal from the Hudson to Lake Erie. In 1812 he differed from President Madison in relation to the war against Great Britain, and became his competitor for the presidency. Mr. Clinton was nominated by the Republican members of the legislature of New York, and was supported by many Federalists. He received eighty-nine electoral

votes, cast by Massachusetts, Connecticut, New Hampshire, Rhode Island, New York, New Jersey, Delaware, and Maryland, but was not elected. His course and policy at this period offended many of the Republicans (or Democrats), and appear to have impaired his popularity for a time. He was removed from the mayoralty about the end of 1814, and retired to private life, from which, however, he was soon raised by his sagacious foresight and successful efforts to promote the prosperity of the State. In 1815 he composed an able argument for the construction of the Erie Canal, of which great and beneficent enterprise he was the principal promoter. This argument was in the form of a memorial to the legislature of the State, which early in 1817 passed a bill authorizing the construction of that canal. He was elected governor of New York almost unanimously in 1817, but his former political opponents organized against him a party who were called "Bucktails," and who denounced the projected canal as visionary and impracticable. In 1820 he was re-elected governor, Daniel D. Tompkins being the defeated candidate. Governor Clinton was at the same time president of the board of canal commissioners. He distinguished himself by his liberal patronage of science and his efforts to promote the education of the people. In 1822 he declined to be a candidate for the office of governor. He was removed from the position of canal commissioner in 1824, and was again elected governor by a large majority in the same year. The Erie Canal was completed in 1825, and brought a great access of trade and prosperity to the city of New York and other portions of the State. When the opening of the canal was celebrated in October of that year, Governor Clinton was conveyed in a barge with triumphal demonstrations from Lake Erie to the city of New York. He was re-elected governor in 1826, and died at Albany before the expiration of his term of office, Feb. 11, 1828. (See JAMES RENWICK, "Life of De Witt Clinton," 1840; WILLIAM W. CAMPBELL, "Life of De Witt Clinton," 1849; DAVID HOSACK, "Memoir of De Witt Clinton," 1829.)

**Clinton (GEORGE)**, the fourth Vice-President of the U. S., born in Ulster co., N. Y., July 26, 1739. He was an uncle of De Witt Clinton. He practised law in his youth, and was elected in 1775 to the Continental Congress, in which he voted for the Declaration of Independence, but he was absent when it was signed, having been called to take command of a brigade of militia. He was chosen governor of New York in 1777, and continued in that office, by several re-elections, until 1795. In 1788 he presided over the State convention called to ratify the Federal Constitution, which instrument he disapproved, because it gave too much power to the central government. He was afterwards the principal leader of the Republican party in the State of New York, and was chosen governor of that State in 1801. In 1804 he was elected Vice-President of the U. S. by the Democrats, who elected Jefferson as President. He was re-elected Vice-President in 1808. Died April 20, 1812.

**Clinton (GEORGE W.)**, LL.D. See APPENDIX.

**Clinton (SIR HENRY)**, an English general, a grandson of the earl of Lincoln, was born in 1738. He served as major-general at the battle of Bunker Hill, June, 1775, and was appointed commander of the British army in North America early in 1778. He evacuated Philadelphia in June, 1778, and moved his army by land to the city of New York. He conducted an expedition against Charleston, S. C., which he besieged and took in May, 1779. In Oct., 1781, he sailed from New York with about 7000 men to relieve Cornwallis, but the latter surrendered at Yorktown before the arrival of Clinton. He was superseded by General Carleton in 1781. Died at Gibraltar, Dec. 24, 1795.

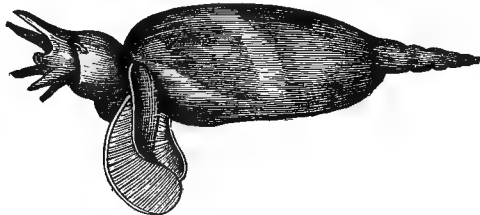
**Clinton (JAMES)**, a general, born in Ulster co., N. Y., Aug. 9, 1736, was a son of Col. Charles Clinton, and the father of the statesman De Witt Clinton. He became a colonel in 1775, and served under Gen. Montgomery in Canada. He was raised to the rank of brigadier-general in 1777, and took part in Sullivan's operations against the Indians in New York in 1779. In Oct., 1781, he assisted at the siege of Yorktown. Died Dec. 22, 1812.

**Clinton State Prison**, at Dannemora, in Clinton co., N. Y., 16 miles W. of Plattsburg, is built of dressed stone with slate roof. The main building is T-shaped, but there are several other buildings all enclosed in a stockade of 37 acres. There are usually about 500 convicts here, mostly employed in the iron and nail works. The iron ore has been in part mined upon the grounds, but is now obtained from various mines leased or owned by the State. Charcoal is employed in reducing the iron. It is furnished by woodlands measuring 17,500 acres, yielding annually 900,000 bushels. The prison lot has 250 acres. Besides mining, smelting, rolling, and nail-cutting, the convicts saw lumber, manufacture nail-kegs, etc.

**Clintwood, Va.** See APPENDIX.

**Clio** [Gr. Κλειώ], one of the nine Muses, presided over history, and was represented as holding in one hand a half-opened roll or scroll, and in the other a cithara. She is first mentioned by Hesiodus, and was generally represented sitting, often with an open chest of books beside her.

**Clio**, a genus of pteropodous mollusks, of the section



*Clio borealis.*

**Gymnosomata.** *Clio borealis* is a principal part of the food of whales, and is very abundant in the Arctic seas. It is scarcely an inch long; the head is furnished with six retractile tentacula; the organs of locomotion are two delicate fins, joined to the neck. It has no shell. Of these creatures the water is sometimes so full that a whale cannot open its mouth without engulfing them in great numbers. *Clio australis* is extremely abundant in the southern seas. Several other species are found in the Indian Ocean, etc.

**Clipper** [from the verb *clip*, to "move fast"] is a name given to a ship built expressly with a view to speed. The commerce in merchandise of a perishable nature which rendered a quick passage desirable was probably among the first causes which directed especial attention to the form of vessels adapted to offer least resistance to the water. For many years fruit-clippers have been celebrated for their rapid passages, and the opium-clippers and slavers have attained an unenviable distinction for speed. The modifications of the old form of vessel have been gradual, the desideratum aimed at being the combination of the greatest carrying capacity with the form best adapted for speed. A clipper, as compared with an ordinary sailing-ship, is longer and narrower (though of late the tendency has been to increase the beam); very sharp at the bows, which are generally hollowed more or less below the water-line; gracefully tapering towards the stern, which is usually elliptical. The Americans have fully done their part in introducing swift clipper ships, and have perhaps been the most successful in the improvement of vessels of this class. It may be observed that clippers are much less used than they were a few years ago, quick freights being now despatched on fast steamers, and heavy goods being sent in vessels of larger carrying capacity.

**Cleisthenes**, or **Cleis'thenes** [Gr. Κλεισθένης], an Athenian statesman, the grand-uncle of Pericles, lived about 500 B. C., and took a prominent part in the expulsion of the Pisistratidæ. He increased the number of the tribes of Attica from four to ten, and made important changes in the constitution, which he rendered more democratic. He became very popular, and was the foremost Athenian statesman of his time. He instituted ostracism, and was himself the first sufferer from it.

**Clitherall** (ALEXANDER B.) was a native of Alabama. In 1857 he was elected to the Senate, and returned in 1859. During the war he was appointed register of the Confederate treasury, and resided for some years in Richmond. He died in 1868.

**Clith'eroe**, a market-town of England, in Lancashire, on the river Ribble, 28 miles N. of Manchester, with which it is connected by railway. The houses are of stone. It is situated at the base of Pendle Hill, which is 1800 feet high, and near Pendle Forest, which is reputed to be the scene of the exploits of the Lancashire witches. It has the ruins of a castle built in the twelfth century. Here are manufactures of cotton fabrics. It returns one member to Parliament. Pop. in 1881, 10,177.

**Clit'us**, or **Cleitus** [Gr. Κλείτος], a Macedonian officer who took part in Alexander's expedition against Persia, and saved his life at the battle of the Granicus, in 334 B. C. He enjoyed the favor of Alexander, who appointed him satrap of Bactria in 328 B. C. In the same year a dispute occurred at a feast between them, and Alexander, who was excited with wine, killed Clitus with a spear.

**Clitz** (HENRY B.), a son of the late Capt. John Clitz, U. S. A., born in New York, graduated at West Point in 1845, served with honor in the Mexican war as an infantry officer, was wounded at Yorktown, Va., and Gaines's Mill in 1862, and was taken prisoner in the latter engagement; served as commandant of cadets and instructor in tactics

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at West Point (1862-64), became lieutenant-colonel Sixth Infantry, and in 1869 colonel Tenth Infantry. In 1865 he was brevetted brigadier-general U. S. Army.

**Clitz** (JOHN M. B.), U. S. N., born Mar. 10, 1823, in the State of New York, entered the navy as a midshipman in 1837, became a passed midshipman in 1843, a lieutenant in 1851, a commander in 1862, a captain in 1866, a commodore in 1873, and afterward a rear-admiral; retired Oct. 16, 1883. He was employed during the civil war in command of various vessels of the N. Atlantic squadron, frequently in action with batteries on the James River while co-operating with the army, in both the Fort Fisher fights, and recommended for promotion by Rear-Admiral Porter in his commendatory despatch of Jan. 28, 1865. FOXHALL A. PARKER.

**Clive** (ROBERT), LORD, the founder of the British supremacy in India, was born at Styche, in Shropshire, Sept. 29, 1725. At school he showed little aptitude for learning and much propensity to mischief. He went to Madras in 1744, and became a clerk in the service of the East India Company, then a trading corporation possessing only a few acres of land. His work here was so uncongenial that he attempted to kill himself, but his pistol missed fire. War having broken out between the English and French, he entered the service as an ensign in 1747. In this field he found scope for his talents, and employment congenial to his audacious disposition. His military genius and resolute spirit procured his rapid promotion. In 1750 and 1751 he defeated the French at Arcot and other places. He made a voyage to England for his health in 1753, taking with him his wife, a sister of Maskelyne, the astronomer. In 1755 he returned to India as governor of Fort St. David. He waged war with success against the nabob Surajah Dowlah, and took Calcutta in 1757. In June of that year, with 3000 men, he gained a decisive victory over the nabob's army of 60,000 men at the battle of Plassey. For this service he was rewarded with the office of governor of Bengal. He had become immensely rich when he returned to England in 1760, and he was raised in 1761 to the Irish peerage as baron of Plassey. In 1764 he was again sent to India, with authority to rectify the disorders which prevailed after his departure from that region. He proved himself an able administrator, and restored discipline. He returned to England in 1767. His enemies in Parliament accused him of having enriched himself by a tyrannical abuse of power, and a committee was appointed in 1773 to investigate his conduct. This inquest resulted in his acquittal. He became addicted to the excessive use of opium, and committed suicide in London Nov. 22, 1774. (See SIR JOHN MALCOLM, "Life of Lord Clive," 3 vols., 1836.)

**Cloa'ca** [a Latin word signifying a "sewer;" Fr. *cloaque*], a name applied to the anal orifice of birds, which also serves for the escape of urine, and is the external organ of reproduction. A similar anatomical arrangement is found in one order of mammals, the Monotremata, in all reptiles, and in many fishes.

**Cloa'ca Max'ima** [a Latin phrase meaning the "largest sewer"], a subterranean passage through which a great part of the sewage of ancient Rome was conveyed to the Tiber. Drains from the parts of the city around the Forum were commenced by Tarquinius Priscus, but the construction of the Cloaca Maxima is attributed to Tar-



Mouth of Cloaca Maxima at Rome.

quinius Superbus. Niebuhr expresses the opinion that it was at first designed to drain the valley of the Forum, but it appears to have been afterwards extended. Passing

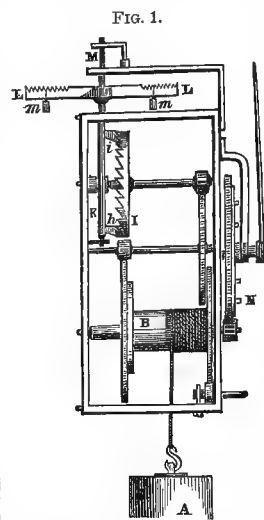


from the Forum by the temple of Vesta, it terminated in the Tiber, where the mouth of it is still to be seen. It consists of three large arches, one within the other. The innermost vault is more than thirteen feet in width. The arches were built of large blocks of tufa, about five feet five inches long and three feet high, fixed together without cement. The sewer was kept clear by a stream of water from the aqueducts. Large portions of this and of other cloacae remain in some places visible, but they are generally at a considerable depth below the present level of the streets. The surveillance of the Roman cloacae was one of the duties performed by the censors. Notwithstanding its great age, the Cloaca Maxima is in admirable preservation.

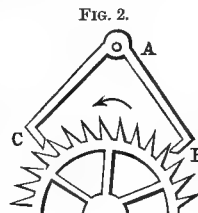
**Clocks.** From the earliest period of human history men have sought for means to measure time. This was not a matter of such extraordinary importance to the savage as to the civilized man, for upon the former there was no pressure to accomplish any work or employment within a given space of time. To him, therefore, the divisions of time by the sun's rising, setting, and nooning were sufficient, when he could see them. But very early men began to divide the day into several portions, and soon the night also. At first, these divisions were of about three or four hours each. After a time the division of the night and the day into twelve hours each was found to be more convenient, and then there came the necessity for means of measuring these divisions of time. The first in use was the dial, which by its shadow on a horizontal plate marked the passage of the hours by the progress of the sun. But as this could only be of service in the daytime, and when the skies were not obscured by clouds, something else was necessary. The hour-glass, which measured time by the flowing of sand through a narrow passage from one spherical vessel into another, and which was so graduated that all the sand would run out from the upper glass in just an hour, was a very good instrument to measure the lapse of an hour, but it could not be depended upon to give the time of day, and required watchfulness to turn it as soon as the sands had all run down. King Alfred's device of twelve candles, graduated so as to burn two hours each, was not much better, and in some respects even more inconvenient. The clepsydra was a step in advance of these. It was a water-jar containing several gallons of water, which ran out from a small graduated orifice in the bottom of the jar at such a rate that the quantity of water in the jar would be lowered to a certain marked point each hour, and the jars being filled at sunrise every day, marked off the hours with tolerable regularity. As glass was not then used for the jars, the only way of determining the time was by looking into the jar or measuring the depth of the water by a graduated stick. We do not know just when or by whom these clepsydres were invented, though they are credited to Greece. They were introduced at Rome about 158 B. C. by Scipio Nasica. Eighteen years later they were improved by Ctesibius, by the addition of a toothed wheel and index driven by the water which flowed from the bottom of the jar. Thus improved, these water-clocks have been in use in the East for about two thousand years. In the more enlightened west of Europe, however, there was a demand for further improvements.

The first of these, which possibly came from the Saracens, and perhaps from their Western empire in Spain, was the substitution of a weight for the water to turn the toothed wheel. It may have been introduced at a still earlier date than this, for Archimedes had discovered the advantage of weights in the turning of small machines some centuries earlier. But after this substitution there still remained the difficulty that the weight was not so regulated as to cause the index to pass over equal spaces of the dial in equal times. How this difficulty was obviated during the Dark Ages we have no means of knowing. There is a record of a clock of very elaborate workmanship having been sent by Pope Paul I. to King Pepin of France in 760, and of another being invented by Pacificus, archdeacon of Genoa, in the ninth century. The invention of an escapement of some kind is attributed to Gerbert about A. D. 1000. Though rude, it probably answered the purpose, for within the next 380 years tower-clocks of great size were set up in Canterbury cathedral (1292), in the abbey of St. Albans (1326), at Genoa (1353), and one which struck the hours at Westminster in 1368. The clock whose construction is best known, and which was undoubtedly the best timekeeper of any of that period, was that made by Henry de Vick, a German, and set up in Paris for Charles V. in 1379. We have deemed the movement of this clock worthy of a pictorial illustration, as showing what were the methods of constructing a balance and escapement at that time. The toothed or crown-wheel I is the escapement-wheel; the pallets or levers *h* having bevelled edges, and projecting from the suspended upright spindle or vertical axis *K M*, on which is fixed the regu-

lator or balance *L L*, give it a vibratory motion, as the motion induced by the weight *A* in uncoiling the cord and causing the cylinder *B* to revolve is communicated to the various toothed or cog-wheels, and finally to the crown or escapement-wheel, causes them alternately to strike the teeth of that wheel. There would still be an irregularity in these motions, and a consequent defect in the clock as a time-keeper, were it not for the weights *m m*, placed on the balance or regulator, and which, by the distance they are removed from the spindle, increase or diminish the resistance of the pallets to the escapement-wheel. This was the principle on which all clocks were made for the next 270 years, but the English do not seem to have been successful in making good timekeepers till 1540, when one set up at Hampton Court by an unknown maker became celebrated



for its accuracy. It was not until a century later (some time between 1641 and 1658) that either an English clock-maker named Harris, or the Dutch philosopher Huyghens, adapted Galileo's discovery of the substantial isochronism of the pendulum beats to the marking of time by making the escapement or crown-wheel horizontal, instead of vertical, and attaching the pallets to the pendulum-rod. Subsequent improvements were made in the escapement, especially the substituting the anchor escapement for that of Huyghens by Dr. Hooke, 1666-80, and the further improvement of this in the dead-beat escapement of George Graham, invented in 1700, in which the arms of the escapement are set at right angles, and the outer surface of the pallet *B* and the inner surface of the pallet *C* are arcs of circles, of which *A*, the point of attachment to the pendulum-rod, is the centre. This ensured great accuracy as timekeepers. Other escapements, as the duplex, detached, pin-wheel, gravity, etc., have been devised, but have not come into very general use, and are not, perhaps, preferable in all respects to Graham's. Other improvements have been attempted in the pendulum itself. These have been mainly in the matter of compensation for the expansion and contraction of the pendulum-rod by heat and cold.



Graham's mercurial compensation pendulum, invented in 1715, in which a tube or ball having mercury in it was substituted for the bob of the pendulum, and the gridiron pendulum of Harrison, invented in 1726, composed of five rods of steel and four of brass, which, expanding differently, compensated by their action for the changes induced by heat or cold, were the principal of these.

The American clockmakers, retaining the dead-beat escapement, made the pendulum-rod of wood and covered it with gold-leaf; and this has been found to be as effectual a contrivance as either the mercurial or gridiron pendulum. In the cheaper clocks, where absolute accuracy is not so important, they have obtained substantial accuracy by turning a screw thread upon the lower end of the pendulum-rod, and putting upon this a nut, which, while it holds the sliding pendulum-bob in place, can by one or two turns regulate it in accordance with the temperature of the season. To accommodate what is known as the cycloidal curve in the arc described by the pendulum, its attachment to the pinion moved by the weights, or afterward by the spring, was made by hammering its upper end into a thin slip of steel which passed into a slit in the pinion, and was held in place by two little cheeks or projections at the top. While the workmanship was gradually perfected, the principles on which clocks were made in England, France, and Germany have not changed, except in a single particular—that of a substitution of steel springs for weights—from the beginning of the eighteenth century to the present time. Even now, very considerable numbers of these brass-wheel clocks, with weights, and standing in a case six feet high, are still made, and some of them are still exported to the U. S. The manufacture of this description of clocks was introduced into this country before the Rev-

olutionary war, but comparatively few were made, though of good workmanship.

The tall, old-fashioned clock, with its long pendulum and heavy weights, seems very different from the little "nutmeg lever," but both depend upon the same principle.

In the U. S. the only clocks now imported, except by the antiquarians, are the French mantel or parlor clocks, and the importation of these is falling off. The clock-manufacture in the U. S. began about 1787. Eli Terry of Windsor, Conn., was probably the first clockmaker here. His clocks were made entirely of wood. They were good timekeepers, and were sold in large quantities by peddlers. In 1807 he undertook to make 500 clocks at one time, but overstocked the market and reduced the price from \$25 to \$15, and at last to \$10. It was not till 1837 that brass-wheel clocks were made in the U. S. From 1806 to 1815 the number of clockmakers largely increased (Messrs. Seth Thomas, Silas Hoadley, Herman Clark, Asa Hopkins, and others engaging in the business), and many thousands were made. In 1814, Mr. Terry invented what was known as the "short shelf-clock," in which, by a change of arrangement and smaller weights, the pendulum being brought forward and greatly shortened, and the weights being carried and run on each side, the whole was reduced to a more compact form, and clock and case were sold together for a moderate price. This modification was adopted by other manufacturers, and soon became general. These clocks were made with wooden wheels, but after the introduction of rolled brass into the market, machinery was invented by which the blank wheels of the clock could be struck out of the rolled brass with a die, and the teeth afterwards cut by machinery, and the brass-wheel clocks could be made cheaper than wooden ones.

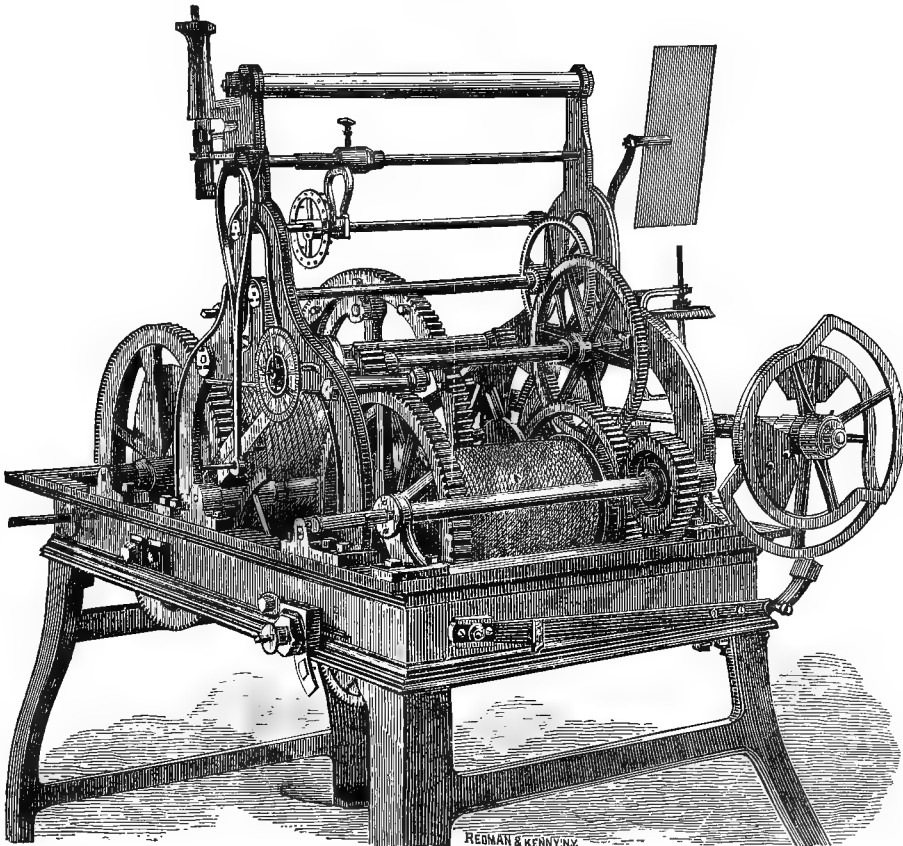
The next improvement was the substitution of coiled steel springs for the weights, thus assimilating the clock to the watch. This has been done in Europe for two hundred years, but only with the most costly parlor clocks, and the springs used were equal in quality to the best watch-springs. Of course, this would not answer for cheap clocks for the million, and various experiments were tried with cheap springs. Coiled brass springs were used, but

these soon lost what little temper they had, and so did their purchasers. An elliptic steel spring connected with a fusee was tried, but with no better success. Finally, a new and completely successful process of making a superior steel spring was invented in this country; and the springs thus produced have for many years been sold at a price compatible with their use in cheap clocks. This, together with the cheapening by machine-labor of the production of all parts of the clocks, has led to their very general introduction, and to the reduction of the size of clocks, till now twenty-four of the smallest sized pendulum clocks can be packed in a box of one cubic foot in dimensions. One result of this reduction in the size and price of clocks was an enormous increase in the demand for them, both in this and foreign countries. Clocks to run thirty hours were made which sold in quantities at nine dollars the dozen, and a fair eight-day clock at forty-eight dollars the dozen.

In 1852 there were thirty-one clock cos., of which nine failed, four were burned out, and five closed their business as unprofitable within the next five years. But these cos. in 1853 and 1854 made immense sales, the Jerome Manufacturing Co. shipping 440,000 clocks per annum. There are only 15 firms engaged in the business, all but 4 of them in Conn.; the number of clocks made annually is about 2,500,000, and the quantity is increasing, and their value at the factories probably \$6,000,000 or more. They manufacture common one and eight day clocks; levers, one and eight day, with and without strike and alarm: office, hanging, and calendar clocks; clock movements, mantel or parlor clocks equal to the best French in accuracy and elegance; and tower and pillar clocks. All of these are superior in quality to and lower in price than the best foreign clocks. They are exported very largely to all the countries of Europe, to China and Japan, India, Western Asia, Egypt, South Africa, Mexico, and South America.

Tower clocks, which until within the past twenty years were imported, are now made of excellent quality by A. S. Hotchkiss for the Seth Thomas Clock Company, the Howard Watch and Clock Company, Charles Fasold, and by several other firms. Cut No. 3 represents the movement of one of the Hotchkiss tower clocks erected in Steu-

FIG. 3.



benville, O., and a similar one is on the City Hall, New York. The clocks are remarkable for their accuracy and the perfection of their mechanism, and have proved admir-

able timekeepers. They have the pin-wheel escapement (very clearly delineated on the second and third cross-bars), the pins having an ingenious contrivance of a shoul-

der to keep the oil upon them; and also a very remarkable arrangement (at the right of the figure) for regulating automatically the gas-jets which illumine the face of the clock, so that they may burn any required number of hours. Regulators, formerly imported in all cases, are now made of the best quality by the Howard Watch and Clock Company of Boston. Regulator clocks are also made by the Seth Thomas Clock Company of Thomaston, Conn., the William L. Gilbert Clock Company of Winsted, the Waterbury Clock Company, and Welch, Spring & Co. The wooden pendulum-rod, covered with gold leaf, which is one of the characteristics of these regulator clocks, is, we believe, an invention of Mr. Silas B. Terry, a son of the pioneer in American clockmaking, and himself for forty-five years in the business. The French parlor or mantel clock, a costly and beautiful ornament to the homes of the wealthy, had so long been imported that it was considered hopeless to attempt to compete with it; but since 1866 Messrs. Seth Thomas' Sons & Co. have been engaged in the manufacture of these articles, and have produced clocks which in the perfection of their workmanship, their accuracy as timekeepers, and the elegance and variety of their patterns, as well as in their moderate price, compete so favorably with the foreign parlor clock that they have well-nigh driven it from the market. The Terry Clock Company at Waterbury have also commenced the manufacture of a neat parlor clock. Of other special kinds of clocks we may name the calendar clock, first successfully made for the general market in this country, which gives the day of the week and month, and sometimes the changes of the moon; the marine clock, a watch on a large scale, which, properly made, is an excellent timekeeper; the railroad clock, which is of similar but somewhat more delicate construction, and with a compensating arrangement for the jar to which it is exposed, etc., etc. The electric or magnetic clock belongs properly to the departments of astronomy and telegraphy. The mechanism for striking the hours or half or quarter hours, in most clocks, is complicated and not readily understood without careful drawings.

L. P. BROCKETT.

**CLOCK, AMERICAN ASTRONOMICAL.** This wonderful clock was invented by Felix Meier, who spent four years in personally superintending its construction. It is now (1884) the grandest work of the kind ever produced, and is altogether superior to the famous Strasbourg astronomical and apostolic clock in Europe (made 1547-80), which was the greatest work of the kind until this clock was made.

It is eighteen feet in height, eight feet wide by five feet deep, and weighs 5000 pounds. There are required in the construction of the clock 2000 wheels, besides the great number of shafts, pinions, and other machinery necessary to complete the grand combination. The clock is run by weights which weigh 700 pounds, and is wound up once in twelve days. The case or exterior of the clock is entirely of black walnut, and is elegantly carved or engraved in designs appropriate and symbolic of our republic. Above the main body of the clock is a marble dome, upon which Washington sits in his chair of state, protected by a canopy which is surmounted by a gilded statue of Columbia; on either side of Washington is a colored servant in livery guarding the doors which open between the pillars that support the canopy; on the four corners of the main body of the clock are black walnut niches containing human figures, emblematic of the march of life; the two lower ones are supported by two female figures with flaming torches: one of the niches contains the figure of an infant, the second the figure of a youth, the third of a man in middle life, the fourth of an aged graybeard, and still another, directly over the centre, contains a skeleton representing Father Time. All of these figures have bells and hammers in their hands. The infant's bell is small and sweet-toned; the youth's bell larger and harsher; the bell of manhood strong and resonant; that of old age diminishing in strength; and the bell of the skeleton deep and sad. A figure of W. C. Bryant, and another of Prof. Morse, inventor of telegraphy, rest upon the pillars that support the planetary system.

The astronomical and mathematical calculation, if kept up, would show the correct movement of the planets for 200 years, leap years included.

When the clock is in operation it shows local time in hours, minutes, and seconds; the difference in time at Chicago, Washington, San Francisco, Melbourne, Pekin, Cairo, Constantinople, St. Petersburg, Vienna, London, Berlin, and Paris; the day of the week, calendar day of the month, month of the year, and seasons of the year; the signs of the zodiac, the revolutions of the earth on its own axis, and also around the sun; the revolutions of the moon around the earth, and with it around the sun; also, the moon's changes from the quarter to half, three-quarter,

ters, and full; the correct movement of the planets around the sun, comprising Mercury, which makes the revolution once in 88 days; Venus, once in 224 days; Mars, once in 686 days; Vesta, once in 1327 days; Juno, once in 1593 days; Ceres, once in 1681 days; Jupiter, once in 4332 days; Saturn, once in 10,758 days; Uranus, once in 30,688 days. There is therefore a movement in this wonderful piece of machinery which cannot regularly be repeated more than once in eighty-four years.

The inventor has a crank attachment to the clock by means of which he can hasten the working of the machinery, in order to show its movements to the public. By turning continuously twelve hours a day for sixteen days and eight hours, a perfect revolution of the planet Uranus around the sun would be shown.

At the end of every quarter hour the infant in his carved niche strikes with a tiny hammer upon the bell which he holds in his hand. At the end of each half hour the youth strikes; at the end of three-quarters of an hour, the man; and at the end of each hour, the graybeard. Death then follows with a measured stroke to toll the hour. A carved figure projecting from either side of the skeleton indicates that time flies.

A large music-box, manufactured at Geneva expressly for this clock, begins to play at the same time that the skeleton strikes the hour, and a surprising scene is enacted upon the platform beneath the canopy. Washington slowly rises from his chair to his feet, extending his right hand, presenting the Declaration of Independence; the door on the left is opened by the servant, admitting all the Presidents from Washington's time, including President Hayes. Each President is dressed in the costume of his time. The likenesses are admirable. Passing in file before Washington, they face and raise their hands as they approach him, and walking naturally across the platform disappear through the opposite door, which is promptly closed behind them by the second servant. Washington retires into his chair, and all is quiet, save the measured tick of the huge pendulum and the ringing of the quarter hours, until another hour has passed.

**Clo'dius**, simply another form of the more common **Claudius** (**PUBLIUS**), surnamed **PULCHER** (*i. e.* "handsome"), a profligate Roman tribune and patrician, was a brother of Appius Claudius Pulcher, and is well known from Cicero's "Oratio pro Milone," which, however, is in the highest degree exaggerated and false. Clodius served in Asia, in his youth, under his brother-in-law Lucullus, and in 62 B. C. committed sacrilege by intruding himself, disguised as a woman, into the mysteries of Bona Dea. At his trial for this offence he attempted to prove that he was not in Rome at that time, but Cicero testified that he saw Clodius in Rome on that day, and thus incurred his enmity. Clodius was acquitted by means of bribery, and was elected tribune of the people in 59 B. C. He persecuted Cicero by the enactment of a law that he should be interdicted from fire and water, and drove him into exile. Clodius was killed in 52 B. C. in an encounter with Milo, who was a partisan of Cicero and was the political enemy of Clodius, whom he succeeded as tribune.

**Clois'ter** [from the Lat. *claustrum*, an "enclosure;" Fr. *cloître*; Ger. *Kloster*], a term which originally denoted a covered ambulatory running round certain portions of monastic and collegiate buildings, but it was subsequently often applied to any monastic establishment. The cloisters usually ran along three sides of a quadrangle, called the *garth*. The roof, often vaulted, was supported by pillars and arches. The portions of these arches above the mullions were often glazed, and sometimes the whole arches, so that they became windows. Cloisters were used for exercise and recreation. Often, when glazed, they had stalls for study, and frequently a stone bench, on the inner side.

**Clonmel**, a parliamentary borough of Ireland, is on both sides of the river Suir, 14 miles S. S. E. of Cashel. It is mostly in the county of Tipperary, and partly in that of Waterford. The Suir is here crossed by several bridges, one of which has twenty arches. It has a church of the twelfth century. There is a trade in grain, cattle, and butter, also manufactures of cotton. In 1650, Cromwell demolished the castle. Pop. 9484.

**Clonmel**, EARLS OF (1793), Viscounts Clonmel (1789), and Barons Earlsfort (Ireland, 1784).—JOHN HENRY REGINALD SCOTT, fourth earl, born Mar. 2, 1839, succeeded his father in Feb., 1866.

**Clontarf**, a town and bathing-place of Ireland, on Dublin Bay, 3 miles E. N. E. of Dublin. Here, in 1014, Brian Boru gained a great victory over the Danes. Near this town is Clontarf Castle, the residence of the Vernon family. Pop. 7814.

**Clootz** (JEAN BAPTISTE), BARON, a visionary character of the French revolution, born near Cleves, Prussia, June 24, 1755. Taking the name of Anacharsis, from the celebrated philosophical romance of Abbé Barthélemy, he traversed Europe, proclaiming the brotherhood of the human race. He contributed large sums to the French republican cause, to which he looked for the fulfilment of his hopes of universal freedom. He was expelled from the Jacobin Club at the instigation of Robespierre, and guillotined for a fictitious offence March 23, 1794.

**Close-Hauled**, in navigation, is the mode in which the sails are arranged in order to make the ship move in a direction the nearest possible towards that point of the compass from which the wind blows. In the thorough attainment of this result, much, of course, depends upon the shape of the vessel.

**Clot.** See BLOOD and COAGULATION.

**Clothaire I.**, born in 497 A. D., was the fourth son of Clovis, king of the Franks. He became king of Soissons in 511, when the dominions of Clovis were divided among his sons. By murdering two of his nephews he obtained the sovereignty of Austrasia and Orleans, and reigned at Paris over all the former dominions of Clovis. He died in 561 A. D., leaving four sons—Caribert, Gontran, Sigebert, and Chilperic I., who divided the realm between them.

**Clothaire II.**, a son of Chilperic I., was a minor when he inherited the kingdom of Soissons in 584 A. D. His mother Frédégonde was regent until 597. He put to death Brunehaut, queen of Austrasia, and usurped the throne of that country in 613 A. D. He thus became sovereign of all France. Died in 628 A. D. He was one of the Merovingian dynasty.

**Clothes-Moth.** See MOTH.

**Clo'tho**, in classic mythology, one of the PARCÆ (which see).

**Clotho**, an asteroid discovered by Tempel in 1868.

**Clotho** (a serpent). See PUFF ADDER.

**Clotild'a**, SAINT, queen of France, was a daughter of Chilperic, king of Burgundy. She was married in 493 A. D. to Clovis I., whom she induced to profess the Christian religion in 496. She opposed Arianism. Died in 545 A. D.

**Clouds** [Lat. *nubes*] are collections of extremely minute particles of water suspended in the atmosphere. These particles are often, in consequence of the great elevation at which they float, in a frozen state, even in summer. It is now known that when masses of air fully charged with aqueous vapor, but at different temperatures, come in contact with each other and mix, the space occupied by the resulting mass will be overcharged, and the vapor, which was invisible so long as completely mingled with the air, becomes precipitated, so to speak, in the form of water-dust, and then takes the appearance of fog or cloud. Why these minute particles remain suspended in the atmosphere, and do not descend as similar particles of earth would do, has not yet been satisfactorily explained. Some have conjectured that the watery particles are hollow, like soap-bubbles. But this—supposing it to be true, of which there is no proof—would not account for their suspension unless they were filled with a gas lighter than the surrounding air. It is not improbable that electricity, which appears to exert so great an influence in giving the different kinds of clouds their form and character, may be the principal agency by which these various collections of water-dust are kept suspended at different elevations, according to the character of the cloud. The only difference between fog and cloud is that while the latter remains high in the atmosphere, the former seems to rest upon the earth; in other words, fog is simply cloud close at hand. Hence, when a cloud high up in the air strikes against the side of a mountain, to a person at that point on the mountain it appears precisely like fog.

To clouds in their infinitely varied forms we are indebted for some of the most glorious scenes that nature ever presents to the eye of man; and a landscape, however beautiful, seems incomplete unless the accompaniment of clouds is added to the picture. (For a particular account of the different kinds of clouds, and their connection with the changes of the weather, the reader is referred to METEOROLOGY.)

**Clough** (ARTHUR HUGH), an English poet, born at Liverpool Jan. 1, 1819, was educated at Rugby. He was one of Dr. Arnold's favorite pupils. His distinguished school-fellow, Arthur Penrhyn Stanley, who has written a valuable notice of Clough, says that "over the career of none of his pupils did Arnold watch with a livelier interest or a more sanguine hope." From Rugby he passed to Oxford, where "he carried away the Balliol scholarship with a renown beyond that of any of his predecessors." From Bal-

liol he was elected to a fellowship at Oriel, and he remained at Oxford until 1848, when a sense that he had done his work there, and that he was a little too alien in speculative and in practical thought from the tone of the university to be of further use or to find a fit abode there—that he might honorably seek a more unshackled career without—led Clough to withdraw from Oriel. In 1848 appeared his first published poem, "The Bothie of Tober-na-Vuolich: a Long-Vacation Pastoral," which was quickly recognized as a work of remarkable power and beauty. But it was something besides a successful literary venture. If it has been called Clough's "Farewell to Oxford," it is because it is revolutionary; it shows that the thought of his time had awakened strong echoes in his nature; that if he had not broken with the ancient past—which he had not, and which he never could—he at least was ready to go forth with hearty confidence to meet the present, and to take an active part in the real business of life. "A sense of fresh, healthy manliness; a scorn of base and selfish motives; a frank admiration for common life; a love of earth, not only for its earthly sake, but for the divine and the eternal interfused in it—such, and other such," says Palgrave, "are the impressions left." The poem is written in English hexameters, which have a certain wild flavor that is very stimulating. "Viewed critically, Clough's work is wanting in art; the language and the thought are often unequal and incomplete; the poetical fusion into a harmonious whole imperfect. It is poetry, however, which belongs to a very uncommon class: it should be judged by the thoughts awakened, rather than by the mode of expressing them." After his withdrawal from Oxford in 1848, Clough spent a year or two in travel on the Continent, going as far as the Italian lakes. On his return he published in 1849 a series of poems of which the earliest date back to 1840, under the title of "Ambarvalia." This collection contains many striking pieces, revealing the depth and earnestness of Clough's nature, with much of that tenderness which his friends declare to have been so notable a characteristic of his, and also a strong tendency, by no means incompatible with this, toward sarcasm.

His tutorship at Oxford relinquished, he passed from one employment to another: was warden of University Hall, London; came to America, and resided here for a few months in 1852; returned to England to accept an appointment in the education department of the privy council office; went to France and Vienna in 1856 on duties connected with the secretaryship to the commission of report on military education; and in leisure hours gradually completed the long revision of Dryden's translation of Plutarch begun in America, comparing that inaccurate though spirited text throughout with the original, and retouching it with a skill and taste in which his careful study of Chaucer and our early literature gave him a special mastery.

Meanwhile, with his usual energetic sympathy for all that touched the welfare of the poor and the wretched, he undertook much anxious work to assist his wife's cousin, Florence Nightingale, in her own arduous labors. His health, never very robust, gave way, and by the advice of his physicians he went on a journey to Greece and Constantinople, and returned much benefited. A second journey to Auvergne and the Pyrenees, and then to Italy in company with Mr. and Mrs. Alfred Tennyson, undertaken with the hope of completing the good work of the former, was not so fortunate. Near the Italian lakes he was struck by the malaria, and pushed on with difficulty to Florence, where fever carried him off, Nov. 13, 1861. Clough contributed several papers of value to the "North American Review," and to the "Atlantic Monthly" one of his best poems, "Amours de Voyage." While here he made one of an intimate circle of the most cultivated scholars and men of letters in Boston and Cambridge. He was beloved here, as at home, for the noble beauty of his character, as well as respected for the range and thoroughness of his attainments. He is come to be reckoned one of the chief names of the time in poetry; his reputation has steadily risen, and Emerson's words in 1848 are like to be justified: "He will make Tennyson look to his laurels." (See "Ambarvalia. Poems by Thomas Burbidge and Arthur H. Clough," London, Chapman & Hall, 1849; "Poems by Arthur Hugh Clough, with a Memoir," by F. T. PALGRAVE, London, Macmillan; "The Poems and Prose Remains of Arthur Hugh Clough, with a selection from his Letters and a Memoir. Edited by his wife," 2 vols. London, Macmillan, 1869.)

CLARENCE COOK.

**Clove Bark.** See CULILAWAN BARK.

**Clover** [from a root akin to *cleave*, *cloven*, because the leaves are parted or cleft], or **Tre'foil** (*i. e.* "having three leaves"), (*Trifolium*), a genus of plants of the order Leguminosæ, containing many species, some of them very important in agriculture. The name is popularly extended

to plants not included in this genus, but belonging to the same order, and having the leaves formed of three leaflets. The true clovers (*Trifolium*) have herbaceous, not twining stems, roundish heads or oblong spikes of small flowers, the pod containing one or two, rarely three or four, seeds. Twenty native or naturalized species belong to Great Britain, and more than twelve species to the U. S., most of them natives. The most important is the common red clover (*Trifolium pratense*), a native of Europe, growing in meadows and pastures. Its heads of flowers are nearly globular, very compact, about an inch in diameter, purplish-crimson, flesh-colored, or whitish. The leaflets have often a whitish horseshoe mark in the centre. The zigzag clover (*Trifolium medium*) resembles the common red clover, but is distinguished by the smooth tube of the calyx, and by the broader, less membranaceous, and acuminate stipules. The stems are more rigid than in *Trifolium pratense*; the heads of flowers larger, more nearly globose, and of a deeper purple color; and the leaflets have no white spot. It is common in Europe, and grows in the U. S. White clover (*Trifolium repens*) is a common native of Europe and also of North America. Alsike clover (*Trifolium hybridum*), a perennial, regarded by some as intermediate between the common red and the white clover, has of late attained a very high reputation. It was introduced from the south of Sweden. Crimson or Italian clover (*Trifolium incarnatum*), an annual, native of the south of Europe, with oblong spikes of rich crimson flowers, is much cultivated in Europe, producing a heavy crop. Egyptian clover (*Trifolium Alexandrinum*), an annual species, a native of Egypt, where it is the principal fodder for cattle, is supposed to be one of the best kinds of clover. It has oval heads of pale-yellow or whitish flowers. Yellow clover, or hop trefoil (*Trifolium procumbens*), is common on dry gravelly soils in Great Britain and the U. S., but not much esteemed. The *Trifolium reflexum*, or buffalo clover of the U. S., deserves the attention of agriculturists.

Clover is now very frequently cultivated in alternation with grain crops. The kinds most generally sown are the common red, white, and alsike. The common red clover is the finest and most valuable. It frequently grows well on sandy loams, though sown every alternate year on the same land. But in some places the land becomes "clover-sick" when sown too frequently with this crop. From ten to twenty pounds of seed are usually sown upon an acre. Red clover is much valued for hay. When it grows well, it bears to be cut more than once in a year. White clover is esteemed for pasture; it grows short and thick on the ground, and throws out stems and flowers during the most of the growing season. Alsike clover has been recently introduced; it rises much higher than white clover, and promises to be a useful addition to our pasture-plants. White and alsike clovers are valuable for bee-pasture. Clovers perform an important part in restoring fertility to exhausted land. They are often ploughed under when green, and thus greatly benefit worn-out soils. Their leaves gather food from the atmosphere, which they store up in their roots and stems, and these on decomposing afford food for crops which are more dependent on the soil itself. The chief profit in raising clover is in the increased value of the manures it yields, which are highly nitrogenous.

**Cloves** [from the Sp. *clavo*, i. e. a "nail," so called from its resemblance to a nail], the smoked and dried flower-buds of the clove tree (*Caryophyllus aromaticus*), of the order Myrtaceæ. The tree is from fifteen to forty feet high, with a beautiful pyramidal head. The leaves are large, ovate-oblong, and evergreen; the flowers are produced in great profusion. Leaves, flowers, and bark have an aromatic odor. The fruit sometimes appears in commerce in a dried state under the name of "mother cloves;" it has an odor and flavor similar to cloves, but weaker. The flower-buds are gathered, and are dried by the smoke of wood-fires, and afterwards by the sun, or by the latter alone. The clove tree is a native of the Moluccas, and the Bencoolen and Amboyna cloves are the best; but they are now cultivated in Sumatra, Zanzibar, Mauritius, the West Indies, Brazil, and Guiana. The Dutch, to secure to their colonists a monopoly of this spice, once destroyed the trees in the other Molucca Islands, and confined the cultivation to the isle of Ternate. Before the discovery of the Spice Islands merchants brought them from Arabia, Persia, and Egypt to the Mediterranean.

Their aromatic qualities depend on two essential oils, which together form one-seventh of the weight of the cloves. The oil is obtained by repeatedly distilling with water, when two oils pass over—one of which is lighter and the other is heavier than water. The oil has a hot, acrid taste, is of a light yellow color when pure, and brown when not carefully prepared. It is a mixture of eugenol acid ( $\text{H.C}_{10}\text{H}_{11}\text{O}_2$ ) and a hydrocarbon ( $\text{C}_{10}\text{H}_{16}$ ), isomeric with oil of turpentine. It is soluble in ether, alcohol, and

the fixed oils. It is useful in medicine to check nausea and griping caused by the administration of purgatives, and as a remedy for toothache.

REVISED BY C. F. CHANDLER.

**Clovis** [Lat. *Clodoveus*] **I.**, called also **Chlodwig** (probably allied to the German *Ludwig*, "Lewis"), king of the Franks, was born in 465 A. D. He was the son and successor of Childeric, who reigned at Tournay and died in 481. By a victory over the Romans and Gauls in 486 A. D., Clovis obtained possession of Soissons, which then became his capital. He married in 493 Clotilda, a Christian princess, and about three years later was converted to the new faith and baptized. In the great battle of Tolbiac (Zülrich), near Cologne, he was heavily pressed by the Alemanni. His troops were beginning to give way. As a last resource he determined to invoke the God of his wife, offering to become a Christian on condition of obtaining the victory. The Alemanni were routed, and on Christmas day the king and—what in those times was a simple and natural consequence—the larger part of his army were baptized by Remigius, bishop of Rheims, 496. Of course his Christianity was of a somewhat doubtful character. Once, after listening to the narrative of the crucifixion of Christ, he exclaimed, "Would I had been there with my valiant Franks to avenge him!" Nevertheless, his conversion contributed very much to bring the Teutonic races generally in closer communication with the Christian Church and Roman civilization. The circumstance that he became a Catholic, while the kings of Burgundy and of the Visigoths were Arians, was a great boon to the Roman Church—why Clovis was also styled "Most Christian King," a title which the French kings bore ever afterward. In 507 he defeated Alaric, king of the Visigoths, in a great battle near Poitiers. By this victory he added Aquitaine to his dominions. He chose Paris as his capital in 507. He died Nov. 27, 511 A. D., and France was then divided among his four sons—Thierry, Clodomir, Childeric, and Clothaire. His descendants are called Merovingians, from Merovig, the grandfather of Clovis. (See VIALON, "Clovis, le grand premier Roi Chrétien," 3 vols., 1788.)

**Cloves** (TIMOTHY), LL.D., an American Episcopalian divine and scholar, graduated at Columbia College in 1808. He was distinguished as a mathematician. In 1823 he became president of Washington College, Md., and was for many years a prominent educator of youth. Died at Hempstead, Long Island, in 1847.

**Clown** [from the Lat. *colonus*, a "husbandman"], a term originally applied to a rustic, now quite generally designates a professional jester or buffoon. In dramatic literature it is frequently the title of a prince's jester or court-fool (Ger. *Hofnarr*; Fr. *fou*; Sp. *gracioso*; It. *buffo*), a privileged character at European courts in former times.

**Club** [etymology uncertain], an association of persons for some common purpose, as of politics, literature, etc., denoting especially a body meeting for social purposes, and consisting of members belonging for the most part to some one class. Club-life in London had its origin in the days of Elizabeth, when the Mermaid tavern, in Fleet street, enlivened by Shakespeare, Raleigh, Ben Jonson, Beaumont, and Fletcher, became the home of a sort of club. Jonson afterwards founded a club at the Devil tavern, Fleet street. These were informal social meetings to which all were welcome who could bring humor or wit. In the last century clubs named after the proprietors of the houses in which the meetings were held were established by politicians in England.

After the close of the great European war in 1815 many officers, no longer needed for war, were placed upon half-pay; and this pay was insufficient to support them without careful economy. If they could dine at a club, it would be cheaper than if each maintained a separate establishment. Hence arose the United Service Club; and the success of this speedily led to others for different classes and for persons of different political opinions. At the present time there are in London sixty-eight great clubs. Each club comprises a definite number of members; and this number cannot be exceeded. The members pay a sum of money on entrance and an annual subscription. The clubs usually comprise news-rooms, libraries, dining-rooms, and drawing-rooms. There are arrangements for the members to sleep at certain establishments called club-chambers, which, however, are not properly clubs. Some of the clubs are furnished with bath, billiard, and smoking rooms. The restaurant is usually very complete; everything is of the best, and is supplied to members nearly at cost. In nearly all hard drinking is discouraged. Some of the club-houses rank among the most elegant buildings in London. Some of the similar organizations exist in the larger cities of the U. S., especially in New York, but their extent and influence are much smaller than in England. The clubs which



sprang up in France after 1789 were not clubs in the English sense of the word, but meetings of the great political parties.

**Club-Foot** (*Talipes*). This deformity is mostly congenital, and usually affects both sides. The inner margin of the foot is elevated, the external one depressed and touches the ground. The middle and anterior portions of the foot are retarded in their growth, and its joints become immovable (ankylosis). The deformity becomes more pronounced when the child begins to walk, sometimes to such an extent that the upper part of the foot takes the place of the sole. At the same time the muscles of the leg become emaciated, and lose their muscular texture altogether. The cause has been sought for in diseases of the brain or spinal cord contracted before birth, or by continued pressure in the womb. But a more rational explanation is yielded by the consideration of the early condition of the foetus. The lower extremities are first formed (about the end of the first month of pregnancy) on the anterior aspect of the abdomen of the foetus, under the skin, in such a manner that the knee-pit is looking towards the abdomen. In order to assume its normal shape the whole extremity, including the foot, has to turn round its axis. When this process, as far as the foot is concerned, remains incomplete, club-foot is the result. A mild degree of club-foot is perceptible in every foetus about the fourth or fifth month of pregnancy. Some cases are the result of an abnormal obliquity of the small bones of the tarsus (posterior portion) of the foot, and a primary shortness of the gastrocnemius muscle of the leg. Club-foot, when acquired after birth, results from paralysis of the extensors of the foot. In that case the action of the flexors results in the same deformity. Mild cases require but little treatment. Manual stretching of the foot, proper bandaging, the application of a splint or plaster of Paris, are often sufficient. More serious cases require the cutting of one or more of the flexors (*tendo achillis*, plantar aponeurosis, anterior tibial muscles), with bandaging or the wearing of an appropriate apparatus (Scarpa's shoe). A. JACOB.

**Club-Mosses, or Ground-Pines** (*Lycopodiaceæ*), a natural order of cryptogamous plants (*acrogens*), in some species resembling the *Coniferæ* in general aspect, but frequently having something of the habit of the mosses. They also approach the ferns through *Ophioglossum*, in their reproduction. The genera are few, the living species quite numerous. The genus *Lycopodium* yields the drug *lycopodium*, a fine inflammable powder consisting of the spores of the plant. This article is much used in pharmacy and in pyrotechnics. Many of the tropical species have active poisonous properties, and some have been used in medicine. Many of our native species are very beautiful, and are much used in Christmas decoration. The fossil plants of this order were often mighty trees (*Lepidodendron*), and seem to have furnished much material for the oldest coal deposits. At the other extreme must be placed the curious grass-like quill-worts (*Jasites*), which are mostly small aquatic plants of singular habit. C. W. GREENE.

**Cluniacs, The, or Congregation of Clugny** (*Cluniacum* in Burgundy, a very influential monastic institution), was founded in 910 by Duke William of Aquitaine, who put his relative, Abbot Berno of Beaume, at the head of the new institution. As the aim of the duke was to effect a reform of monastic life, which had sunk very low in France, Berno enforced the strictest observance of the rules of St. Benedict; but just this severity struck a rich vein of sympathy in the time. Clugny became the reformer not only of the Benedictine order, but of monastic life in general, and its rules, "*Consuetudines Cluniacenses*," were generally adopted. Three popes issued from its cells, Gregory VII., Urban II., and Paschales II. Privileges and endowments were showered upon it, and it soon became one of the richest and most magnificent institutions which the Middle Ages ever saw. It received at one time Pope Innocent IV. and the king of France, with their whole retinues, in 1245. But lack of discipline and the dissipation of the abbots greatly impoverished the institution during the next two centuries. Under the Revolution the Constituent Assembly closed the convent, confiscated the property, and sold the buildings. The church was broken down. (See LORAIN, "*L'abbaye de Clugny*," Dijon, 1830.)

**Cluny, formerly Clugny** (anc. *Cluniacum*), a town of France, department of Saône-et-Loire, on the Grône, here crossed by two stone bridges, 14 miles N. W. of Mâcon. Here are the remains of a rich and famous Benedictine abbey, founded in 910 A. D. It has also the church of Notre Dame, of 13th century. Cluny has manufactures of gloves, lace, linen, paper, and pottery. Pop. in 1881, 4385.

**Clupe'idæ** [from *Clupea* (herring), perhaps the most important of its genera], a family of malacocephalous fishes

allied to the Salmonidæ, and distinguished from them chiefly by the absence of an adipose fin. The scales are easily detached. The fins are without spinous rays. The gill-openings are very large; the teeth small and generally numerous; the maxillary bones of three pieces easily separated; the body generally long; the air-bladder is always large; the roe consists of a vast number of eggs. A few of the fishes of this family ascend rivers, the rest are exclusively marine. They generally appear in shoals, and some of them periodically visit certain coasts in great numbers. They are found in many parts of the world, some species especially having a wide geographic range. To this family with its widest limits belong the herring, shad, pilchard, anchovy, sardine, etc., but the latest authorities divide it into several families.

**Cluseret** (GUSTAVE PAUL), a French revolutionist, born June 13, 1823, resigned in 1858 his place as captain in the French army because he had adopted the principles of Mazzini. In 1859 he served under Garibaldi, and in 1861 entered the volunteer army of the U. S., in which he became in 1862 a brigadier-general. In 1864 he published in New York the "*New Nation*," to urge the nomination of Fremont for the presidency. His attempts, in 1870, to proclaim in Lyons and Marseilles the "*Red Republic*" failed. In Mar., 1871, the Communists of Paris appointed him chief of the war department; on May 1 he was deposed, arrested, and impeached, but after a few days set free, and fled to England.

**Clusia** [so called in honor of the botanist L'écluse or Clusius], the name of a genus of small tropical trees and shrubs of the order Clusiaceæ. Some of them are called balsam trees, from their resinous or balsamic products. They are often epiphytes, growing on larger trees, over the bark of which they send their roots in search of decayed parts from which they may extract nourishment; sometimes a root is sent to the ground, and becomes a kind of stem. According to good authorities, they are sometimes parasitical. *Clusia rosea*, a native of the West Indies and tropical America, yields an abundant resin, which is used in medicine and for covering boats instead of pitch. A resin which exudes in large quantities from the disk of the flowers of *Clusia insignis*, known as the wax-flower of Demerara, is used to make a gently-stimulating and soothing plaster. *Clusia flava*, or yellow balsam tree, grows in Southern Florida and the West Indies. It abounds in a yellow resin or balsam, which has medicinal qualities, and is largely used in the West Indies instead of pitch.

**Clustered Columns, or Compound Piers**, form one of the richest features in Gothic ecclesiastical architecture. The columns or shafts are sometimes attached to each other throughout their whole length, sometimes only at the base and the capital. When surrounded by floriated fillets they are compared by Sir Walter Scott to "*bundles of lances that garlands have bound*."

**Clu'ver** (PHILIP), a learned geographer, born at Dantzic in 1580. He published an "*Introduction to Universal Geography, Ancient and Modern*" (1629; best ed. Amsterdam, 1729), etc. Died in 1623.

**Clyde**, the principal river on the W. coast of Scotland, celebrated for the beauty of its scenery, rises in the Lowther and Moffat Hills. It drains the counties of Lanark, Renfrew, and Dumbarton, and flows generally in a N. W. direction. Near the town of Lanark occur the Falls of the Clyde, a series of cascades and rapids. The river descends 280 feet in a course of six miles over old red sandstone rocks, amid very picturesque scenery. The highest of these cascades is Corra Linn, forming three distinct leaps, in all eighty-four feet high. At Glasgow the Clyde becomes navigable for large vessels, and at Greenock it is four miles wide. Below Greenock it flows southward, and expands into the Frith of Clyde, which is about thirty miles wide. Its length is 75 miles, not including the frith.—CLYDESDALE, or the valley of the Clyde, is noted for its coal and iron-mines, its orchards, and its horses.

**Clyde, Kan.** See APPENDIX.

**Clyde**, Wayne co., N. Y. (see map of New York, ref. 4-E, for location of county), on the Erie Canal, and on the Clyde River where it is crossed by the Central R. R., 44 miles E. of Rochester. It has a manufactory of glass and several malthouses. Pop. in 1870, 2735; in 1880, 2826.

**Clyde**, R. R. junction, Sandusky co., O. (see map of Ohio, ref. 2-E, for location of county). It has various manufactures. Pop. in 1880, 2380.

**Clyde, Lord.** See CAMPBELL (COLIN).

**Clymer** (GEORGE), an American statesman, born in Philadelphia in 1739. He was elected to the Continental Congress in 1776, and signed the Declaration of Independence. He was re-elected a member of Congress in 1780, and was a member of the convention which formed the

Federal Constitution in 1787. He was the founder of the Pennsylvania Agricultural Society. Died July 23, 1813.

**Clytænnes'tra**, or **Clytemnestra** [Gr. Κλυταιμνήστρα], the wife of Agamemnon, king of Mycenæ, was a sister of Castor and of Helen. She became the paramour of Ægisthus, and murdered Agamemnon on his return from Troy. She was killed by her son Orestes.

**Clytia**, or **Clytie**. See APPENDIX.

**Cni'cin**, or **Centaun'rin** ( $C_{14}H_{18}O_5$ ?), the bitter principle of *Chiens*, or *Centaurea benedictus*. It is in odorless, silky needles, having a pure bitter taste. (See BLESSED THISTLE.)

**Cni'dus** [Gr. Κνίδος], sometimes written **Gnidos**, an ancient Greek city of Caria, in Asia Minor, was on the Ægean Sea and on the promontory of Triopion. It was one of the six cities of the Doric league called *Hexapolis*, and had an extensive commerce. Here were several famous temples of Venus, one of which contained a celebrated marble statue of Venus by Praxiteles. Cnidus was partly built on a small island, connected by a causeway with the mainland. Conon the Athenian defeated the Spartan fleet near Cnidus in 394 B. C.

**Coach**. See CARRIAGES, etc., by L. P. BROCKETT, M. D.

**Coadju'tor** [from the Lat. *co* (for *con*), "together with," and *adjuvo*, *adjutum*, to "help"], an assistant; in ecclesiastical law, a term technically applied to one appointed to assist a bishop or other dignitary. Coadjutant bishops in the Roman Catholic Church are usually bishops of sees *in partibus*. In the Protestant Episcopal Church of the U. S. they are called assistant bishops.

**Coagula'tion** [from the Lat. *co* (for *con*), "together," and *ago*, to "drive," to "force"], the changing of a liquid to a semi-solid or curd-like consistency. Thus, the white of an egg becomes solidified on the application of heat. The caseine of milk is coagulated (curdled) by the action of rennet and by many acids. The fibrine in the blood, chyle, and lymph is coagulated after the removal of these fluids from the living animal. Great importance was formerly attached by physicians to the appearance of the blood-clot or coagulum after bleeding.

**Coahuila**, a state of Mexico, bordering on Texas, bounded on the N. and E. by the Rio Grande del Norte. Area, 50,890 sq. m. The surface is hilly; the soil in some parts is sterile, and other parts produce pasture. It has several silver-mines, but its resources are as yet entirely undeveloped. Capital, Saltillo. Pop. 130,026.

**Coal**, a general name given to several carbonaceous substances derived from vegetable tissue. It was formerly limited to what is now known as charcoal, the residual carbon of wood, from which the volatile constituents have been expelled by heat; but it is at present almost universally

used to denote the various kinds of mineral fuel. As these have no definite composition, the vagueness of the term has given rise to much discussion in scientific books and courts of law. These substances form part of an unbroken series which begins with woody fibre and ends with graphite. They are all derived from the decomposition of vegetable tissue in the changes which it undergoes when buried under water, earth, or rock. The different products of this progressive change, which is a sort of distillation, are peat, lignite, bituminous and anthracite coal, graphite, and asphaltum, which are solids; petroleum and water, which are liquids; carbonic acid, carburetted hydrogen, etc., which are gases. Of these, all the solids, excepting asphaltum, are residual products, while that substance and the liquids and gases are the evolved products or distillates. The first mineralized solid formed from vegetable tissue is called lignite, if derived from wood—peat, if from herbaceous vegetation. Neither of these substances has any definite formula of composition, as each individual specimen may represent a distinct stage of the process of bitumenization. The nature of the change which takes place in the formation of peat and lignite from vegetable tissue will be best understood by the comparison of typical examples of each given below:

Vegetable tissue.	Loss.	Peat.
Carbon.....49.1.....	21.50.....	27.6
Hydrogen.....6.3.....	3.50.....	2.8
Oxygen.....44.6.....	29.10.....	15.5
Wood.	Loss.	Lignite.
Carbon.....49.1.....	18.65.....	30.45
Hydrogen.....6.3.....	3.25.....	3.05
Oxygen.....44.6.....	24.40.....	20.30

In this process the evolved products represented by the loss are water, carbonic acid, carburetted hydrogen, or petroleum. Where peat and lignite have been longer buried in the earth they have suffered still further loss and change, and are converted into what is termed bituminous coal, as will be seen in the following example:

Lignite.	Loss.	Bituminous coal.
Carbon.....30.45.....	12.35.....	18.10
Hydrogen.....3.05.....	1.85.....	1.20
Oxygen.....20.20.....	18.13.....	2.07

This is the condition in which we find most of the beds of peat and lignite which accumulated in what is called the carboniferous age millions of years ago, and which, deeply buried, have been subjected to a slow and general distillation, resulting in the formation of the different varieties of bituminous coal. Where exposed to peculiar influences, as to heat from volcanic eruptions, or in the elevation of mountain-chains where all the strata are baked and hardened, the volatile constituents of bituminous coal are par-



Vegetation of the Coal Marshes.

tially or perfectly driven off, giving us, first, semi-bituminous coal, then anthracite, and finally graphite. The

process by which anthracite and graphite are formed from ordinary coal is indicated in the succeeding formulæ:

Bituminous coal.	Loss.	Anthracite.
Carbon.....18.10.....	3.57.....	14.53
Hydrogen.....1.20.....	0.93.....	0.27
Oxygen.....2.07.....	1.32.....	0.65
Anthracite.	Loss.	Graphite.
Carbon.....14.53.....	1.42.....	13.11
Hydrogen.....0.27.....	0.14.....	0.13
Oxygen.....0.65.....	0.65.....	0.00

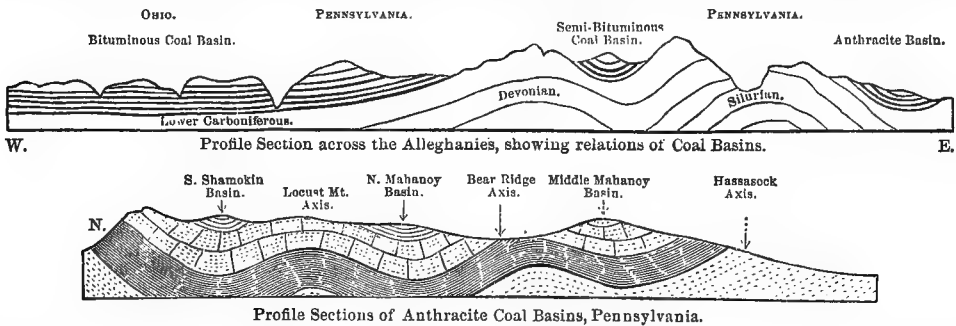
All the varieties of coal mentioned above shade into each other, and we have lignites which exhibit every degree of approach to bituminous coals, semi-bituminous coals intermediate between these latter and anthracite, and graphitic anthracites by which the anthracites are connected with the graphites.

The geological position of the different varieties of coal accords with the theory of their origin given above. For example, the oldest rocks known contain comparatively little carbonaceous matter, as they date from a period when the vegetation of the globe was scanty and mostly marine. Here we have only the residual products of the distillation of vegetable tissue, graphite and anthracite. In the carboniferous age the terrestrial vegetation was luxuriant over large areas, and conditions prevailed favorable to the formation of beds of peat. These, submerged and deeply buried under sediments which were deposited upon them, have, as a general rule, been changed to our beds of bituminous coal—to anthracite where local causes have carried the process of distillation further. In formations more modern than the carboniferous the accumulations of vegetable matter are usually classed as lignites. These contain more water and oxygen, and are less valuable fuels, than the true coals, but shade into them imperceptibly. In the present period we see the formation of coal only in its initial stages—viz. the growth of vegetation and the accumulation of bituminized vegetable tissue in marshes, where oxidation is prevented or retarded by water. By artificial processes we can, however, hasten the changes in vegetable tissue, and by properly conducted distillation produce lignite, bituminous coal, and anthracite. We find, too, that Nature is locally accelerating her processes, and by volcanic heat distilling lignites and bituminous coals to anthracite. In Colorado, New Mexico, and on Queen Charlotte's Island, excellent anthracite has been produced by volcanic heat from cretaceous lignites. At Los Bronces, in Sonora, triassic coal is converted into anthracite by a similar cause. In Eastern America all the coal strata, except those of the small triassic basins of Virginia and North Carolina, are of carboniferous age. In the Valley of the Mis-

issippi, where they have suffered no local metamorphosis, they are all of the bituminous class. In the Alleghanies the same strata, having been somewhat affected by the causes which resulted in the upheaval of the mountains, have lost a portion of their volatile matter, and have become what are known as semi-bituminous coals. To this group belong the coals of Blossburg, Broad Top, Frostburg, and a belt running down to Alabama. Still farther E. the carboniferous strata are more metamorphosed, and the coal which they contain is converted into anthracite. In Rhode Island a coal-basin of limited extent, and of the same age with those of Pennsylvania, seems to have been still nearer the focus of metamorphic action; and here the coal is partially converted into graphite, forming the variety known as graphitic anthracite.

The value of coal in the economy of civilization is now so well understood and so fully appreciated that it requires no lengthy exposition. Coal may indeed be considered as the mainspring of our civilization. In its combustion the heat of the sun, absorbed in the growth of the plants from which it is derived, is all given out again, subject to human control; and, as heat is but another name for physical force, coal becomes the most important source of power at our command. The power developed in the combustion of a pound of coal is theoretically equal to 11,580,000 foot-pounds. But by our imperfect methods of utilization not more than 1,500,000 foot-pounds are made available for our purposes. This is about the amount of power exerted by a man of ordinary strength during a day of labor. Hence 300 pounds of coal will represent the labor of a man for a year. The production of coal in the British Islands in 1882 was 158,500,000 tons. Of this, aside from all exported or employed for heating, lighting, smelting, etc., it has been estimated that 30,000,000 tons were devoted to the development of motive-power, and that this is equivalent to the labor of 200,000,000 of men who are producers and not consumers. Hence, if we may suppose that the remainder of the coal product of the United Kingdom pays the expense of the entire production, we may estimate the contribution annually made to the wealth of the British Islands by their coal product to be equal to that of 200,000,000 of laborers industriously employed and requiring no food and no pay.

Such being the value of coal, its geographical distribution becomes of great interest and importance. Among the nations of Europe the English occupy a pre-eminent position, not only from the extent of their coal-fields, but



from the industries dependent upon them. The British coal area is estimated to be 11,859 square miles, and the coal production in 1881 was 154,184,300 tons. The coal area of France is about 2000 square miles, and the production in 1882 was 19,800,000 tons. Belgium has a coal area estimated at 500 square miles, and in 1881 produced 17,500,000 tons. In Prussia the coal area has been considerably increased by the cession of the Rhine provinces, and she now has probably 2000 square miles of very deep and valuable coal strata. The production of coal in Prussia and the other German states in 1881 was 61,540,475 tons. The coal area of Spain is not definitely known. Her coal-field in the province of Asturias is one of the most important on the continent of Europe, but as yet her coal production is small. Austria has 1800 square miles of coal territory, and her production in 1880 was 16,500,000 tons. Recent discoveries have shown that Russia has much larger coal-fields than were formerly credited to her, and it is estimated that she has 20,000 to 30,000 square miles of coal strata of different ages.

Coal also occurs in China, India, Australia, Japan, and Borneo. So far as known, it is all of mesozoic age, though in China and Japan anthracite and well-formed bituminous coals are found, and have been worked for centuries.

When we turn to the U. S., we find a coal area which throws all those which have been mentioned into insignif-

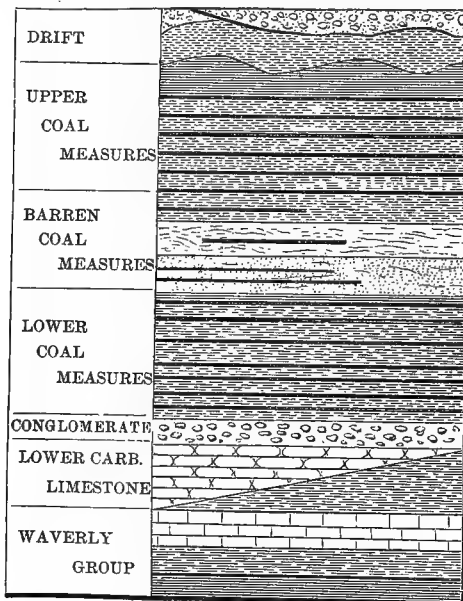
icance, and coal-fields which, although shallow compared with those of N. Scotia and parts of Europe, are by far the most extensive and richest in the world. The coal area of the U. S. is divided into several distinct basins, of which the most important are the following: 1st, the Alleghany coal-field, bordering the Alleghany Mountains on the W. side, and reaching from the N. line of Pennsylvania to the middle of Alabama. Its area is computed at 58,737 square miles. 2d, the Illinois coal-field, which covers a large part of Illinois and portions of Indiana and Kentucky. Its area is estimated at 64,887 square miles. 3d, the Missouri coal-field, lying W. of the Mississippi in the States of Iowa, Kansas, Arkansas, Missouri, and Texas, and supposed to extend over 47,138 square miles. To these great expanses of coal territory must be added the anthracite basins of Pennsylvania and Rhode Island, the coal-fields of Virginia, Michigan, and North Carolina, and the numerous and extensive deposits of cretaceous and tertiary coals of the far West. Combining all these, the productive coal area of the U. S. will be seen to largely exceed 200,000 square miles. The production of coal in the U. S. was, by census of 1880, 70,481,426 tons, of which Pennsylvania furnished 46,068,143 tons (28,612,595 tons anthracite, 18,075,548 tons bituminous coal). The product of the U. S. for 1882 was 87,083,134 gross tons. (See Map of North America for coal-fields.)

The different chemical and physical properties exhibited

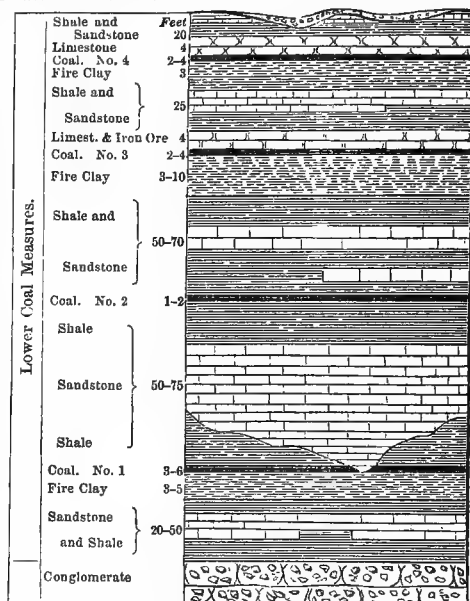
by the various kinds of coal fit them for a wide range of uses in the arts. Coals are primarily divided into two great groups—the hard and soft, or the anthracite and bituminous coals—but each of these groups is capable of subdivision into several varieties. For example, we have at the base of the series—1, *Graphite*, which is a coal deprived of all its volatile matter, and consisting only of a portion of its carbon mingled with all its ash. This is practically incombustible, and is never used as a fuel nor classed as a coal. 2, *Graphitic anthracite*, containing 1 or 2 per cent. of gaseous matter, igniting with difficulty, and forming an inferior fuel. This is the prevailing variety of coal in the Rhode Island coal-basin. 3, *Anthracite*, containing from 3 to 10 per cent. of volatile matter, sometimes 95 per cent. of carbon, igniting with some difficulty, but pro-

ducing in combustion an intense local heat. When burning it gives off a little blue flame (carbonic oxide), is valueless for purposes of illumination, but the best of all natural fuels for smelting iron, and is extensively used for the generation of steam and for household purposes. 4, *Semi-bituminous coal*, containing from 15 to 20 per cent. of gaseous matter, but generally caking in the fire; of little value as an illuminator, but kindling readily, with high heating power. It is the most highly valued of all coals for the generation of steam. The semi-bituminous coals produce a dense and excellent coke, and in the raw state are preferred to all others for blacksmiths' use, as they form a hollow fire and produce intense heat in combustion. 5, *Bituminous coals*, which have been subjected to no local metamorphic action, but are the natural product of the

The following sections, general and local, will serve to give an idea of the mode of occurrence of coal in the carboniferous rocks, and of the nature of the associated strata.



Carboniferous strata—W. Pennsylvania and Ohio.

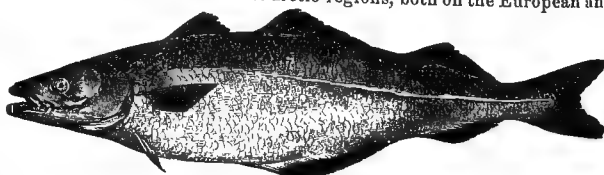


Coal Measures—N. Ohio.

slow and general distillation of vegetable tissue buried in the earth since the palæozoic ages. In bituminous coals the volatile matter varies in quantity from 30 to 50 per cent. of the mass. They are subdivided into *coking*, *furnace*, and *cannel* coals. Of these the coking coals melt and adhere in burning, and when the gaseous matter has escaped a mass of "coke" is left which has the properties of anthracite, but is cellular or spongy from the expansion of the gases. Most bituminous coals belong to this variety, of which the Pittsburgh coal may be taken as a type. They are extensively employed for the generation of steam, as household fuels, and, when coked, for smelting the metals, their adhesive character preventing their being used for this purpose in the raw state. Caking coals which are sufficiently free from sulphur, their great contaminating ingredient, are termed "gas coals," as they are chiefly employed for the production of illuminating gas. In the volume and illuminating power of their gas they are exceeded by the cannel coals, but their deficiency in this respect is more than compensated for by the greater value of the coke which is derived from them. The furnace coals are those bituminous coals which do not melt or adhere in the fire, and can therefore be employed in the raw state in the blast furnace. These are termed *open-burning* and sometimes *splint coals*, but the latter term is more appropriately applied to a kind of cannel coal which contains a large percentage of carbon, comparatively little gas, and has high heating power. The famous Brier Hill coal of Ohio and the Brazil coal of Indiana are typical furnace coals. The cannel coals have a more homogeneous texture, and are less pitchy and brilliant, than the other bituminous coals. They represent the carbonaceous mud which accumulated in the open lagoons of the coal marshes, while the surrounding mass of spongy vegetable tissue formed the cubical coal. The cannels are rich in gas, but have comparatively low heating power. They are favorite household fuels, are employed for the production of oil by distillation, but are nearly valueless for metallurgical

purposes. Nearly all coal-fields contain more or less cannel, which is either interstratified with the cubical coal or gradually passes into it in one or another direction. As a general rule, the cannels contain more ash than the furnace or gas coals; and as the earthy matter increases in quantity, they shade off imperceptibly into bituminous shale. The most esteemed household fuel in our Atlantic cities is the English Wigan cannel, which is preferred to the American cannels, since it generally contains much less ash. (See ANTHRACITE, LIGNITE, and PEAT; MACFARLANE'S "Coal-Fields of America;" TAYLOR'S "Statistics of Coal;" "The Coal Question," by W. S. JEVONS; "Fuel," by C. W. SIEMENS; "Coal and Its Uses," by WILLIAMSON, GREEN; etc.) J. S. NEWBERRY.

**Coal-Fish** (*Merlangus carbonarius*), a fish of the family Gadidae, and of the same genus with the whiting, corresponding in form and fins, but of a different color, the upper parts being nearly black. It has received its name from a dusty pigment which not only tinges its skin, but soils the hands when handled. It is much larger than the whiting, and is noted for its voracity. They are found in large shoals, and when attracted by bait will keep near a boat till great numbers are taken. Although coarse, the coal-fish is much used for food in northern parts. It is found in the most arctic regions, both on the European and



Coal-fish.

American sides of the Atlantic. The liver of the coal-fish abounds in oil, which is used for various purposes; sometimes also in medicine. This is one of the fishes known as pollock in the U. S.

**Coal Gas.** See GAS-LIGHTING, by PROF. CHANDLER.

**Coalition** is the designation generally applied to those alliances which during the last decade of the eighteenth and the first decade of the nineteenth century were formed against France by the other European powers. The first coalition was directed against the Revolution, the others against Napoleon. (See FRANCE, HISTORY OF.)

**Coal-Mines,** a post-village of Queen's co., N. B., on Salmon River, has rich mines of coal and large manufactures of lumber. Steamers run regularly in summer to St. John, 77 miles distant.

**Coal Oil.** See PETROLEUM, by PROF. C. F. CHANDLER.

**Coal Tar.** See TAR, by PROF. C. F. CHANDLER.

**Coal-Tar Colors.** Under this head is included a great variety of artificial dyes which have in recent years largely superseded the animal and vegetable dyes previously used. They are derived from various bodies found in coal tar, and are best classified as follows: 1. Aniline Colors; 2. Phenol Colors; 3. Phthalic-Acid Colors; 4. Azo-Colors; 5. Naphthalene Colors; 6. Anthracene Colors. Each of these classes of dyes is described under its appropriate title. C. F. CHANDLER.

**Coalville,** capital of Summit co., Ut. (see map of Utah, ref. 2-G, for location of county). It is the southern terminus of a branch railroad, 5 miles long, from Echo City on the Union Pacific R. R. It has beds of valuable cretaceous coal. Pop. in 1880, 911.

**Coan' (TITUS), D. D.,** an American missionary, born at Killingworth, Conn., Feb. 1, 1801. He graduated at Auburn Seminary in 1833. In 1834 he sailed for the Hawaiian Islands, where he gathered 15,000 members into the Church. He contributed important papers on volcanoes to the "American Journal of Sciences" (1840-80). D. at Hilo, H. I., Dec. 1, 1882.

**Coan (TITUS MUNSON), M. D.,** son of the preceding, born at Hilo, Hawaiian Islands; educated at Yale and Williams Colleges and at the College of Physicians and Surgeons of New York; acting assistant surgeon in U. S. navy 1863-65; has contributed essays to the "Galaxy" and "Harper's Magazine" since 1868, and wrote "Adventures in Patagonia" (1879) and "Life in Hawaii" (1882).

**Coast-Guard,** in Great Britain, a force posted along the coast, and originally intended to prevent smuggling merely, but now made to serve as a defensive force also. The organization was formerly in the employment of the customs department, but in 1856 the coast-guard was transferred to the admiralty. The able seamen in coast-guard service are in three classes—chief boatmen, commissioned boatmen, and boatmen. In time of war all of these men may be called upon to serve as regular sailors on board ship. The coast-guard are taught naval gunnery, gunboat exercise, and the serving of land-batteries.

THE ROYAL NAVAL COAST VOLUNTEERS is a corps organized in connection with the coast-guard for the defence of the coasts of the United Kingdom. By an act of Parliament passed in 1853, the admiralty was empowered to raise a number, not to exceed 10,000, of coast volunteers for five years' service, and to be exercised twenty-eight days in each year, either on shipboard or on shore; not to be sent more than fifty leagues from the coast unless in cases of emergency, when the distance may be extended to one hundred leagues. In ordinary cases one year's active service entitles them to discharge. Their pay, allowance, and rank during exercise and active service are the same as those of able seamen.

**Coasting-Trade,** the trade which is carried on by sea between the different ports of the same country. Coasting vessels or vessels employed in this commerce are subject to certain rates and regulations differing from those relating to overseas traders, and the masters are required to keep books proving that their cargoes come strictly within the limits of coasting-trade. Formerly in Great Britain no goods or passengers were allowed to be carried from one port of the United Kingdom to another except in British vessels, but this restriction was repealed in 1854.

The coasting-trade of the U. S. is very extensive. Formerly, this trade was chiefly carried on by means of schooners and sloops, but of late years its character has much changed. Since the introduction of screw steamers for this service there is a prospect that they will to a great extent supersede the use of schooners on our coast.

**Coast-Line** is the name given to the line which bounds the coast of any country, island, or continent. Very important results follow from the degree to which a coast is indented by inlets, gulfs, or other natural interruptions of a straight line; and in proportion as a coast-line is longer as compared with the simplest possible line enclosing the same area, so is there generally facility of access, shelter for ships, and a capacity for commerce. The coast of Eu-

rope is very remarkable in this respect as compared with any other part of the world; for with an area of 3,816,400 square miles, one side of which is in contact with Asia, there is a length of coast of nearly 20,000 miles; while Africa, with an area of 11,600,000 square miles, has less than 15,000 miles of coast; and even Asia, whose area is 17,310,000 square miles, has only 30,000 miles. Of both North and South America, the Atlantic and Pacific coasts are very different, for the former presents in all upwards of 23,000 miles, and the latter only 15,500 miles of coast-line. The most important trading countries are, with few if any exceptions, always those with the longest coast-line.

**Coast Range, or Coast Mountains,** a range of mountains in California extending nearly parallel with the coast of the Pacific Ocean, from Oregon to the southern boundary of the State. San Bernardino, a peak of this range, rises 8500 feet above the level of the sea.

**Coast Survey.** An accurate acquaintance with the physical features of the coast that bounds its territory is an economical necessity to every nation largely engaged in commerce. The ocean being the great outlet of production, the highway over which the currents of commerce are constantly flowing to and fro, the diminution of its hazards is a matter of the greatest moment. Among the dangers to which the mariner is exposed, the most formidable are those which beset him when he approaches the land, arising out of his unacquaintance with the sea-bottom beneath him, with the currents that carry him out of his course, with the situation of reefs, shoals, or dangerous shores, and with the courses that would take him safely to his destination. Against these dangers no absolute security can be provided, but they can be very much diminished by supplying accurate charts of the coasts and their approaches, and by maintaining lighthouses and buoys to mark available channels or warn against hidden dangers. To supply this want the governments of all maritime nations have in modern times undertaken surveys of their coasts by the most exact geodetic and hydrographic methods, resulting in elaborate charts for the guidance of the navigator, and aiding in the selection of sites for lighthouses and the proper location of buoys. Such a survey of the coast of the U. S., carried on under the authority of the Federal government, has also for a number of years been in progress, and it is the object of this article to review the history, methods, and present condition of this important public work.

In the early part of this century the only charts of our coasts and harbors in existence were those made in the latter half of the last century by Des Barres, Roman, Gauld, and other surveyors, acting under the orders of the British admiralty. Respectable chiefly by the great extent of coast-line represented, their charts were the merest preliminary explorations, and fell far short of the wants of navigation. The necessity for a thorough survey was perceived very early in the history of the nation, and, upon the recommendation of President Jefferson, Congress in 1807 passed an act authorizing the President to cause a survey to be made of the coasts of the U. S., in which were to be designated the islands, shoals, and places of anchorage within twenty leagues of the shores; and such other matter as might be deemed proper for completing an accurate chart of every part of the coast; it also authorized the survey of St. George's Bank and the soundings and currents beyond the limits aforesaid to the Gulf Stream.

The plan of survey adopted by government was submitted by Prof. F. R. Hassler, a native of Switzerland, who had gained experience in similar works abroad, and who was accordingly appointed to superintend its execution. It consists substantially of three operations: first that of *geodesy*, or the accurate determination of the geographical position of numerous points along the coast by astronomical and trigonometrical methods; second, that of *topography*, or the delineation of the coast-line and the characteristic features of the land; and third, the *hydrography*, or a nautical survey of the channels, shoals, and approaches to the shore, including observations of currents and tides. The geodesy furnishes the framework for the map, without which the accumulation of unavoidable inaccuracies in its topographic survey would soon attain objectionable proportions; but taking a fresh departure from each point that has been trigonometrically determined, the errors of the land-survey are checked and kept within bounds inappreciable on its scale of representation. The nautical survey, equally taking frequent points of reference supplied by the two preceding operations, cannot run into any material error of position.

To appreciate the necessity of a geodetic survey as the basis of a series of coast-charts, it must be borne in mind that the figure of the earth is a spheroid, and that conse-



quently methods of plane surveying, when extended over areas of large extent, would lead to intolerable errors of misrepresentation. Geodesy takes account of the true figure of the earth, determining with the greatest attainable accuracy the distances and bearings between the series of points by the processes of base-measurement and triangulation, and determining the curvature of the surface at suitably chosen points in the series by the determination of their differences of latitude and longitude. The geographical position of the intermediate points can then be computed with great precision, and the whole chain projected upon a suitable plan that enables us to preserve as nearly as possible their principal relative positions. The steps of the principal triangulation are made as large as possible, in order to avoid the accumulation of error, and the operations are checked at intervals by the lineal measurement of some of the distances, serving as a verification for the entire chain.

The delay naturally attending new enterprises, the necessity of procuring all the instruments from Europe, where they had to be specially constructed, the interruption caused by the war between England and the U. S., and the subsequent pressure upon the public finances, prevented active operations from being undertaken until 1817, when a commencement was made near the important harbor of New York. But the work had been hardly begun when the last-mentioned cause led to its abandonment by the failure of Congress to provide funds for its continuance. From 1817 to 1832 detached portions of the coast were surveyed by naval officers, some harbors were surveyed, and hydrographic reconnaissances made of the coast of some of the States; but no general survey was attempted, nor did these detached surveys yield more than the most indispensable information. On the repeated representations of Hon. S. L. Southard, secretary of the navy, and others, Congress in 1832 again made a small appropriation for carrying out the law of 1807, under which the operations of the Coast Survey passed anew under the charge of Hassler, who was authorized to employ, in the conduct of the work, such astronomers and other persons as he should judge proper, in addition to the officers in the military and naval service. Mr. Hassler continued to direct the work until his death, which occurred in the year 1843.

In reviewing the history of this early period it is proper to remember that the first years were necessarily years of organization and instruction. The superintendent had to systematize methods, to train up assistants, to cause the work to grow from a small beginning until it comprehended the various operations of a geodetic survey upon the land, and included the hydrography of the adjacent waters. When the results accumulated it was necessary to provide for their computation and reduction, and also for the preparation of maps and charts upon a plan suited to our extended coast, and for the engraving of the maps themselves. All these things were new in this country. The amount of knowledge, skill, and labor required to overcome these and other difficulties was hardly appreciated. The results show how large an amount of work had been done, and how the work was extending beneficially at the time of Mr. Hassler's death.

The condition of the work as Mr. Hassler left it will be made intelligible by the following brief statement: A baseline had been measured in the vicinity of New York, the commercial importance of which obviously indicated it as the proper point of beginning. The triangulation had extended eastward to Rhode Island and southward to the head of Chesapeake Bay, the primary triangulation crossing the neck of New Jersey and Delaware, while a secondary triangulation skirted the coast of New Jersey, meeting with another series which extended down Delaware Bay. The topography had kept pace with the triangulation, and the hydrography of New York bay and harbor, of Long Island Sound, of Delaware bay and river, and the off-shore soundings from Montauk Point to the capes of the Delaware were substantially completed. The triangulation covered an area of 9000 square miles, furnishing determinations of nearly 1200 stations for the delineation of 1600 miles of shoreline; 168 topographical maps had been surveyed and 142 hydrographic charts.

The progress thus sketched, although really very considerable and highly creditable to the late superintendent, was still felt to be inadequate to the pressing demands of commerce, and clamors arose in Congress against the administration of the survey, ascribing the slow progress to an unnecessary refinement in the processes employed, and claiming the results to be inadequate to the expenditure. An investigation was accordingly instituted in 1842 by a Congressional committee, which, after a severe and unfriendly scrutiny, practically resulted in a complete endorsement of the principles on which the survey had been conducted by Hassler, while at the same time a more efficient plan of or-

ganization was put in force. According to this plan the personnel consists of a superintendent, under whose general direction the work is carried on by assistants detailed from the army for the survey on land, and from the navy for the nautical work, so far as officers could be spared from the respective services; and in addition to these of a number of civil assistants, who form a more permanent nucleus, preserving unity of system and method. The responsibility of carrying into effect the provisions of the adopted plan, and of expanding the work to a scale commensurate with the growing demands of commerce, fell mainly upon Hassler's successor, Prof. A. D. Bache. His appointment was made upon the united representations of the colleges, learned societies, and men of science in the country, whose estimate of his merits has been abundantly justified by the brilliancy of his official career. Upon his recommendation Congress provided the means for carrying on the work independently in many places at once; each section having its own base and geographical determinations, but all designed to form, when completed, a continuous chain of triangulation and a homogeneous survey of the whole coast. In 1845, besides extending in both directions the former work, active operations were commenced on the coasts of Virginia and North Carolina, and of Alabama and Mississippi in the Gulf of Mexico; two years later they had been extended to the States of South Carolina, Georgia, Louisiana, and Texas; and two years later still the important survey of the reefs and keys of Florida was commenced. On the annexation of California the Pacific coast was at once included in the operations.

While the field-work was thus pushed with great vigor in every quarter, the publication of the charts and other results was made to keep pace as rapidly as possible. The annual reports of the superintendent, besides giving an account of the progress of the work, are accompanied by appendices, forming valuable contributions to knowledge in the shape of scientific discussions of various subjects connected with the survey, such as tides, terrestrial magnetism, harbor hydraulics, and ocean physics, and of new methods of observation and computation employed by persons engaged in the work. These valuable volumes have been widely circulated by a wise liberality of Congress, and are to be found in most public libraries. The United States Coast Survey charts are printed in sheets for the use of mariners, and can be obtained at a low price in the principal seaports, where agencies for their sale have been established. In addition to the charts, printed sailing directions or "Coast Pilots" are issued in book-form, and tide-tables predicting the heights and times of high and low water for all ports of the U. S. are published annually.

Some estimate of the magnitude of the work may be formed by considering that the general coast-line of the Atlantic, including the large open bays, is 3030 miles, that of the Gulf of Mexico, 2160, and that of the Pacific coast (including Fuca Strait, but exclusive of Alaska), 1870 miles, making a total of 7060 miles. A measurement of the shore-line, including bays, sounds, islands, and rivers, made as nearly as practicable where the survey is not yet made, gives similarly for that of the Atlantic coast, 14,725 miles; of the Gulf of Mexico, 10,400 miles; and of the Pacific coast, 4250 miles. The proportion of this vast extent of coast-line that had been surveyed and mapped at the outbreaking of the civil war in 1861 may be stated at about three-fourths of the Atlantic, fully one-third of the Gulf, and nearly one-fourth of the Pacific coast. The war of 1861-65 seemed likely at first to put a stop to the Coast Survey, but it was soon perceived that by preserving its organization the information gathered in its archives and the experience and skill of its officers could be made more useful to the cause of the Union than the individual efforts of its members could possibly be when merged in general organization of the military forces. The great knowledge and judgment of the superintendent was brought into requisition for planning the details of the blockade and of naval attacks upon the ports in possession of the Confederacy. The military and naval officers engaged on the Survey at that time of course at once rejoined their proper corps. Some of the civil assistants were detailed to aid, by their special knowledge of localities, in guiding the operations of the squadrons on the Southern coasts, where all lighthouses and buoys had been removed, and no local pilots could be obtained; others joined various armies to aid in reconnaissances and surveys, while others, again, obtained leave of absence to enter the army, and served with distinction. The resources of the office were taxed to the utmost to produce charts for the blockading fleets, and to compile for the use of the armies maps of the country in which they were to operate. By a wise foresight, Prof. Bache had caused to be collected in the Coast Survey office all the extant geographical maps of the country, which enabled him to issue

a series of maps of the Southern States that proved of the greatest service in the movements of troops, and which remain to the present day the best maps of those regions.

The value of the services rendered by the Coast Survey and its officers was on all occasions freely acknowledged by the commanders of our forces and brought to the notice of the government. Accordingly, after the close of the war the work enjoyed the increased favor of Congress, and while the great military and naval establishments that the war had rendered necessary were reduced to their lowest possible limits, the regular operations of the Coast Survey were resumed on a moderate scale of expenditure, which has since been gradually increased. Prof. Bache died in Feb., 1867.

Prof. Benjamin Peirce, the eminent astronomer, was appointed as his successor, and remained as superintendent until the spring of 1874, when he resigned, and was succeeded by Mr. Carlisle P. Patterson, who since 1861 had been hydrographic inspector upon the survey. The latter died in Aug., 1881. His successor was Prof. J. E. Hilgard, who for many years had been in charge of the main office in Washington. Under their successive administrations the work had been pushed with vigor, and the survey of the coast is now approaching completion. The report for 1883 shows that field-parties were working in 76 different localities. In 22 places the work was entirely triangulation, in 10 it was topography, in 21 hydrography, or deep-sea sounding, in 9 astronomical work, and in other places different classes of work were combined. In addition to these, continuous tidal observations were making at six stations in the U. S., at Kodiak, Alaska, and at Honolulu, Sandwich Islands. With the exception of some minor estuaries and some off-shore hydrography along the southern Florida coast, the survey is now continuous from Penobscot Bay to the Tortugas. The work on the Gulf coast is about four-fifths completed. All the principal harbors are surveyed, and the breaks in the continuity of the whole comprise only comparatively unimportant shoreline between harbors. These gaps are being rapidly filled. On the Pacific coast of the U. S. the work is being prosecuted with energy. All the principal harbors are already charted, and the intervening coast-line is being surveyed. Much attention has been given to Alaska. No detailed trigonometric or topographical survey of the territory has yet been undertaken, but many independent surveys of harbors and islands have been made, and forty-nine charts have been published.

The plan of publication is as follows: the main series of charts gives a continuous representation of the coast on a scale of 1:80,000, or about three-quarters of an inch to a mile. On these charts are exhibited all natural and artificial features of the shore, such as streams, hills, houses, and roads, together with the depth of water and configuration of the sea-bottom, the channels and shoals, as also the lighthouses, buoys, and other aids to navigation. Besides being characterized by the greatest precision, which is the first and essential condition of their value, they also do honor to the country as works of art, being in point of execution surpassed by none that are produced by other nations. A series of 112 of these charts will comprise the whole coast from the north-eastern boundary to the Rio Grande, 72 of which have been completed, while a large number are partially drawn and engraved. The same range of coast is also covered by a series of sixteen other charts on a smaller scale, that of 1:400,000, of a more general character, known as "off-shore charts," and intended for use in sailing along or approaching the coast; of which 12 sheets have been issued. Another still more general chart of the coast, on a scale of 1:1,200,000, and reaching farther out to sea, is published to serve the purpose of navigating on courses between distant points. In addition to the foregoing charts, there are published very numerous charts of separate harbors, bays, rivers, anchorages, passages, and dangers, on scales varying from 1:5000 to 1:60,000, according to the character of the subject and amount of detail to be represented. Of such charts more than 200 have already been published of places on the Atlantic and Gulf coasts, and over 150 on the Pacific coast.

When once a continuous survey of the whole coast has been obtained, there will still be a necessity of maintaining the organization of the Coast Survey for the purpose of watching the unceasing changes that take place in the channels leading to our harbors, which for the most part are barred by shifting sands. Such changes, produced by the action of the waves and tidal currents, often also by the encroachments on the harbor areas by wharves and docks, render necessary changes in buoys and beacons, and often call for works of protection or improvement, which can only be planned after minute surveys and a careful study of the physical causes that are at work. Most important service to commerce and navigation has already

been rendered in this direction by the advisory boards, composed of the superintendent of the Coast Survey, the chief of engineers of the army, and an officer of the navy, in studying these problems for the principal harbors, and laying down for each the principles of preservation or improvement. The subject of physical hydrography has been made a special department in the Coast Survey.

The gradual extension of at least the trigonometrical work of the Coast Survey over the entire area of our country to serve as a basis for better maps, and in future of detailed topographical surveys, is a proposition which had for some time attracted favorable attention, when, in 1871, it was authorized by Congress in a provision for conducting a chain of triangulation across the continent to form a geodetic connection between the Atlantic and Pacific coasts, and for the execution of the trigonometric survey of such States as should make requisite provision for the topographical and geological survey of their domain. A main triangulation is now complete from Eastport, Me., to Florence, Ala. The transcontinental work along the thirty-ninth parallel is two-thirds completed, and the triangulation of the Pacific coasts is in large part executed. These systems afford great facilities for the inauguration of the surveys of the States through which they pass, and a number have used the opportunity. Others have begun their surveys independently, but in time they will be connected with the general system. The trigonometric surveys of ten States are now in active prosecution, and others are soon to be begun. The plan of a general geodetic survey of the entire country is now fairly inaugurated. In the development of the country it is inevitable, and the plan pursued receives the approval of scientists and statesmen. Since the extension of its field of operations to include interior work the survey has been known as the Coast and Geodetic Survey.

An account of the Coast Survey would be incomplete without a brief notice of the incidental contributions to science which have been made and are constantly being added to during the progress of the work. Its geodetic operations furnish important data for determining the figure of the earth. (See FIGURE OF THE EARTH AND GEODESY.) In 1877 the primary triangulation, extending from Eastport, Me., to Atlanta, Ga., a distance of 1225 miles, was connected with five measured base-lines distributed along the series. The length of any one of these base-lines, computed through the triangulation from another, did not differ more than at a rate of a quarter of an inch in a mile. The completion of this triangulation furnishes the data for the computation of an oblique arc of a great circle of more than 16°. Similarly, a meridional arc of 5° is now had from the triangulation from Pamlico Sound northward into Pennsylvania, and on the closing of a gap of 100 miles between the work in Pennsylvania and in New York the arc will be extended northward to Kingston, Ontario, covering 9° of the meridian. When the triangulation of the thirty-ninth parallel is completed, it will furnish the means of computing an arc of 48°, the greatest ever attained or attempted. The apparatus for measuring base-lines, constructed in the Coast Survey office, is extremely perfect, the measuring-bars consisting of rods of different metals, so combined as to compensate the effect of temperature and preserve the lengths between the points of contact unchanged when exposed to varying temperatures. The necessity for the greatest attainable accuracy in such operations is apparent when we remember that an error in the base-line will affect the whole distance depending upon it by triangulation in the same ratio. The angles of the primary triangulation have been measured by means of the theodolites graduated to five minutes of arc, and reading to single seconds by means of micrometer microscopes; about thirty measures of each angle are taken, the mean of which has generally no greater uncertainty than one-eighth of a second. The same instruments serve for determining the azimuths of the sides of the triangulation, or their direction in reference to the true north. Knowing thus the exact distance between any two points, and the direction of the line joining them, on the surface of the globe, we have only to ascertain their latitudes and difference of longitude in order to deduce the curvature of that portion of the globe occupied by our operations.

The latitudes are chiefly determined with an instrument called the *zenith telescope* or equal-altitude instrument, first applied to that purpose by Capt. A. Talcott of the U. S. army, and remodelled and specially adapted to the purpose in the Coast Survey. By the aid of this instrument, and the great accuracy which modern star-places have attained, the latitude of a station may readily be determined in three nights with such precision as to leave no greater uncertainty than one-tenth of a second. The comparison of differences of latitude so observed at many stations with their differences deduced from the triangulation has developed the existence of small irregularities in the direction of

gravity, arising doubtless from local attractions, even in places where the outward conformation of the surface affords no such indication.

The accurate determination of the longitude of some point in the Coast Survey from the principal observatories in Europe has been one of the great problems of the work. All available methods have been resorted to—the observation of lunar occultations and eclipses, and of right ascensions of the moon; the transportation of chronometers; and finally the comparison of time by means of the electric telegraph. The latter method has yielded the most consistent results, which are also confirmed by the others within their limits of precision. The difference of time between the observatories of Greenwich and Cambridge has thus been determined within a limit of uncertainty no greater than one-twentieth of a second of time. The differences of longitude between Cambridge and other principal stations of the Survey are determined by the aid of the electric telegraph. A series of such determinations has been extended southward as far as Galveston and westward to San Francisco, fixing the geographical positions of many important places on the way. The method of recording observations of time on a chronographic register, by means of a galvanic circuit, known in Europe as the *American method*, originated in the Coast Survey with the first attempts to determine longitude by means of the electric telegraph. The idea of comparing the local time of different places by means of the electric telegraph is sufficiently obvious, but the refined methods by which the intervention of human senses and operations, and the consequent liabilities to error, are in the greatest possible degree avoided, and by which the time of transmission is measured and eliminated from the longitude, have been the result of careful study and long experience. By this perfect and admirable method we are able to measure arcs of longitude with the same degree of accuracy with which arcs of latitude have heretofore been measured, and a new element has thus been introduced into geodesy.

The variation of the compass being an important element in navigation, observations have been made at several hundred places along the coast and in the interior, not only of the deviation of the magnetic needle, but also of its inclination and of the intensity of the earth's magnetism, these elements being necessary for a complete study of the distribution and changes of this subtle force. At many points these observations are from time to time repeated, and their discussion, in connection with the more ancient observations that have been collected, has largely added to our knowledge of the secular variation. A magnetical chart has been constructed, from which the surveyor can learn the variation of the needle at any place with considerable accuracy.

The subject of the tides has received great attention in the Coast Survey. Long-continued tidal registers are kept up at selected points on the coast, for the purpose of ascertaining, upon the basis of observation, the complicated laws governing the tides in the different seas that wash our shores. Self-registering tide-gauges are used, by which a continuous curve, representing the successive changes in the height of water, is traced on paper moved by clockwork by a pencil actuated by the rising and falling of a float in a vertical box to which the tide has free access. The discussion of these observations has already largely increased our knowledge of the laws to which they are subject, and has rendered possible the predictions of high and low water for all ports in the U. S., which are published annually in advance. But highly important results are yet to be obtained from the discussion of the observations when continued through a full lunar cycle of nineteen years. Such a series has been completed for Boston harbor, which has yielded, in addition to exact data for future predictions, an independent estimate of the moon's mass.

A hydrographic survey of our coast would be incomplete if it did not embrace the investigation of that remarkable ocean-current which sweeps along in the vicinity of our Atlantic coast. The method of exploring the Gulf Stream adopted by Prof. Bache was to determine the limits of the stream by the temperature of its water at all depths by means of deep-sea thermometers along lines crossing the stream at right angles at various points. Sections have been run along which the temperature of the water at various depths has been determined, and also sections of the bottom wherever it has been possible to obtain soundings. It is necessary that the thermometers employed should be self-registering, and able to withstand the crushing pressure of the water without having their indication affected thereby. Until recently the metallic self-registering thermometers invented by Saxton were exclusively employed, being found best to fulfil the required conditions; latterly, the simpler Miller-Casella

self-registering thermometer with protected bulb has also been employed. (See GULF STREAM for an account of the results of these explorations.)

In conclusion, it may be said that the U. S. Coast Survey is a national work of which Americans may justly be proud, it having been declared, by the most competent foreign scientific authorities, to stand in the very front rank of similar works of other nations, and to be one of the most perfect examples of applied science.

J. E. HILGARD, *U. S. Coast Survey.*

**Coat'bridge**, a town of Scotland, in the county of Lanark, on the Caledonian Railway, 8 or 9 miles E. of Glasgow. It has seven churches, two academies, and several banks; also eight malleable-iron works. It is the centre of a mineral district in which are numerous smelting-furnaces, and derives its prosperity from the manufacture of iron. It is a place of rapid growth. Pop. in 1881, 17,509.

**Coatesville**, R. R. junction, Chester co., Pa. (see map of Pennsylvania, ref. 6-1, for location of county), on the Brandywine Creek, 39 miles W. of Philadelphia. It is in the rich and beautiful Chester Valley, and has seven rolling-mills, woollen and paper mills, and water and gas-works. Pop. in 1870, 2025; in 1880, 2766.

**Coati** [a word of Brazilian origin], the name of a genus (*Nasua*) of quadrupeds of the Ursidæ (the bear family), by some referred to Viverridæ (the civet family), although their plantigrade character allies them to the former. They are very nearly allied to the raccoons, and, like them, are exclusively American. They are remarkable for the long snout, which is a sort of flexible proboscis, and is employed in rooting up the earth to obtain worms and insects. They are often domesticated in South America.

The coati-mondi (*Nasua narica*) or solitary coati is considered by many naturalists to be the only species of the genus, while others reckon at least five species. The coati-mondi is a native of Brazil, Mexico, and the intermediate countries. It is often seen in menageries.

**Coat'icook**, a post-village and port of entry of Barnston township, Stanstead co., Quebec (Canada), on the Grand Trunk Railway, 26 miles N. of Island Pond, Vt. Pop. in 1881, 2682.

**Coat-of-Arms**, in the Middle Ages, was a coat worn by princes and great barons over their armor. It was made of cloth of gold or silver, of fur or of velvet, and bore armorial insignia, corresponding in every respect in the military trappings of that time to the *paladamentum* of the ancient Roman captains. The "coat-of-arms," as understood by heraldry in the present day, is nothing more than a relic of the ancient armorial insignia. (See HERALDRY, by REV. B. R. BETTS.)

**Coat-of-Mail**, in the armor of the Middle Ages, was a suit formed of metallic scales or rings linked to each other. (See ARMOR.)

**Co'balt**, a hard white metal of sp. gr. 8.5 to 8.9, with a granular fracture, quite malleable at red heat, attracted by the magnet, and even capable of receiving weak magnetic power when rubbed with a magnet, though arsenic destroys this property. It is unalterable in air and water at ordinary temperatures, though at red heat it decomposes water. The metal was first obtained in an impure state by Brandt in 1733, but the ores had already been used since the middle of the sixteenth century for imparting a blue color to glass. Their use was apparently known to the Greeks and Romans, as some of their pigments have been found to contain cobalt. The name is derived from the German word *Kobold*, an "evil-minded sprite," the miners believing that the presence of ores which were heavy and had a metallic lustre, but were, so far as they knew, of no value, containing no copper or silver, was due to his influence. Before their value was discovered the ores were used in Hesse for repairing roads.

Ores of cobalt are found in various parts of the world, though they are never very abundant. They are almost invariably associated with nickel compounds, and the metal is generally united with arsenic and sulphur. The principal supplies come from Schneeberg, Saxony, from Westphalia, Bohemia, Hesse, and Cornwall, England, though they occur in other localities. Mine La Motte, Mo., the Gap mine in Pennsylvania, Chatham, Conn., and mines on the N. shore of Lake Superior have furnished some cobalt.

The principal minerals in which cobalt occurs are *smaltite*, or *smaltine*, gray cobalt or tin-white cobalt, an arsenide of cobalt; *cobalt glance*, or *cobaltine*, the sulpharsenide; *cobalt bloom*, or *erythrine*, the hydrated arsenate; *earthy cobalt*, or *asbolan*, also called black oxide of cobalt, a combination of the oxide with iron and manganese oxides, found in several places in Europe, as well as in Missouri; *cobalt vitriol*, or *bieberite*, an impure sulphate

found in the rubbish of some old mines; *sympoorite*, the sulphide, occurring in North-western India, and used by the Indian jewellers to give a rose color to gold. The first two being the more common, are used for the manufacture of smalt and zaffre. Cobalt also occurs incidentally in some nickel minerals, in selenide of lead, cerite, and in Flemish coal. The metal is nowhere found native, except in some meteorites, some of which have been found to contain from 0.1 to 1 per cent.

The metal may be reduced from its oxide by heating in a current of hydrogen. If the heat has been too low, the cobalt is pyrophoric, and burns with a red flame when brought in contact with the air. It forms several oxides, of which the most important are the protoxide,  $\text{CoO}$ , and the sesquioxide,  $\text{Co}_2\text{O}_3$ , both of which give a series of salts. The highest oxide,  $\text{CoO}_2$ , has not yet been isolated. Cobalt combines with arsenic or antimony, giving brittle gray products. It also alloys with gold and silver, a small amount of cobalt rendering those metals quite brittle. In the case of gold one sixty-fifth part is sufficient to cause brittleness. With tin it gives a ductile alloy of a violet color. With mercury it forms an amalgam which is magnetic. The alloy with iron is extremely hard.

Cobalt salts are prepared by extracting the roasted ore with an acid, precipitating out the arsenic by means of sulphuretted hydrogen or by an iron salt, and then precipitating out the cobalt by means of chlorine water, which converts it into sesquioxide, or by the use of nitrite of potassa, filtering and dissolving. The chloride is used as a sympathetic ink. The writing, which is an extremely pale pink color, almost invisible, becomes blue when the water of hydration is removed by heat; but it gradually absorbs water and disappears again. The presence of nickel salts gives a greenish cast to the lines. In the arts the compounds of cobalt are applied for coloring either as pigments or enamels. The principal preparation is *smalt*, or azure blue, which is a double silicate of cobalt and potassium, prepared by fusing the roasted ore with carbonate of potassium and clean white quartz sand. The nickel, arsenic, and other impurities settle to the bottom, forming what is termed by the workmen a "speiss." The glass is poured off into water, then ground, and elutriated. The coarser qualities are called "blue sand," and contain some arsenic. The best quality contains little or no arsenic, and is known as "king's blue." The color is very intense, one part of oxide of cobalt being sufficient to give a decided color to 250 parts of glass. The presence of nickel seriously affects the color. It is stated that the manufacture of artificial ultramarine has nearly driven smalt from the market. Smalt is sometimes adulterated with ultramarine; the fraud may be detected by the addition of an acid to the article, which causes a change in the color of the ultramarine, and the development of sulphuretted hydrogen.

*Zaffre*, zaffer, or saffor is the roasted ore mixed with twice its weight of quartz sand. It is used for coloring glass, enamels, and pottery glaze. The well-known willow-pattern plates are colored by this substance. *Thénard's blue*, or cobalt ultramarine, is a pigment obtained by calcining phosphate or arseniate of cobalt with alumina. *Rinman's green*, or cobalt green, consists of the mixed and ignited oxides of zinc and cobalt; it is also used as a pigment. *Cobalt yellow*, another pigment not very generally used, is the yellow precipitate obtained by treating the solution of a cobalt salt with nitrite of potassa. A combination of the oxides of iron, cobalt, and manganese is also used to give a black coloration to glass.

In the laboratory cobalt is recognized by the brilliant blue color which it imparts to a bead of borax glass.

C. F. CHANDLER.

**Cobalt-Bases, Ammoniacal**, a series of bodies which contain the elements of ammonia,  $\text{NH}_3$ , united with cobalt or oxide of cobalt, and which form salts with salt radicals,  $\text{Cl}$ ,  $\text{Bi}$ ,  $\text{I}$ , and with acid radicals,  $\text{SO}_3$ ,  $\text{SO}_4$ ,  $\text{CO}_3$ ,  $\text{NO}_3$ ,  $\text{CrO}_3$ , etc. (See WATTS' "Dictionary of Chemistry," i, 1057; "Journal pour Chemie," lxxii., 209; and a paper by GRUBS and GENTH, published in the "Smithsonian Contributions to Knowledge," 1856.)

**Coban', or Ve'ra Paz**, a city of Central America, in the department of Vera Paz, Guatemala, stands near the source of the Rio de Cajabon, about 90 miles N. of the city of Guatemala. It presents a very peculiar aspect. Built on the slopes of a rounded hill, the cathedral occupying the top, its streets, radiating in all directions from the central square, look like rural avenues, the low houses with their gardens being screened behind high, dense hedges. It originated in the sixteenth century as the centre of the Dominican mission, and was afterward made the political capital of the province of Vera Paz. The missionary occupation gone and the government moved to Salama, it is now falling into decay. Pop. 12,000.

**Cobb** (DAVID), a soldier of the Revolution, born at Atleborough, Mass., Sept. 14, 1748, graduated at Harvard (1766), practised medicine for many years, was a lieutenant-colonel in the Continental army, member of Congress from Massachusetts (1793-95), was for many years a judge of common pleas, and lieutenant-governor in 1809; he resided for many years in Maine (1796-1820), and was a chief-justice of court of common pleas. Died Apr. 17, 1830.

**Cobb** (HOWELL), an American lawyer and Methodist preacher, born in Georgia in 1795. He has written much, including a work on legal forms (1845) and a compilation of the penal laws of Georgia.

**Cobb** (HOWELL), an American Democratic politician, born in Jefferson co., Ga., Sept. 7, 1815. He was elected a member of Congress in 1843, 1845, and 1847. In 1849 he was chosen Speaker of the House of Representatives. He became governor of Georgia in 1851, and was appointed secretary of the treasury by President Buchanan in 1857. He resigned near the end of 1860, and was president of the Congress of secessionists which met in Feb., 1861. In the civil war he was a major-general of the Confederate army. Died suddenly in New York City Oct. 9, 1868.

**Cobb** (JOSEPH BECKHAM), a son of T. W. Cobb (see below), born in Oglethorpe co., Ga., April 11, 1819, was the author of novels and other works, among which are "The Creole" (1848) and "Leisure Hours" (1858). Died Sept. 15, 1858.

**Cobb** (SYLVANUS), D. D., a Universalist minister, born in Norway, Me., in 1799, was the author of a "Commentary on the New Testament" and other works, and editor of a denominational newspaper for twenty years. Died in East Boston, Mass., Oct. 31, 1866.

**Cobb** (SYLVANUS, JR.), a son of the preceding, born in Waterville, Me., in 1823, has written many popular tales for the "New York Ledger" and other papers.

**Cobb** (THOMAS R. R.), GENERAL, a brother of General Howell Cobb (see above), born in Jefferson co., Ga., in 1820, had a high reputation as a lawyer and author of legal works. He was a member of Congress and general of the army of the Confederate States, and was killed at the battle of Fredericksburg, Va., Dec. 13, 1862.

**Cobb** (THOMAS W.), a lawyer, born in Columbia co., Ga., in 1784, was a member of Congress from Georgia (1817-21 and 1823-24), U. S. Senator (1824-28), and a State judge (1828-39). Died Feb. 1, 1830.

**Cobb** (WILLIAMSON R. W.) was born in Ray co., Tenn., in 1807. He began business as a peddler of clocks, but his political talents brought him in the House in 1844, and to Congress in 1847. In 1863 he was elected to the Confederate Congress, but did not take his seat. He died by accident Nov. 1, 1864.

**Cobbe** (FRANCES POWER), a rationalistic writer, was born in Dublin in 1822. In early youth she was much troubled with religious doubts. "As she was one day musing on the great problem of existence, she said to herself that although she knew nothing of God or of any law beyond her own soul, she would at least be true to that, and merit the approbation of her own conscience. This resolution, we are told, brought almost immediately a renewed faith in God." She afterwards read with great interest the writings of Theodore Parker, whose views on all essential points she appears to have cordially adopted. Among her numerous works may be named "Intuitive Morals" (1855-57), "Broken Lights," and "Dawning Lights." She has also edited a complete edition of Parker's works.

**Cobbett** (WILLIAM) was born at Farnham, in Surrey, Mar. 9, 1762. He enlisted in the army, served eight years in America, and returned to England in 1791. Having obtained a discharge from the service, he emigrated to the U. S. in 1792, and settled in Philadelphia, where he edited a Federalist paper called "Peter Porcupine's Gazette." He returned to England in 1800, and began to issue in London, in 1802, "The Weekly Political Register," which was at first a Tory paper, but gradually changed and became a strenuous opponent of Pitt and an advocate of radicalism. He was prosecuted for libel, and sentenced in 1810 to imprisonment for two years. He continued to publish the "Register" until his death. Among his popular works are "Rural Rides," "Cottage Economy," and "Advice to Young Men and Women." In 1832 he was elected a member of Parliament for Oldham. Died June 18, 1835. He was a vigorous writer, and distinguished for his common sense. (See "Life of Cobbett," Philadelphia, 1823.)

**Cobbold** (THOMAS SPENCER), M. D., F. R. S., F. L. S., an English scientist, born May 26, 1828, was educated at Edinburgh. He is distinguished for his original investigations in helminthology.

**Cobbs** (NICHOLAS H.), D. D., Protestant Episcopal bishop of Alabama, born in Virginia in 1796, was ordained

deacon in 1824, priest in 1825, and became bishop in 1844. Died Jan. 11, 1861.

**Cob'den** (RICHARD), an eminent English statesman, born at Dunford, near Midhurst, in Sussex, June 3, 1804, was a son of a poor farmer who owned a small estate. He learned mercantile business in the warehouse of his uncle in London, and became a partner of a firm of cotton manufacturers in Manchester. Between 1834 and 1838 he travelled in Egypt, Greece, France, and the U. S. In 1837 he offered himself as a candidate for Parliament in the borough of Stockport, but was not elected. He advocated free trade, and was the most prominent member and orator of the Anti-Corn-Law League, formed in 1839. In 1841 he was returned to Parliament for Stockport. He spoke against the corn laws in Parliament and in many public meetings. As a parliamentary orator he was distinguished for his extensive information and cogency of reasoning. He was a man of sound judgment and uncommon energy. After the corn laws had been repealed in 1846, Sir Robert Peel acknowledged that Mr. Cobden was entitled to more credit for this reform than any other man. In 1847 he was chosen to represent the West Riding of Yorkshire. He was one of the leaders of the Manchester party or school, which advocated electoral reform, a pacific foreign policy, and non-intervention in foreign quarrels. He was defeated in the election of 1857, because he opposed Lord Palmerston's Chinese policy. In 1857 he revisited the U. S., and was elected a member of Parliament for Rochdale. Lord Palmerston in that year offered him a seat in the cabinet as president of the board of trade, but he declined it, because he disapproved the foreign policy of Palmerston. He negotiated in 1860 an important commercial treaty with France in the interest of free trade, which increased the commerce between the British and French dominions. He was one of the few British statesmen who sympathized with the Union cause in the American civil war. Died April 2, 1865. His influence extended far beyond England, his free-trade principles having found followers and energetic advocates in all civilized lands. (See J. GARNIER, "R. Cobden, les Liqueurs et la Ligue," 1846; J. MCGILCHRIST, "Life of Richard Cobden," 1865.)

**Cobi'ja**, or **Puerto de la Mar** (i. e. the "seaport"), a town of Chili, in the department of Atacama, is on the Pacific Ocean: lat. 22° 34' S., lon. 70° 21' W. Before the late war between Chili and Bolivia the place had some importance, being the principal port of Bolivia. As a possession of Chili, however, which has other and better harbors, and situated, as it is, in a desert which yields none of the necessities of life, not even water, it will hardly ever become of consequence. Its harbor is comparatively safe, but the landing-place is bad and the danger from the surf by no means inconsiderable. The population is floating, between 3000 and 6000.

**Cob'leigh** (NELSON EBENEZER), D. D., LL.D., a divine, educator, and journalist of the Methodist Episcopal Church, was born in Littleton, N. H., Nov. 24, 1814, graduated at the Wesleyan University, Conn., in 1843, was elected professor in McKendree College, Ill., 1853, professor at Lawrence University, Wis., 1854, president of McKendree College 1858, editor of "Zion's Herald," Boston, Mass., 1863, president of East Tennessee Wesleyan University, Athens, Tenn., 1867, and editor of the "Methodist Advocate," Atlanta, Ga., 1872. He is author of numerous and able reviews.

**Coblentz** (anc. *Confluentes* or *Confluentia*), a fortified city of Rhenish Prussia, is finely situated at the confluence (whence its name) of the Rhine and the Moselle, 50 miles S. E. of Cologne, with which it is connected by rail. The Rhine is crossed by a bridge of boats 435 yards long, and the Moselle is crossed by an iron railroad bridge and a stone bridge. Here are handsome churches, a gymnasium, a palace, and an old castle of the electors of Treves. The church of St. Castor was commenced about 836 A. D. Coblentz is a free port, and has an active trade in wine, grain, etc.; also manufactures of cotton and linen fabrics and japanned wares. On the opposite side of the Rhine is the strong fortress of Ehrenbreitstein. Coblentz is said to be the strongest place in the Prussian dominions. Pop. in 1880, 30,548.

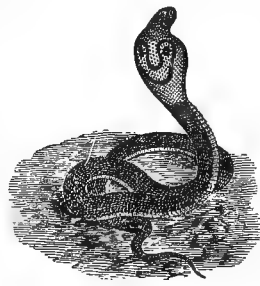
**Cob'leskill**, Schoharie co., N. Y. (see map of New York, ref. 5-I, for location of county), on R. R. and Cobleskill Creek, 45 miles W. of Albany. Pop. in 1870, 1030; in 1880, 1222.

**Cob-Nut**, the name given to different varieties of the cultivated hazel-nut. In the West Indies the name cobnut, also called hog-nut, is given to the fruit of *Omphalea triandra*, a tree of the natural order Euphorbiaceæ. A white juice is obtained from the tree which turns black in drying, and in Guiana is used instead of ink. The fruit

is a 3-celled capsule, each cell containing one nut, which, if the embryo is retained, has cathartic properties, but after its extraction is wholesome and palatable.

**Co'bourg**, a port of entry and capital of Northumberland co., Ontario (Canada), on Lake Ontario and on the Grand Trunk Railway, 69 miles E. by N. of Toronto, and is the S. terminus of the Cobourg Peterborough and Mar-mora Railway. It has a good and commodious harbor, and has regular lines of steamers to many of the principal lake and river ports of Canada and the U. S. The town is finely laid out, well built, and lighted with gas. Among the finest buildings are Victoria Hall, owned by the county, and Victoria College (Wesleyan Methodist), connected with Victoria University. Cobourg has manufactures of woollen goods, railway carriages, castings, lumber, beer, etc., and exports lumber, provisions, flour, and iron ore. Pop. in 1881, 4957.

**Co'bra de Capel'lo** [a Portuguese term signifying



Cobra de Capello.

"hooded snake"), the name of a venomous serpent, sometimes applied to other species of the genus *Naja*, of the family Viperidæ, though it is more usually limited to the *Naja tripudians*, a native of the Indies, the most venomous of known reptiles. Other species of *Naja* are found in the warmer parts of Asia, Africa, and Australia, and in the East Indian Islands. The term cobra de capello is derived from a singular faculty possessed by these

snakes of expanding and elevating the skin of the back of the neck into the resemblance of a hood. This phenomenon is shown when the creature is angry or excited, and is produced by the structure and action of the skeleton, as well as of the skin and muscles. The back of the hood is usually ornamented with two eye-like spots joined by a curved dark stripe, the whole resembling a pair of spectacles; hence it is often called the "spectacle snake." The color of the cobra is not uniform; some are brownish olive, having the spectacles white, edged with black. Another variety has cross-bands of black. Specimens without spectacles have been found in Java, Borneo, and other islands. The cobra attains a length of from three to five or more feet. It is sluggish in its habits, and easily destroyed. It feeds on lizards and other small animals. Its venom is secreted by two large glands in the head, and is extremely powerful, often causing death in two hours or less. This poison, though generally fatal if introduced through a wound, is said to be harmless when taken into the stomach. The only successful treatment is immediate excision or thorough cauterization of the wound, but Fayrer believes that artificial respiration will save many cases. The cobra, together with other serpents, is an object of worship among many of the Hindoos. It is asserted that thousands of people perish annually in British India from the bite of this reptile, and the government now pays a bounty for the destruction of this and other dangerous serpents.

**Co'burg** [Lat. *Melocabus*], a town of Central Germany, in the duchy of Saxe-Coburg-Gotha, is on the river Itz and on the railway from Dresden to Munich, 26 miles N. of Bamberg. It is one of the residences of the duke of Saxe-Coburg-Gotha, and is the seat of all the high courts of the duchy. It has a ducal palace with a library of 26,000 volumes, a theatre, an observatory, an evangelical gymnasium, and a large arsenal. On a hill 500 feet high is an old castle in which Luther was concealed in 1530. Here are manufactures of cotton, linen, and woollen fabrics, etc. Pop. in 1880, 15,791.

**Co'ca**, the leaves of a shrub (*Erythroxylon Coca*) of the order Erythroxylaceæ, a narcotic and stimulant used by the inhabitants of Peru, Brazil, and Bolivia, and especially by the Indians of Ecuador and of the Peruvian Andes. The leaves are chewed with a little unslaked lime or alkaline ashes. The effects resemble those of opium, although less narcotic; it dilates the pupil of the eye, while opium contracts it. It lessens the desire for food, and enables the person who uses it to endure greater and more protracted exertion than he otherwise could, and with less food. It possesses the remarkable property of preventing the difficulty of respiration common in the ascent of great elevations. Used in excess, it weakens the digestion, produces various disorders, and finally impairs both body and mind. It is supposed that about 30,000,000 pounds of the dried leaf are consumed in a year, about 10,000,000 of the human race habitually using it. Its



powers are believed principally to depend upon an active principle called cocaine.

**Cocaine** ( $C_{16}H_{19}NO_4?$ ), an alkaloid extracted from coca leaves. It crystallizes in colorless, odorless prisms, having a slightly bitter taste, and resembling atropine in its properties.

**Cocceius** (NERVA), an eminent Roman jurist, was a grandfather of the emperor Nerva. He was elected consul in 22 A. D. His learning is highly extolled by Tacitus. Died about 33 A. D.

**Coccejus, Cocceius, or Cock** (JOHANN), an eminent German theologian, born at Bremen Aug. 9, 1603. He was professor of Hebrew at Franeker from 1636 to 1650, when he became professor of theology at Leyden, where he died Nov. 5, 1669. He wrote commentaries of great learning and ability on nearly the whole of the Old Testament, but is best known as the founder of the so-called "Federal School" in theology. His doctrine of the covenants of works and grace is drawn out in the treatise "Summa Doctrinæ de Fœdere et Testamento Dei" (1648; 2d ed. 1653).

**Coccejus** (SAMUEL), BARON, a German statesman, son of Heinrich Coccejus, born at Heidelberg in 1679, became in 1727 Prussian minister of state, and in 1746 chancellor. He was the author of a new code of laws ("Codex Fridericianus," 1747-50). Died in 1755. (See TRENDLENBURG, "Friedrich der Grosse und sein Grosskanzler Samuel von Coccejus," 1863.)

**Coccius** (ERNST ADOLF), a prominent German oculist, born Sept. 19, 1825, at Knauthain, near Leipsic, became in 1849 lecturer at the University of Leipsic; established in 1857 a clinical institution of eye-diseases, of which he was the director until 1867. He wrote numerous works, all of which are regarded as important contributions to ophthalmological literature.

**Cocco Root** is the product of plants of the nearly-allied genera *Colocasia* and *Caladium*, of the order Araceæ, cultivated in tropical countries for their flat corms, which abound in starch, and are used as food after being roasted or boiled to remove the acidity. The above names strictly belong to *Colocasia antiquorum*, a stemless plant with ovate leaves, and flowers enclosed in a cylindrical erect spathe. *Colocasia esculenta* is a much-cultivated plant of tropical America. *Colocasia macrorrhiza* is the taro of the South Sea Islands. *Colocasia Himalensis* forms the principal food of many of the inhabitants of the Himalaya Mountains.

**Coccos'teus** [from the Gr. κόκκος, a "berry," and ὀστρεόν, a "bone," alluding to the prominences on its bony armor], the name of a genus of fossil ganoid fishes of the Devonian measures. Eight species have been found in Scotland. It was allied to the *Cephalaspis*, but differed in having, in addition to the bony helmet of that genus, a cuirass covering the dorsal and ventral aspects of the body as far as the origin of the dorsal fin, from which to the tail—more than one-half the length of the animal—all seems to have been without the protection even of a scale.

**Cocculus Indicus**, the very poisonous seed of the *Anamirta Cocculus*, a beautiful climbing plant of the order Menispermaceæ. The seed is brought from the East Indies, and is sometimes used for medicinal purposes, and illegally in the preparation of malt liquors. It possesses acrid and intoxicating qualities. It is used for stupefying fish, that they may be taken by the hand; in some of the U. S. this practice is forbidden by law. An ointment made with it is very efficacious for ringworm. It contains a poisonous principle, called Picrotoxin (which see), while the pericarp contains another called menisperm, equally poisonous. It imparts to beer a bitter taste, and at the same time an apparent richness, but renders it very deleterious in its effects.

**Coccus** [from the Gr. κόκκος, a "berry," so called because some species of the insect were formerly supposed to be the seed of a plant], a genus of insects of the order Hemiptera, allied to the aphidæ family, although very distinct. The Coccidæ are sometimes called "scale insects" and gall insects, but they are not to be confounded with the gall-flies (Cynipidæ). They are very numerous, and are attached to plants, on the juices of which they feed, often producing much mischief by their punctures, and giving great trouble to gardeners. Various washes of soap, sulphur, tobacco, etc. are employed to destroy them, but moist heat, or as much exposure to steam as the plant can bear, has been found in many cases efficacious. The destructive coffee-bug belongs to this family. The male Coccidæ have only two wings, which shut horizontally upon the body; the abdomen is terminated by two threads. The females are wingless; they have a beak, which they insert into plants to suck their juices. This interesting family contains not only many troublesome species, but some which are of great value for the beautiful dyes which

they yield. Among them are COCHINEAL and KERMES (which see). Other species produce LAC and WAX (which see).

**Cocentayna**, a Spanish town, in the province of Alicante, 30 miles N. of Alicante. It is ill built, but has considerable manufactures of cloths, taffetas, etc. Pop. 7926.

**Cochabamba**, a department of Bolivia, S. of Chuquisaca, in the centre of the republic. The climate is healthful and spring-like. The soil is exceedingly fertile and rich in manifold products. So abundantly do cereals grow that it has been called the granary of the republic. Area, 26,803 square miles. Cattle and horses are plenty. The noble metals are found, but in smaller quantities than elsewhere. Pop. 473,717.

**Cochabamba**, sometimes called **Orope'sa**, a city of Bolivia, capital of the department of Cochabamba, is about 150 miles N. N. W. of Chuquisaca, and 8440 feet above the level of the sea. The city was founded in 1565. The houses are mostly one story high, well built, and surrounded by gardens. The trade is large. It has fifteen churches, and some manufactures of cotton and woollen stuffs, leathers, soap, glass-ware, and pottery. Most of its inhabitants are Indians still speaking the Quichua language. Pop. 14,705.

**Co'chin**, a rajahship of India, on the Malabar coast, is bounded on the S. W. by the ocean, and on several sides by Travancore and Malabar. It is in the presidency of Madras. Area, 1988 square miles. The climate is very wet. Here are extensive forests of teak and other trees. Rice, pepper, ginger, yams, and sweet potatoes are among the productions of the soil. Chief town, Cochin.

**Cochin**, a seaport-town of Hindostan, in the district of Malabar, was formerly the capital of the above country. It is situated at the entrance of an extensive backwater or lagoon, 80 miles S. S. E. of Calicut. The lagoon, which is nearly 120 miles long, and is navigable, affords valuable facilities for communicating with the interior. Cochin has great natural advantages for trade and shipbuilding. The Jews, of whom there are many both of the white and black castes, have a synagogue, almost the only one in India. It is also a Roman Catholic episcopal see. Here the Portuguese erected in 1503 their first fort in India. They were expelled from Cochin by the Dutch in 1663. The town was ceded to the British in 1814. The chief articles of export are teak-timber, cardamoms, coir, etc. Pop. 20,000.

**Cochin-China**. See ANAM.

**Cochineal** [Sp. *cochinilla*, originally the name of the coccus insect used in dyeing; see KERMES], a substance used in dyeing crimson and scarlet and in the preparation of the colors carmine and lake. It consists of the bodies of the females of the *Coccus cacti*, which feeds on plants of the cactus family, particularly on the cochineal plants (*Opuntia cochinitifera*, *Hernandezii*, and *Tuna*), nearly allied to the prickly pear. It is a native of the warm parts of America, and is cultivated for the sake of the valuable insect which feeds on it. This cultivation was practised by the Mexicans long before the country was known to Europeans. It is now carried on also in parts of the West Indies and Peru, and in the Canary Islands, where it forms a very important article of commerce with Europe and the U. S. The cochineal insect is very small, a pound of cochineal being calculated to contain not less than 70,000 in a dried state. The male is of a deep-red color and has white wings. The female is wingless, and of a deep-brown color, covered with a white powder, flat beneath, convex above. The cultivator procures branches laden with the insects, and keeping the branches till the mother-insects have laid their eggs, he places their bodies, with the eggs, in little nests formed of some cottony substance upon the cochineal plants, and the young insects, when hatched, soon spread over them. The gathering of the cochineal is very tedious, and is accomplished by brushing the branches with some soft brush, such as the tail of a squirrel. The insects are killed by boiling water, by heating in ovens, or by exposure to the sun. They must be quickly killed, to prevent them from laying their eggs, which diminishes their value. When killed and dried, they may be kept for almost any length of time without injury. The coloring principle of cochineal is carminic acid ( $C_{14}H_{14}O_8$ ), known in an impure state as *carmine*, and combined with alumina as *carmine lake*. Cochineal is used for dyeing wool and silk scarlet and crimson. The colors are very brilliant, but not durable. They are easily spotted by water and alkalis. The mordants used are alum, cream of tartar, and tin salt.

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**Cochituate Lake**, in Middlesex co., Mass. 18 miles W. from Boston, is  $3\frac{1}{2}$  miles long, about 1800 feet wide in its broadest part, and has an area of 800 acres at high-water mark. Dug Pond ( $44\frac{1}{2}$  acres) and Dudley Pond (81 acres) are tributary to it. The lake is connected by an

artificial channel with Sudbury River, and is the principal source of water-supply for the city of Boston.

**Coch'ran** (JOHN), M. D., born Sept. 1, 1730, in Chester co., Pa.; studied medicine with Dr. Thompson of Lancaster; served as surgeon's mate in the hospital department in the French war of 1755; at the end of the war he settled in Albany, N. Y.; removed soon after to New Brunswick, N. J.; April 10, 1777, he was appointed, on Washington's recommendation, physician and surgeon-general in the middle department; in Oct., 1781, he was made director-general of the hospitals of the U. S. After peace was declared he removed to New York, and was made commissioner of loans by Washington. Died at Palatine, Montgomery co., N. Y., April 6, 1807.

**Cochran** (JOHN WEBSTER), an eminent inventor, born at Enfield, N. H., May 16, 1814, removed in 1832 to Boston, Mass., patented in 1833 a steam heating-apparatus, and in 1834 a revolving cannon, constructed on the principle afterwards used in the revolving pistol. He afterwards invented valuable machinery for the curvilinear sawing of timber. He resided in Europe many years, and afterwards returned to the U. S., having acquired wealth and fame by his inventions.

**Cochran** (WILLIAM), a Scotch painter, born Dec. 12, 1738, at Strathaven; studied at Rome under Gavin Hamilton; settled at Glasgow on his return to his own country, and painted portraits and historical pieces with great success. Died Oct. 23, 1785.

**Cochran** (WILLIAM) was a Northern man of Irish descent who settled in Tuscaloosa, Ala., about 1837. He became a law-partner of Gen. Crabb, and acquired a great reputation.

**Coch'rane** (SIR ALEXANDER FORESTER INGLIS), an English admiral, born April 22, 1758, served with distinction in Egypt and the West Indies, and commanded the English fleet which assisted in taking Washington in Aug., 1814. Died at Paris Jan. 26, 1832.

**Cochrane** (CLARK B.), born in New Boston, N. H., May 31, 1815, a graduate of Union College, Schenectady, N. Y.; was by profession a lawyer, and was a member of the legislature of New York in 1843 and 1844; was a representative from New York in the 35th Congress; served on committee on expenditures in the War Department; was re-elected to the 36th Congress; served on committee on private land claims; was a delegate to the Baltimore Convention of 1864, and was re-elected to the assembly in 1865. Died at Albany, N. Y., Mar. 5, 1867.

**Cochrane** (JOHN), GENERAL, born at Palatine, Montgomery co., N. Y., Aug. 27, 1813, graduated at Hamilton College, Clinton, N. Y., in 1831, became a lawyer and removed to New York City in 1846; was surveyor of the port of New York for four years; Democratic member of Congress (1856-62), served as a brigadier-general of volunteers (1862-63), was assigned a brigade in Couch's division of the Potomac army, led the reserve in the battle of Antietam, partook afterward in the pursuit of the retreating enemy, and in 1864 was nominated for Vice-President on the Fremont ticket. He was attorney-general of New York in 1865, and was a delegate to the Philadelphia "National Union Convention" of 1866, and to another, of the same name, in Chicago in 1868. He was appointed revenue collector for the sixth district of New York in 1869.

**Cochrane** (JOHN DUNDAS), CAPTAIN, a British naval officer, son of Admiral Sir Alexander Cochrane, and called the "pedestrian traveller," was born about 1780. He purposed a journey round the globe on foot, and traversed Russia and Siberia in that manner. When he arrived in Kamchatka, however, he married, and abandoned his original project. He returned by way of Russia to England in 1823, and published a narrative of his travels, which was very favorably received by the public, and read in several editions. Died Aug. 12, 1825.

**Cocin'ic Acid**, or **Cocostearic Acid** ( $\text{HC}_{13}\text{H}_{25}\text{O}_2$ ), the fatty acid of cocoanut oil.

**Cock** [Fr. *cog*], the male of the common domestic fowl, which has been under the protection of man from time immemorial; and some of the earliest historical records—the curious paintings of the Egyptians—show that it was as completely domesticated at that early period as in our own time. The name is also applied to the males of many other kinds of birds. The ancients regarded the domestic cock as sacred to Mars. The cock is said to have been the emblem of the ancient Gauls, though the tradition does not rest on authority, and is supposed to have been a mere play of words between the Latin *gallus*, a "cock," and *Gallus*, a Gaul; the cock was placed, after the Revolution, on the ensigns of France. It is introduced by artists amongst the emblems of our Lord's passion, in allusion to

Saint Peter's sin, and for the same reason it is Saint Peter's emblem as the lion is the emblem of Saint Mark. Among the early Christians it was represented on tombs as an emblem of the resurrection—the herald of light after the night of death. They also used it as a symbol of vigilance.

There is reason to believe that the domestic fowl is the descendant of more than one recognized species of the genus *Gallus*, all, however, of Asiatic origin. Among these are the *Gallus giganteus*, or Kulm fowl, a large bird of India and the Eastern Archipelago; *Gallus Sonneratii*, a spirited fowl of Hindostan; *Gallus senensis*, *furcatus*, and *bankiva* of the Archipelago, and others; but there is very good reason to believe that they are all of one stock, since the domestic fowl, like the pigeon, has a remarkable tendency to develop strongly-marked varieties in breeding.

**Cock** (THOMAS), M. D., a prominent physician of New York, born at Glen Cove, Long Island, in 1802. He distinguished himself by his courage and ability during the yellow-fever season in New York in 1822, and in the epidemic of cholera in 1832. He was a professor in the New York College of Physicians and Surgeons, and an active Christian philanthropist. Died June 14, 1869.

**Cockade** [Fr. *cocarde*], a ribbon or badge worn on the hat or cap by officers of the army or navy; an appendage to the headress, worn as a military or naval distinction or as a badge of a party. During the Revolution of 1789 the French people generally assumed the tricolored ribbon (red, white, and blue) as a badge of patriotism or the symbol of the new *régime*. The army also wore the tricolored cockade until the Restoration, when the legitimists adopted the white cockade. In England a white rose was the badge of the Stuarts, and became a favorite theme in Jacobite songs after the Stuarts had ceased to reign.

**Cock'atoo'** [a word derived from the cry of these birds], the name applied to several birds nearly allied to the parrots (of the family Psittacidae), from which they are distinguished by the greater height of the bill and by the lengthened and rounded tail. In the genus *Ptilinopus* the head is large, and surmounted by a crest of long pointed feathers, with their tips directed forward, which can be expanded like a fan or depressed by the bird. The cockatoos are of generally whitish plumage, often finely mixed with red, orange, and other colors. The name cockatoo is also extended to allied genera, *Cacatua*, *Nestor*, *Calyptorhynchus*, and *Microglossum*. The genus *Microglossum*, to which belongs the giant cockatoo of New Guinea, is remarkable for the structure of the tongue, which is cylindrical, tubular, capable of being greatly protruded, and which terminates in a horny tip. The cockatoos are natives of Australasia



White-crested Cockatoo.

and the Malay Islands. They not only eat fruits and seeds, but the larvæ of insects. None of the cockatoos learn to

speak with fluency. The owl parrot (*Strigops*) and the hairy parrot (*Dasyptilus*) are kindred to the cockatoos.



Black Cockatoo.

The black cockatoo, noted for its enormous bill, is blue-black, and is a native of New Guinea.

**Cockatrice** [called in Latin *basiliscus* and *cocatrix*], a fabulous monster or venomous serpent, which has been sometimes identified with the basilisk. It was said to be hatched from a cock's egg, and its breath and look were fatally poisonous. The word occurs in the English version of the Old Testament as the name of a venomous serpent.

**Cockburn** (Sir ALEXANDER J. E.), BART., an English judge, born in 1802; graduated LL.B. at Trinity Hall, Cambridge, in 1829; was called to the bar, and subsequently became Q. C. in 1841. He was elected to Parliament as a liberal in 1847, and was appointed attorney-general in 1851. In 1856 he became chief-justice of the court of common pleas, and in June, 1859, lord chief-justice of the court of queen's bench; succeeded to the baronetcy in 1858. He was selected by the British ministers as an arbitrator of the tribunal for the settlement of the "Alabama claims" at Geneva, in 1871-72. D. Nov. 20, 1880.

**Cockburn** (Sir GEORGE), G. C. B., a British admiral, born April 22, 1772, entered the navy in 1781, was made lieutenant in 1793, captain of a frigate in 1794, distinguished himself in many engagements, among which were the battle off Cape St. Vincent in 1797, the reduction of Martinique, the defence of Cadiz against the French, etc. He was made rear-admiral in 1812, and assisted in the capture of Washington, D. C., in Aug., 1814; in 1815 he received the order of the Bath, K. C. B., and conveyed Napoleon Bonaparte to St. Helena; received the grand cross of his order, G. C. B., and was M. P. for Portsmouth in 1818; lord of the admiralty in 1818 and 1828; vice-admiral in 1819, privy councillor 1827, and admiral in 1837; commanded the West Indian and North American naval stations 1832-36; M. P. for Ripon in 1841, and senior lord of the admiralty; retired from the admiralty in 1846; admiral of the fleet, 1851; succeeded to the baronetcy on the death of his brother in 1852. Died at Leamington, England, Aug. 19, 1853.

**Cockburn** (JAMES), born at Berwick-on-Tweed, England, Feb. 13, 1819, died at Ottawa, Canada, Aug. 14, 1883. He was educated in the Upper Canada College, studied law, was admitted to the bar in 1846, and created a queen's counsel in 1863 and a member of the cabinet 1864-67. In 1872 he was chosen speaker of the second Parliament.

**Cockchafer**, the common English name of the *Melolontha vulgaris*, a European coleopterous insect of the family Melolonthidæ, famous for the ravages which it commits, the winged beetle feeding on the leaves of fruit and forest trees, the grub devouring the roots of pasture-grasses and corn. The cockchafer is an inch in length, of a pitch-

black color, with a whitish down, giving a powdered appearance; the grub is an inch and a half long, whitish, with a red head and six legs. The cockchafer does not live long in its perfect state, but it lives nearly four years in the larva form. The female deposits her eggs in the earth. The whole grass of a field has been destroyed in a short time by the grubs, and the beetles themselves strip the trees like locusts. The river Severn is said to have been so filled with their bodies in 1574 that the water-wheels of the mills were clogged; and in 1688 they were so abundant in some parts of Ireland that they hung in clusters on the trees like bees swarming, and the noise of their jaws at work was compared to that of the sawing of timber. This insect does not occur in the U. S., but others of the same family and of similar habits abound.

**Cocke** (JOHN), GENERAL, born at Brunswick, Nottoway co., Va., in 1772; emigrated in early life to Tennessee; became a lawyer; was a member of its first legislature in 1796; Speaker of the House in Tennessee for many years, and was also member of the Tennessee Senate; major-general of volunteers in the Creek war (1813), and served as colonel at the battle of New Orleans (1815); was a member of Congress from Tennessee (1819-27). Died Feb. 16, 1854.

**Cocke** (WILLIAM), born in Virginia; was engaged in the military, civil, legislative, and judicial services of that State; removed to Tennessee, and became a general of militia; member of the State legislature in 1813; judge of the circuit court; U. S. Senator from Tennessee in 1797 and 1799-1805; in 1814 was appointed Indian agent for the Chickasaw Nation.

**Cock'er**, a small spaniel, similar to the Blenheim dog. The small size of the cocker fits it for ranging in coverts, and it is much employed by British sportsmen in pheasant and woodcock shooting; but it cannot easily be trained to wait for the sportsman. It is sometimes called the "cocking-dog," taking both its names from its behavior when game is discovered. It somewhat resembles the setter.

**Cock'erell** (CHARLES ROBERT), R. A., born in London, England, in 1788; visited Italy, Asia Minor, etc. 1810-17; discovered Æginetan and Phigaleian marbles in 1811; in 1819 was appointed surveyor to St. Paul's, and held that office till his retirement from business; was elected a royal academicien in 1836, and in 1840 became professor of architecture in the Royal Academy. He designed many important public buildings, and was for some years chief architect of the Bank of England. Among other honors conferred on him by his own and by foreign countries are the following: F. S. A., D. C. L., president of the Royal Institute of British Architects, member of the Institute of France, of the Legion of Honor, and of many foreign academies. He published "On the Iconography of Wells Cathedral," "On the Sculptures of Lincoln and Exeter Cathedrals," "Tribute to the Memory of Sir Christopher Wren," etc., and died at London, England, Sept. 17, 1863.

**Cock'erill** (JOHN), an English engineer and well-known promoter of modern commerce, born in Lancashire Aug. 3, 1790. In 1802 he went to Belgium, where his father had long been employed as a machinist, and in 1816 established at Seraing, near Liège, a large machine-shop, the king of Holland being for a time in partnership with him. He also established coal-mines, iron-mines, and large factories in many parts of Europe. In 1839 he failed, and died in 1840.

**Cockerill** (JOSEPH R.), born in Virginia; removed to Ohio, and was elected representative in the 35th Congress; member of committee on public expenditures, etc. Died at West Union, O., Oct. 23, 1875.

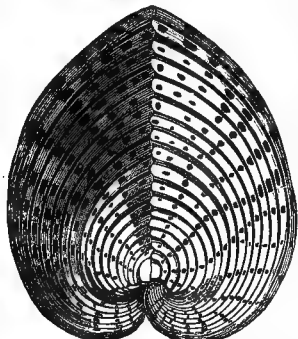
**Cock'ermouth**, a town of England, in Cumberland, on the river Derwent, at the mouth of the Cocker, 24 miles by railroad S. W. of Carlisle. It is poorly built. Here are the ruins of a castle founded about 1100, and razed by the army of the Parliament in 1648. It has manufactures of cotton and woollen goods, hats, hosiery, and paper. St. Mary's church, rebuilt in 1850, has a memorial window to the poet Wordsworth, who was born in this town. There are extensive coal-mines in the vicinity. Pop. in 1881, 5354.

**Cock-Fighting**, a barbarous sport which is said to have originated with the Athenians, who enjoyed its ludicrousness rather than its excitement. It existed in the days of Thomas à Becket, and until the time of the Commonwealth it flourished, a pit at Whitehall having been erected and patronized by royalty. It was prohibited in 1654, but, though there have been other acts passed with the view of putting it down, it still exists both in England and the U. S. Cocks of the breeds known as game fowl are chosen. These birds often exhibit the highest degree of courage.

Much art is displayed in training and in trimming and preparing the cock for the combat; the fastening on of the

steel spurs or "gaffs" is a matter requiring considerable experience. Young cocks are called stags; two years is the best age. In fighting, a certain number of cocks on either side is agreed upon, and before the match the cocks are shown, and matched according to their weights. The cocks within an ounce of each other in weight are said to "fall in," and are matched for the "main." Those which do not fall in are matched to fight what are called "byes." The main is fought for a stake upon each battle, and so much for the main or the winner of the most battles in the main; while the byes have nothing to do with the main, and are fought for smaller sums. The nations of Spanish origin are especially fond of this sport, which has also been very popular in parts of the U. S.

**Cock'le** [Gr. *κογχύλιον* (from *κόγχη*, a "shell"); Lat.



Cockle-shell: *Cardium Junonis*.

[*conchylium*], a name given to various accephalous mollusks, chiefly of the genus *Cardium*. The *Cardium edule*, or common cockle, and other species, constitute an important supply of food in England and other European countries. The species are very numerous, and are chiefly tropical. *Cardium Junonis* is one of the finest species. Several species occur on the Atlantic and Pacific coasts of the U. S.

**Cock'le, or Corn-Cockle** [*Fr. coquelicot*], a common name of the *Lychnis Githago*, an annual plant of the order Caryophyllaceæ, a native of Europe. It often occurs as a weed in the wheat-fields of the U. S., and produces black seeds, which are injurious to the appearance and quality of wheat flour. The lobes of the calyx are linear, and longer than the corolla, which is purple-red.

**Cock'ney.** The origin of this term, applied to a native or citizen of London, is involved in obscurity. In 1517, Henry VIII. made an order with reference to the feast of the King of the Cockneys, held on Childermas Day. The term Cockney School was applied to a literary coterie consisting of Hazlitt, Keats, Leigh Hunt, Shelley, etc.

**Cock'pit,** in a ship of war, is a room near the after hatchway, under the lower gun-deck. It adjoins the surgeon's cabin and the surgery, contains the medicine-chests for all the crew, and is the place where the wounded men receive surgical treatment during an action.

**Cock'roach, or Roach,** a name of several orthopterous insects of the genus *Blatta* and allied genera, which have a flattened body, the head beneath the plate of the prothorax, and wings folded longitudinally. The elytra are parchment-like, and the wings sometimes imperfectly developed, particularly in the females. The eggs are in a sort of shell fixed to the abdomen of the mother, which at last she deposits in a suitable situation, attaching it by a glutinous secretion. The larvae are similar in form to the perfect insects, and, like them, very voracious. Cockroaches are numerous in warm countries, and the common cockroach (*Blatta orientalis*) was imported from abroad, but its native country is uncertain. It devours both animal and vegetable substances, and a dark-colored fluid from its mouth gives a disgusting smell to everything that it passes over. The common cockroach is an inch long, but some tropical ones are much larger. The cockroaches are remarkably infested by parasitic insects and fungi. Borax, used freely, will generally drive them away.

**Cocks'comb** [named from the resemblance of its head of flowers to the comb of a cock], a name applied to various amaranths, but especially to the *Celosia cristata*, a native of the East Indies, and a familiar inmate of conservatories, often also planted in borders. Its upright stem becomes flattened, expands, and forms a crest, bearing on its surface many very small and brilliant flowers, so crowded as to present a rich velvety appearance.

**Cocoa.** See CACAO and THEOBROMA.

**Co'coa-Nut,** the fruit of the *Cocos nucifera*, a tree of the order Palmaceæ, which is indigenous or cultivated in nearly all tropical countries. It has pinnate leaves, from twelve to twenty feet long. The trunk or stem is branchless, and grows to the height of sixty to ninety feet, bearing at its summit a crown of leaves. These trees prefer a sandy soil, and are seldom found growing far from

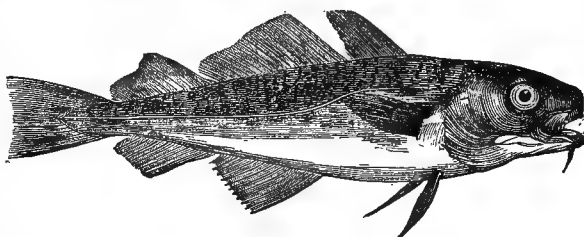
the sea, unless they have been planted by man. The thick and hard shell of the nut is well adapted to preserve the seed when it is carried by the waves to some distant shore or sandbank; hence the cocoanut-palm is one of the first large plants that usually appear on a new island of coral formation as soon as sufficient soil has been collected there. It affords a large variety of useful products. The nut, which is an important article of food to the people of tropical countries, is eaten both ripe and unripe. The young unripe fruit contains a pleasant milky fluid, which is used as food and is prepared in various ways. The kernel yields about 70 per cent. of a fixed oil called *cocoanut oil*, which is an important article in the manufacture of stearine candles and marine soap. In tropical countries it is used as lamp oil and as an article of food. It can be separated by compression in the cold into a more liquid portion called oleine, and a more solid part termed *cocostearine* or *cocosine*. (See COCINIC ACID.)

The terminal bud (palm-cabbage) of *Cocos nucifera* is edible and is considered a delicacy, but its removal causes the death of the tree, which is sometimes cut down for its sake. The stem abounds in a saccharine sap called "toddy," which is esteemed as a pleasant beverage, either in the state in which it is drawn from the tree, or after fermentation, which takes place in a few hours. From the fermented sap (palm wine) a spirituous liquor called "arrack" is obtained by distillation. The dried leaves of the cocoanut-palm are useful for thatching houses, for making mats and baskets, and for other purposes. The wood of the lower part of the stem is very hard, takes a beautiful polish, is employed for a variety of purposes, and is imported for ornamental joinery under the name of porcupine-wood. The most important fibrous product of this tree is coir, the fibre of the husk of the immature nut. (See COIR.) The shell of the nut is made into cups, ladles, etc., and is often finely polished and elaborately ornamented by carving. The double cocoa-nut is the product of the *Lodoicea Seychellarum*, a palm growing in the Seychelle Islands.

**Co'coa Plum,** the edible fruit of the *Chrysobalanus Icaco*, a shrub of the order Rosaceæ, growing in the southern part of the U. S. and the West Indies. The fruit resembles a large plum, yellow, purple, or black in color.

**Cocoon.** See SILKWORM and CHRYSALIS.

**Cod** (*Gadus morrhua*), a fish of great commercial importance, belonging to the family Gadidae. The genus is distinguished by three dorsal and two anal fins and a barbule beneath the chin. The cod has been known to reach



Common Cod.

a weight of 100 pounds. The roe of the female is estimated to contain from four to nine millions of eggs, a reproductive power which seems intended to provide for the extensive fisheries which are carried on in the northern parts of the Atlantic and Pacific oceans and in the Arctic seas. The cod is not known in the Mediterranean. It occurs both on rocky coasts and on sandbanks, where the largest are usually caught in depths of from twenty-five to fifty fathoms. The productiveness of the banks of Newfoundland excels that of all other known regions, but the cod-fisheries near Holland, Norway, Iceland, and the north of Scotland are also productive. The cod-fisheries of Alaska promise to become very important. The Dutch and the English engaged in the cod-fishery in the fourteenth century, about the same period. More than 6000 European vessels are employed in it, besides boats along the shores. The fishery is carried on partly by long lines and partly by hand lines. One man has been known to catch from 400 to 550 fish on the banks of Newfoundland in ten hours, and eight men to take 1600 in a day on the Dogger Bank, near Holland. Small fishes, shell-fish, etc. are used for bait. The cod is used as food, either fresh, salted, or dried. Great quantities of dried cod are carried from Newfoundland to the West Indies and the south of Europe. Cod tongues and sounds (or air-bladders) are esteemed a delicacy, and are often salted and sent to market. Several varieties and species seem to be peculiar to the American coasts. The cod-fisheries of the U. S. are principally carried on from Massachusetts and Maine, though the fisheries on the Pacific coast are assuming considerable importance.

**Cod'dington** (WILLIAM), born in Lincolnshire, England, in 1601, came to Salem, Mass., in 1630, was a merchant of Boston, and fled to R. I. in 1638, in consequence of his defence of Anne Hutchinson and others. He soon became a Quaker and an advocate of liberty of conscience, was elected a judge, and afterwards governor of R. I. (1640-47). In 1651 he was again appointed governor of the island and by the Commonwealth of England, but resigned soon. He was again governor (1674-75). Died Nov. 1, 1678.

**Code** [Lat. *codex*], a collection of laws made by public authority. In modern law, it more commonly means a methodical arrangement of law, either customary or statutory, in chapters and sections. In a number of the American States the general statutes (see *STATUTE*) are arranged in this manner under the title of "Revised Laws," "Revised Statutes," or "Codes." How far it is practicable to accomplish useful results in the codification of customary or common law is a subject of much controversy among jurists. On the one hand, it is claimed that as law of this nature can be enunciated or stated, the statement can be reduced to writing in the form of general and particular propositions. It is added, as to the common law of England, that it has been for ages in writing, and that all that is now known of it is derived from written sources such as reports and treatises of recognized authority. The rules there found are susceptible of collation, analysis, and systematic arrangement. The materials thus obtained may be recast by the codifier, and moulded into the form of positive and authoritative statement in *his own language*. True, the judge in deciding a cause states a principle as applied to the particular cause before him; the codifier may seize upon the principle that underlies the specific case, and state it in a positive and precise form. From this mode of collecting and arranging legal propositions it is claimed that a number of benefits will be secured, such as reducing the labor of lawyers, decreasing the size of their libraries, introducing legal reforms by comprehensive legislation, and affording to the public increased opportunities to become acquainted with general rules of law. (See "Report of Civil Code for New York by Commissioners," Albany, A. D. 1855.) On the other hand, it is urged that a code, being inflexible in its character, prevents the true growth of law. Discussions in court will turn upon the construction of *words* used in the code, instead of there being an examination of legal principles. The interpretation of specific words is to the last degree attended with uncertainty. Leading inquiries concerning the great statute of frauds passed in the reign of Charles II. are still regarded in the courts as open to consideration. This objection is truly formidable. Where customary law prevails, little if any attention is paid in the decision of causes to the particular language in which the court in a former case cited as a precedent expressed its views. The principle of the decision is seized upon and stated in perhaps wholly different words. The arguments applied to the construction of statute or codified law must, from the nature of the case, be in the main textual criticism. There must be interpretation of particular words, reconciliation of discordant phrases, and minute consideration of mere forms of expression. While a rule of law is in process of formation discussions as to its true principle should be as free and unfettered as possible until, after a long interchange, and perhaps collision, of opinions, the true rule is evoked, with its various qualifications and limitations. This process, so beneficial in its character, could not be made available if the rule in its early stages had already been hardened into fixed forms of statute law. Mr. Austin, in his great work on jurisprudence, though from the bent of his mind inclined to favor codification, sees the great difficulties attending it in its more perfect forms, and suggests that the work can only be accomplished successfully, if at all, by lawyers of the very highest ability and most comprehensive views, for no others can see the full scope of the subject and draw the needful sections. It may be added that in a country like our own, where legislation is fluctuating and often inconsiderate, there would be great danger, even though a well-devised code of laws were once introduced, that its symmetry would shortly be marred and the coherence of its provisions broken up. No argument for a code in the modern sense can be derived from the work of Justinian on the Roman law. The "Pandects," the great body of the Roman law, is, in the main, a mere collection of extracts from distinguished writers in *their own language*, and which had already become settled law. The "Institutes" are substantially a bare reproduction of a well-known work of Gaius, a distinguished Roman jurist. Besides, the development of the Roman law was different in some respects from our own. In that system much was made of the opinions of text-writers, while nearly the whole development of English jurisprudence has taken place through the medium of adjudged cases or "case

law." The true method of growth would seem to be that the courts should render decisions, while text-writers of ability should collect them, arrange the principles in a scientific manner, criticise them when faulty, and call the attention of the courts to needful improvement. By the work thus done law will make a steady progress, and adapt itself to the wants of the community. Radical changes must be produced by legislation. It is in vain to hope that a code will reduce libraries or make thorough study unnecessary. Jurisprudence will take on an historical form, for courts must apply the code to specific cases, and a body of case law will soon grow up, the roots of which will be sought in the past as heretofore, and its results modify the code itself, just as great masses of case law collect around an instrument so brief as the U. S. Constitution. (See also AUSTIN "On Jurisprudence," vol. ii., p. 1129, and POMEROY's "Introduction to Municipal Law," chap. iii., and the works of Savigny.)

Some of the leading codes may be referred to.

1. *Justinian's Code of Roman Law*.—The word *code* is used here as describing the whole mass of codified Roman law under the order of the emperor Justinian, including the "Code" of that system, the "Institutes," "Pandects," and "Novels." These, taken together, constitute the *corpus juris civilis*, or whole body of civil law. (These will be more fully considered under *LAW, CIVIL*.) The Theodosian code of Roman law may also be referred to, which is of comparatively little interest. (See "Foreign Quarterly Review," vol. ix., 374.)

2. *French Codes*.—Of these there are five principal ones—the civil code, of civil procedure, of commerce, of criminal procedure, and of criminal law. There are also codes upon special subjects. French codification is largely due to the emperor Napoleon.

3. *Code of Louisiana*, based on the Code Napoleon, and principally prepared by Edward Livingston. It is divided into three books, and is concerned with the civil as distinguished from the criminal law. Mr. Livingston also prepared a draft of a penal code for the State, which was not adopted, as well as one for the U. S. (These are to be found, together with introductory reports explaining the grounds of them, in a work published by the National Prison Association, with an introduction by the late Chief-Justice S. P. Chase, A. D. 1873.)

4. *New York Code of Procedure*.—The object of this is to assimilate law and equity, and to have but one form of action. It assumes to regulate in a general way both pleadings and practice, and to state in a condensed form the general rules. A large body of case law has grown up in connection with the code regulations. The results of these decisions are collected in "Annotated Codes" or in works of practice. The system has been adopted in substance in a considerable number of the States. Commissioners in New York have also reported a political, a civil, and a penal code, which have not been adopted by the legislature.

Mention may also be made of various collections of maritime rules, such as the "Consolato del Mare," "Laws of the Hanse Towns," "Ordonnance de la Marine" (of the time of Louis XIV. of France), "Laws of Oléron," and the "Laws of Wisby," which will be noticed again in connection with maritime law, as well as of the Code of Prussia, etc.

T. W. DWIGHT.

**Code'ia** [from the Gr. *κόδη*, a "poppy-head"], ( $C_{18}H_{21}NO_3 + H_2O$ ), one of the alkaloids to which opium owes its hypnotic powers. Its salts are sometimes administered in place of morphia salts. It is asserted that it possesses many of the valuable properties of that drug, without its disadvantages. The dose is much larger than that of morphia. (See *OPIMUM*, by PROF. EDWARD CURTIS.)

**Co'dex** (plu. **Co'dices**), [a Latin word signifying the "trunk" or "stem" of a tree; later it was applied to wooden tablets covered with wax, which were used for writing on]. In modern Latin, *codex* is a manuscript volume, and is especially applied to a manuscript copy of the Scriptures. *Codex rescriptus* is a synonym of *PALIMPSEST* (which see). Among the most ancient manuscripts of the New Testament are the *Codex Alexandrinus*, the *Codex Vaticanus*, and the *Codex Sinaiticus*.

**Co'dex Alexandri'nus**, the third in antiquity of the great uncial extant manuscripts of the Bible in the Greek language. (See *PALEOGRAPHY*.) It contains the Old Testament (in the Septuagint version), with some deficiencies in the Psalms, and all the books of the New Testament, with a few chasms where leaves are wanting. To these it adds the one genuine, and a fragment of the apocryphal, Epistle of Clement of Rome to the Corinthians. The Catholic Epistles follow the Acts; then come the Pauline Epistles, with that to the Hebrews before the Pastoral Epistles; the Apocalypse, which is rare in extant manuscripts, stands at the close of the New Testament.



This codex is now preserved in the British Museum, having been presented to Charles I. in 1628 by Cyril Lucar, patriarch of Constantinople, who had previously been patriarch of Alexandria, from which city he brought the manuscript. It is in quarto form, about thirteen inches high and ten broad, each page being divided into two columns of fifty lines each, having about twenty letters or upwards in a line. It is written on thin, fine, and very beautiful vellum, in uncial (or capital) letters of an elegant yet simple form, and without any space between the words. The punctuation, which is infrequent, consists merely of a point placed at the end of a sentence, usually on a level with the top of the preceding letter; and a vacant place follows the point at the end of a paragraph, the space being proportioned to the break in the sense. The black ink, in which the body of the codex was written, has

turned to a yellowish-brown; but the vermillion, freely used in the initial lines of the different books, is still bright. The manuscript bears an ancient Arabic inscription on its margin, asserting that it was written by the martyr Thecla; Tregelles, however, explains the origin of this inscription by remarking that the New Testament in the codex as we have it commences with Matthew xxv. 6, this lesson (Matthew xxv. 1-13) being that appointed by the Greek Church for the festival of Saint Thecla. The Egyptian, therefore, who wrote this Arabic note, observing the name of Thecla on the now mutilated upper margin of the codex, where such *rubrical* notes are commonly placed by later hands, hastily concluded that she wrote the book. But though not by Thecla, it may be that the neat chirography of the codex is due to a female hand, for we know that women as well as men were employed as copyists at Alexandria.

ΚΑΙ ΟΥΝ ΕΛΕΞΑΝΤΟ ΤΟ ΠΡΩΤΟΝ  
ΕΚΑΣΤΟ ΤΟ ΚΛΕΙΝΟΝ ΑΥΤΩ· ΗΝΙ  
ΚΑΔΕΙΘΕΡ ΜΕΝΕΝΟΗ Ο ΧΙΟΣ ΕΤΗ

Codex Alexandrinus (Exodus xvi. 21).

Και συνέλεξαν αὐτὸ πρῶτῳ πρῶτῳ, ἕκαστος τὸ καθήκον αὐτοῦ· ἡνίκα δὲ διεθέρμενεν\* ὁ ἥλιος, ἐτῆ-

The general consent of palæographers refers this manuscript to the beginning or middle of the fifth century of our era. In the general style of the writing and in the shape of the letters (especially those which furnish the best tests, as α, δ, ε, π, σ, φ, and ω), it holds a middle place between copies of the fourth and sixth centuries. There are no accents or breathings, and the contractions of words (as ΘC, IC, XC, ΠHP, KC, etc., for Θεος, Ἰησους, Χριστος, Πατηρ, Κυριος, etc.) are only such as are found in other manuscripts of the more ancient class. Of itacisms (as the interchange of ε and ει, η and ι, ε and α) it contains no more than others of the same date. The references in the margin to the tables of parallel passages called the "Canons of Eusebius" (A. D. 268-340?), and the insertion, before the Psalms, of the epistle to Marcellinus by Athanasius, patriarch of Alexandria (A. D. 300?-373), prove that the manuscript was not written before the fourth century; while the absence of the so-called Euthalian divisions of the Acts and Epistles into chapters, which came into vogue very soon after 458, and the shortness and simplicity of the *subscriptions* at the end of the books, appear tolerably decisive (says Scrivener) against a later date than about 450. The insertion of the Epistles of Clement points to a period when the canon of Scripture was in some particulars a little unsettled, or about the age of the Synod of Laodicea (363). It appears from the table of contents that the manuscript formerly contained the apocryphal Psalms of Solomon, but these are separated from the other books in the list, as wholly different in kind. This separation conforms to the prohibition of such psalms, at the Synod (or, as it is sometimes called, Council) of Laodicea, from being read in churches.

This manuscript is of great importance to the critic, and exhibits a text more nearly approaching that found in later copies than is read in others of its high antiquity. It is designated, in critical editions, by the letter A. It has been published in elegant style, in *quasi* facsimile, uncial type, bearing a general resemblance to the written characters, having been cast for the purpose, and (what is more important) the edition exhibiting the manuscript page for page, line for line, and letter for letter. The handsome folio volume containing the New Testament appeared in 1786, edited by Charles Godfrey Woide; the four folio volumes containing the Old Testament were edited by Henry Hervey Baber, and published in 1816-28. An edition of the New Testament, in small letter, in which Woide's text has been corrected from the manuscript itself, was published in 1860, edited by B. H. Cowper. The Old Testament has been edited by Field.

THOMAS CHASE.

**Codex Bezae or Cantabrigien'sis** (designation, D), an uncial manuscript, probably of the sixth century, containing the four Gospels and the book of Acts in Greek and Latin on opposite pages. It was presented to the University of Cambridge in 1581 by Theodore Beza, who obtained it during the French civil wars in 1562, when it was found in the monastery of Saint Irenæus at Lyons. This manuscript has several peculiar features. The Gospels stand Matthew, John, Luke, Mark, an order found also in some of the manuscripts of the Old Latin version. The pecu-

liarities in the text are striking, consisting of interpolations, sentences recast, and occasional omissions. The interpolations had probably been introduced into some still older copy from the margin of another manuscript, where they had been subjoined by some who wished to *add* whatever they could obtain from various sources to make the narrative more full and complete. These additions would be very serious were this manuscript our only record of the original writings; but when they are removed the text which remains is valuable for comparative criticism, and is strongly corroborative of the other most ancient MSS.

The text of this codex, both Greek and Latin, was published by Dr. Thomas Kipling at Cambridge in two handsome folio volumes in 1793, in type cast for the edition, and so wonderfully exact that it possesses nearly all the advantages of an actual facsimile. A more scholarly and accurate edition was brought out in 1864 by F. H. Scrivener. Whiston, who had an extravagant admiration of the manuscript, published an English translation of it in 1745.

THOMAS CHASE.

**Codex Ephraemi, or Codex Ephraemi Syri Rescriptus** (designation, C), an ancient and valuable palimpsest manuscript of portions of the Greek Bible, preserved in the great library in Paris called by turns National, Royal, and Imperial. It was brought from the East by Andrew John Lascar, a learned Greek patronized by Lorenzo de' Medici, and Catharine de' Medici carried it to Paris. The ancient writing is read with difficulty, having been erased about the twelfth century in order that the vellum might be used for transcribing some Greek works of the Syrian Father Ephraem. The treasure which lay below was first noticed by Peter Alix in the latter part of the seventeenth century. Several readings from the palimpsest were published by Küster in 1710, in his reprint of Mill's Greek Testament. In 1716, Bentley sent Wetstein to Paris to collate the whole manuscript. This work, for which fifty pounds were paid, was performed as far as was then possible. Wetstein told Bentley that it had cost him two hours to read one page. This collation Wetstein used in his own edition of the Greek Testament (1751-52). In 1834 a chemical preparation (*tinctura Giobertina*) was applied to the leaves in order to revivify the ancient writing. But although much that had been illegible was thus brought fully to light, every part of the manuscript was stained and discolored in the process, and some passages made more difficult to read than before. The conquest of all the difficulties which beset the deciphering of this codex is one of the greatest triumphs of Tischendorf. This enthusiastic, patient, keen-sighted, and skilful palæographer occupied himself from December, 1840, till September, 1841, in examining and copying the manuscript for publication, and has given the world the first complete transcript of it; the New Testament portion being published at Leipzig in 1843, the Old Testament in 1845.

Codex C is an uncial manuscript, about the size of Codex A, but written in characters a little larger (Tregelles) and somewhat more elaborate, and with but one column on a page. All its characteristics point to a date as early as the fifth century. Three correctors at least have left on it traces of their work; the earliest may have been of the sixth century, the second (who revised such portions only

\* For διεθέρμενεν.

as were used for church lessons or other ecclesiastical purposes) perhaps of the ninth. By him and by the third hand (whose changes are few) small crosses were interpolated as stops, and there are marks of cantillation as guides in intoning. In critical authority Trevelles places this MS. next to the Sinaitic and the Vatican. T. CHASE.

**Codex Sinaiticus** (designated, *Σ αλεφ*), the most recently discovered of the uncial manuscripts of the Greek Bible, and inferior to no other in antiquity, authority, and completeness.

In 1844, Constantine Tischendorf—who, although but twenty-nine years old, was already famous as an editor of the Greek Testament and as the decipherer of the Codex Ephraemi—in a journey undertaken in search of ancient manuscripts of Holy Writ, arrived at the ancient Greek convent of Saint Catharine on the range of Mount Sinai. Here he was shown a beautiful codex of the Gospels, the pride of the convent, written upon exquisite white parchment in letters of gold, and adorned with beautiful paintings of the four Evangelists, our Saviour, the Virgin Mary, and the apostle Peter, and said to have been the gift of Theodosius III. From the character of the writing it must date from the seventh or eighth century; but Tischendorf found it very inaccurate, and of slight critical value. Something much more precious than this costly codex had been thrown aside as worthless by the unintelligent guardians of the convent library. In a large basket filled with remains of torn and damaged manuscripts which stood in the middle of the room, Tischendorf found a considerable number of vellum leaves of a Greek manuscript of the Septuagint version of the Old Testament, which his practised eye at once recognized as one of the oldest in existence. The contents of the basket had been destined for the flames, two baskets full of similar materials having been already burned in the stove. Tischendorf easily obtained possession of forty-three sheets, about one-third of the number which he rescued, but was not permitted to take the other portions, nor even to copy more than a single leaf. Unfortunately, he had betrayed the value of the treasure of which the monks had before been so unconscious. Of the portion he obtained he published a lithographic facsimile in 1846, under the name of *Codex Friederico-Augustanus*, in honor of his patron, Friedrich August, the king of Saxony. Of course, Tischendorf was hoping all the time that he should at length obtain the rest of the manuscript. He made proposals for it through a friend whom he had found at the court of the viceroy of Egypt, but only to learn that the monks, having learned its value, would not part with it for any sum of money. In 1853 he visited the monastery a second time, in the hope of being permitted to copy those parts of the codex which he had left behind, but he could gain no tidings of them whatever. He found, however, one trace of the codex—a single shred, in a roll of parchment, containing eleven lines from the first book of Moses. But few years passed before Tischendorf felt impelled for a third time to journey to the East, in the hope of prosecuting his search for ancient copies of the sacred text over a wider field and more fully than before. To facilitate his researches, he succeeded in gaining the powerful patronage and protection of the emperor Alexander II. of Russia, the great champion of the Oriental Orthodox Church, and of his imperial consort. Near the beginning of the year 1859 this enthusiastic scholar presented himself for the third time at the gates of the convent. After repeated calls from below, a door in the convent wall was opened thirty feet above the ground, and a rope let down to receive the letters which the traveller brought. Ordinarily, guests are received through this same door, seating themselves on a cross-piece of wood at the end of the rope, and being then drawn up by the servants of the convent. Tischendorf's credentials procured him a more distinguished reception. In honor of his imperial commission the steward of the convent soon appeared in person, in the name of the prior, and conducted the guest, through a door seldom used, "into the still, friendly asylum." The luggage and the dragoman took the usual journey through the air.

After five days' trarriance, during which Tischendorf had carefully examined the treasures of the library, as well as ascended Mount Sinai, when he was preparing to take his departure, and had sent his Bedouins after the camels, as he was taking a walk with the steward, the conversation turned upon the text of the Old Testament. Returning at twilight to the convent, the steward invited him to partake of a luncheon in his cell, and while they were eating remarked that he had here a copy of the Septuagint, there-upon bringing out of a corner of the room a large manuscript, wrapped in a red cloth according to the Oriental custom, which he had brought to his own cell from the library of the *σκενοφύλαξ*, or keeper of the sacred utensils. Glancing at the pile of vellum, Tischendorf soon recognized

it as belonging to the same codex of which he had rescued some leaves from the basket of fuel fifteen years before; and, eagerly turning over the different sheets, beheld, to his astonishment, in addition to a large part of the Old Testament, the beginning and the end of the New, and the Epistle of Barnabas. It appears that soon after the original discovery in the waste-basket the monks had found these sheets, and placed them with the fragments which Tischendorf rescued from destruction. The German guest, concealing his emotion, begged the privilege of taking the manuscript to his own chamber; to his unspeakable joy, he found that it contained the New Testament *entire*, whereas all the other manuscripts of the first class (as regards antiquity) are more or less imperfect; and he could not withhold an offering of praise and thanksgiving to that Divine Being who had suffered so valuable a boon for the Church of Christ to come into his hands. The first night he spent in transcribing the Epistle of Barnabas (now found for the first time entire in the original Greek), in spite of a dim lamp and the cold temperature; "indeed, it seemed impious to sleep."

Understanding the aversion of the monks to part with manuscripts in their possession, Tischendorf asked and obtained, after some opposition, permission to copy the whole codex at Cairo, where there were greater facilities for the work than at the convent. With the assistance of two of his own countrymen, with incessant toil he completed his transcript, but he was not able to give his copy that careful revision and comparison with the original without which it would be unfit for publication. At Tischendorf's suggestion the monks were at last persuaded to offer the whole codex as a gift to that great monarch whom they recognized as the shield and bulwark of the Eastern Church; and in a little less than eight months after his discovery of the treasure they committed it to his hands to be borne to St. Petersburg—to be held for a time, however, as a loan made simply to facilitate the publication of an accurate edition, until the confirmation of their new archbishop's election should enable him to present it formally to the emperor, as he afterwards did.

The Codex Sinaiticus is written upon vellum sheets of extreme fineness and beauty, the delicate skins of antelopes or of wild asses (probably the former). It consists of three

ΧΕΤΕΔΕΛΠΟΤΩΝ  
ΑΝΩΝΠΑΡΑΔΩ  
COYCINΓΑΡΥΜΑ  
ΕΙCCYNEΔΡΙΑΚΑΙ  
ΕΝΤΑΙCCYΝΑΓΩ  
ΓΑΙCΑΥΤΩΝΜΑΤΙ  
ΓΩCOYCINΥΜΑ  
ΚΑΙΕΠΙΗΓΕΜΟΝΑ  
ΔΕΚΑΙΒΑCΙΛΙCΑ  
ΧΘΗCΕCΘΑΙΕΝΕ  
ΚΕΝΕΜΟΥΕΙCΜΑΡ

Codex Sinaiticus (Matthew x. 17, 18).

χρετε δὲ ἀπὸ τῶν ἀνθρώπων\* παραδώσουσιν γὰρ ὑμᾶς εἰς συνέδρια, καὶ ἐν ταῖς συναγωγαῖς αὐτῶν μαρτυρώσουσιν ὑμᾶς· καὶ ἐπὶ ἡγεμόνας δὲ καὶ βασιλεῖς ἀχθήσεσθε· ἔνεκεν ἐμοῦ, εἰς μαρ-

hundred and forty-six leaves, of which one hundred and ninety-nine contain twenty-two books of the Old Testament and Apocrypha in the Septuagint version, beginning

\* ΑΝΩΝ is a contraction for ΑΝΘΡΩΠΩΝ.

† For βασιλεῖς.

‡ For ἀχθήσεσθε.

§ An English Bible printed in the same style would read somewhat as follows:

WAREOFMNFORTHEY  
WILLDELIVERYOUUP  
TOTHECOUNCILSAND  
THEYWILLSCOURGE  
YOUINTHEIRSYNA  
GOGUEsANDYESHALL  
BEBROUGHTBEFORE  
GOVERNORsANDKINGs  
FORMYSAKEFORATES

at the first book of Chronicles; while the remaining one hundred and forty-seven present the whole of the New Testament, the Epistle of Barnabas, and a part of the Shepherd of Hermas. (To these should be added the forty-three leaves of the Codex Friderico-Augustanus.) It is written in uncial letters of exceeding beauty and simplicity of shape, approaching closely to the forms of the best papyri. Such testing characters as alpha, delta, epsilon, pi, and sigma are as unadorned as possible, without flourishes, knobs, or thickened points at their extremities—a proof of antiquity. It resembles the Vatican Codex in the absence of initial letters larger than the rest, which seem to have been regularly used after the beginning of the fifth century. It has but little punctuation, and that in the oldest manner. Its peculiarities of orthography and etymology belong to a period as early as the fourth century of our era. It is conspicuous for the brevity of its titles and subscriptions—e. g., “According to Matthew,” “Acts,” “To (the) Romans.” Longer titles, as “The Holy Gospel according to Matthew” (wrongly translated in our version “The Gospel according to St. Matthew”—*Horne's Introduction*, 3d ed., p. 410), were not introduced until a later date.

It has, moreover, certain other signs of antiquity peculiar to itself. It has always been regarded as one of the striking proofs of the remote age of the Vatican Codex that it is written in three columns on each page, presenting to the eye, when the book is open, six narrow columns at once, thereby the more closely resembling the appearance of the ancient *volumina* or papyrus-rolls when extended for reading. Just as in the first books printed after the invention of printing many of the peculiarities of the manuscripts were carefully imitated, so when manuscripts began to be written on leaves instead of scrolls, it is natural to suppose that some of the peculiarities of the older form would be retained. A very few other manuscripts have been found with the same number of columns on a page as the Vatican. But the Sinaitic Codex stands alone among known manuscripts in presenting four narrow columns on a page, seldom exceeding two inches in breadth, and eight columns at once when the book is opened; so that its claims to the benefit of this argument for antiquity are the strongest. This fact, with certain other indications, renders it probable that this codex was copied directly from an old Egyptian papyrus manuscript. The remarkably large size and great beauty of the vellum sheets is another proof of high antiquity. In size, indeed, they are the largest known, “each page being even at present as large as thirteen and one-half inches in length by fourteen and seven-eighths inches high, although marginal notes have sometimes been partially cut off by the ancient binder.” A single animal could contribute only two leaves, or one sheet, of such unusual size. As time went on, smaller and coarser sheets of parchment took the place of the exquisite vellum used in the oldest manuscripts. The peculiar order in which the books of the Bible follow each other corresponds with what Epiphanius, who flourished towards the end of the third century, testifies to as existing in some manuscripts of his day, and proves that the codex was written before our present order had become established; while the presence of the Epistle of Barnabas and the Shepherd of Hermas is a strong indication that it was written before the age of Cyril of Jerusalem and the so-called Council of Laodicea (about A. D. 363). Those divisions called “the larger chapters,” with their corresponding summaries of contents, which appear in all the copies of the Gospels written from the fifth century downward, are wanting in the Sinaitic and Vatican manuscripts alone. On the other hand, the Sinaitic Codex exhibits the Ammonian sections and Eusebian canons in red ink in the margins; which, if written by the original copyist, prove that the manuscript cannot be ascribed to an earlier date than some time within the first half of the fourth century.

There is a striking agreement between the readings of this codex and those defended by Origen (186-253); while the marked coincidence of its text with certain readings known to have been approved by Eusebius, as well as the imperial beauty of the manuscript, renders it even possible that the Codex Sinaiticus was one of the fifty volumes of Holy Scripture which Eusebius himself, at the order of the emperor Constantine, caused to be prepared on beautiful skins by skillful calligraphists in the year 331, soon after the foundation of Constantinople. At any rate, we can assign it with moral certainty to the fourth century of our era, and with the highest probability to the first half of the same.

The publication of the original text of this and other ancient manuscripts is rendered difficult by the various corrections they have undergone in different ages. The Codex Sinaiticus abounds in such alterations, “brought in by at least ten different revisers, some of them systematically spread over every page, others occasional or limited

to separate portions of the manuscript, many of them being contemporaneous with the first writer, far the greater part belonging to the sixth or seventh century, a few as recent as the twelfth.” In many cases nothing short of the skill of a Tischendorf can identify with certainty the original writing under the alterations.

The Codex Sinaiticus has been published in a style worthy of its unique importance and value. The enlightened sovereign of Russia was easily persuaded to signalize the one-thousandth anniversary of the establishment of his empire, in 1862, by bringing out an edition of the manuscript—now properly characterized by the additional title of *Petropolitanus*—in a style surpassing in splendor and in accuracy of imitation any previous work of the kind. The text is printed in three folio volumes (ii.-iv.), the leaves of the shape and size of those in the manuscript itself; the first volume contains valuable introductory matter, and twenty-one admirable facsimile plates, representing chiefly pages of the manuscript, and two being covered with facsimile specimens of other important manuscripts for comparison. The work is “printed upon paper at once thick and fine, the ink being made to resemble that of the original in color, and the type being greatly varied, so as to imitate the various shapes and sizes of the letters employed by the scribe: the very spaces, too, between the letters have been carefully measured and represented with all faithfulness.” But three hundred copies of this truly imperial edition were printed, two hundred of which were distributed by the emperor himself as presents to various public bodies and learned men; the rest were given to Tischendorf for sale, their price being fixed by him at two hundred and thirty Prussian thalers. Several of the foremost colleges and libraries in the United States possess this valuable work, in a few instances as a donation from its imperial patron. A cheap manual or popular edition, containing the New Testament and its appendages in ordinary Greek type, was published in 1863; and an octavo edition of the New Testament, together with the variations of the Vatican manuscript and of the Elzevir edition from the Sinaitic readings, appeared in 1865. English readers will be interested in examining the various readings of the three most celebrated manuscripts of the original Greek text as presented by Tischendorf in his edition of the authorized English version of the New Testament, which was published by Baron Tauchnitz in 1869 as the one thousandth volume of his “Collection of British Authors.”

THOMAS CHASE.

**Codex Vaticanus** (designation, B), a beautiful uncial manuscript of the Greek Bible in the Vatican Library, dating from the fourth century. Its marks of antiquity are similar to those of the Sinaitic codex; and indeed Tischendorf not only pronounces it as of precisely the same age, but is confident also that it was written by one of the four copyists to whom he ascribes that manuscript: it is, however, the copy evidently of a different exemplar, and cannot be considered as one of the fifty copies ordered by Constantine through Eusebius. It presents three narrow columns on a page, except in the poetical books of the Old Testament, which, as in the Codex Sinaiticus, are written stichometrically (in verses clause by clause, according to the sense) in two columns. It is written on fine, thin vellum, in a square, plain, and noble style of handwriting, being a close resemblance in shape to that of the Heracula-

ΚΑΛΥΜΜΑ ΕΠΙ ΤΗΝ ΚΑΡ  
ΔΙΑΝ ΑΥΤΩΝ ΚΕΙΤΑΙ ΗΝ  
ΚΑ ΔΑΝΕ ΠΙΣΤΡΕ ΨΗΡΟC  
Ν ΠΕΡΙΕΡΕΙΤΑΙ ΤΟ ΚΑ

Codex Vaticanus (2 Corinthians iii. 15, 16).

κάλυμμα ἐπὶ τὴν καρδίαν αὐτῶν κεῖται ἡνικα δ' ἂν ἐπιστρέψῃ πρὸς κύριον,\* περιαιρείται τὸ κά-

nean papyri. The manuscript contains the greater part of the Old Testament, and the New as far as Hebrews ix. 14. It appears to have belonged to the Vatican Library from the latter part of the fifteenth century. Its earlier history is unknown, but Tischendorf regards it as the work of an Alexandrian scribe. In critical authority it is inferior to no other manuscript.

This codex has always been difficult of access. Scholars all over the world rejoiced when it was announced that Cardinal Mai was preparing an edition of it. After a long delay, his edition appeared in the Christmas holidays of 1857, three years after his death; but it proved to have been so carelessly and inaccurately executed as to be of little value; a smaller edition, also prepared by the cardinal, appeared in 1859, avoiding some of the errors of the

\* ΚΝ is a contraction for ΚΥΠΙΟΝ.

former, but introducing almost as many new ones. Mai's edition was reprinted in several places—in Berlin with corrections by Philip Buttmann. In 1867 the New Testament was published in Leipsic, in common cursive characters, by Tischendorf; but he had been allowed to collate the whole manuscript no farther than partly through the third Gospel, and only to consult it on difficult or doubtful passages beyond that point. While falling short of the highest character, on account of the restrictions placed upon his use of the manuscript, this edition will generally be held decisive on the disputed points on which its editor gives his deliberate judgment upon personal examination of the passage. The codex is now publishing by papal authority, in magnificent style, edited by Carlo Vercellone and Giuseppe Cozza. The size and shape of the manuscript are accurately represented, and it is copied line for line and letter for letter, in printed characters approaching facsimile, Tischendorf having lent for the purpose the type which had been cast for the imperial edition of the Sinaitic Codex, and the writing being astonishingly alike in the two manuscripts. The first volume to be published, but the fifth of the entire work, containing the New Testament, appeared in 1868. In some of the four subsequent volumes, containing the Old Testament, Vercellone is replaced by Caietano Sergio.

THOMAS CHASE.

**Cod'icil** [Lat. *codicillus*, dimin. of *codex*], an addition or supplement to a will for the purpose of explaining, altering, or adding to its contents. Of codicils, as of wills, the last prevails where it contains provisions contradictory to those of a former will or codicil. (See WILLS AND TESTAMENTS, by PROF. T. W. DWIGHT, LL.D.)

**Cod'lin**, a name of several varieties of apples, some of which are highly esteemed in England, and are used chiefly for culinary purposes. The codlin ripens in summer or autumn, and cannot be kept long.

**Codlin Moth** (*Pyrallis Pomona*). This moth is one of the Tortricidæ; it is small, with short and broad wings. It is very destructive in apple-orchards, laying its eggs in the eyes of the newly-formed fruit, within which the larva feeds, thus arresting the growth of the fruit, and causing it to die prematurely.

**Cod-Liver Oil** (*Oleum Morrhue*), an oil obtained from the liver of the cod, also from many allied species, as pollock, dorse, ling, hake, haddock, etc. In these fish, as in the shark tribe, the tissue containing oil is almost entirely confined to the liver. Cod-liver oil is prepared largely in Great Britain, Norway, Newfoundland, and the U. S. There are three varieties sold in commerce—pale, pale-brown, and dark-brown oil.

The oil is sometimes prepared by placing the livers in a tub upon a wooden strainer, and subjecting them to pressure, when the light-colored oil exudes, and is removed. As the livers partially putrefy, more oil escapes, which is darker, and constitutes the pale-brown oil; while finally the residue, boiled with water, parts with the remaining dark-brown oil. The pale oil thus resembles more nearly the oil present in the livers, while the other varieties are more or less impregnated with the products of putrefaction. The oil is often extracted by steaming, which produces the best oil and the largest yield. Various other methods are employed. Even the purest oil has a peculiar disagreeable fishy odor and taste. The darker varieties leave a very unpleasant nauseous sensation.

The constituents of cod-liver oil are oleic and other acids, in combination with glycerine, and holding in solution the constituents of the bile, acetic acid, phosphoric acid, iodine, bromine, chlorine, and a principle called galatine.

As a remedial agent it is used in the treatment of scrofula, consumption, chronic rheumatism, and diseases of the bones and joints. Its virtues have been ascribed to iodine, bromine, and other specific ingredients, but its principal efficacy is probably due to its nourishing and fattening properties. For emaciated old people it is sometimes of great service in conjunction with other remedies. It is commonly taken in doses of from a dessert-spoonful to a table-spoonful three times a day.

**Cod'man** (JOHN), D. D., an American Congregational divine, born at Boston, Mass., Aug. 3, 1782, graduated at Harvard in 1802, studied in Edinburgh, and became pastor of a church at Dorchester, Mass., in 1808. He was a prominent advocate of clerical education. He published many sermons, etc. Died Dec. 23, 1847.

**Codo'gno**, a town of Italy, in the province of Milan, between the Adda and the Po, by rail 24 miles S. E. of Lodi. It is well built, and has manufactures of silks. It is noted as a market for cheese. Pop. 8917.

**Cod'rington** (Sir EDWARD), G. C. B., an English admiral, born in 1770. He served as captain at Trafalgar in

1805, and became a vice-admiral in 1821. He commanded the English, French, and Russian fleets which defeated the Turks at Navarino in 1827. Died in London April 28, 1851.

**Codrington** (Sir WILLIAM JOHN), G. C. B., a general, a son of the preceding, was born in Nov., 1804; entered the army in 1821; went with the Coldstream Guards to Bulgaria in 1854; was made major-general by brevet whilst at Varna, and distinguished himself both at the Alma and at Inkerman in 1854, and directed the attack on the Redan of Sebastopol in Sept., 1855. In November of the same year he became commander-in-chief of the army in the Crimea, a member of Parliament in 1857, and in 1859 governor of Gibraltar. In 1863 he was promoted to the rank of general, and in 1877 he was placed on the retired list. Died Aug. 8, 1884.

**Co'drus** [Gr. Κόδρος], the last king of Athens, is supposed to have reigned about 1060 B. C. According to tradition, he sacrificed his life for his country during a war between the Athenians and the Dorians. An oracle having predicted that the people whose king was slain by the enemy should be victorious, Codrus went in disguise to the Dorian camp, and provoked a quarrel in which he was killed. His son Medon was then chosen archon of Athens.

**Coeff'icent** [from the Lat. *co* (for *con*), "with," and *efficio*, to "effect"], in algebra, one of two simple or compound factors whose product constitutes a term. Thus, in the term  $2ab^2c$ ,  $2ab^2$  is the coefficient of  $c$ ,  $2a$  of  $b^2c$ , and  $2$  of  $ab^2c$ . In the latter case,  $2$  is frequently called the "numerical coefficient" of the term, the others being distinguished as "literal coefficients." In an algebraical expression, and especially in quantities whose terms involve constant as well as variable factors, it is usual to restrict the term "coefficient" to the former, and to refer to the latter as "facients."

**Coehorn**, ko'horn, so named from Baron Coehorn, who invented it, is a small mortar, frequently a twenty-four-pounder. Coehorns, being easily moved and taking little powder, are found very useful in sieges, if grouped in great numbers. They are generally made of bronze.

**Coehorn** (Lieutenant-General MENNO, BARON COEHORN), colonel-proprietor of the superb regiment bearing his name, general of artillery, director-in-chief of the fortifications, and engineer-general of the United States or Provinces of Holland, styled by the distinguished Prussian engineer Zastrow "the prince of engineers," and by the French "the Dutch Vauban," was to Vauban himself exactly, in regard to recent fortifications, what Zwingli was to Luther, more restricted as to his stage, in prescience, originality, and soldiery. But even while saying this let it be considered no disparagement of Vauban. Most honest and generous of men, without envy he recognized Coehorn's merit as early as 1676, and did all he could to induce Louis XIV. to make any advances which could induce Coehorn to enter the French service. Sprung from a distinguished, noble, and military stock, originally Swedish, near Leeuwarden in Friesland, he was born in 1641, distinguished himself while yet a youth in mathematics, was appointed captain at the age of sixteen, became colonel at thirty-three, and with that rank, with his own regiment, "Nassau-Frise," defended Fort William, the key-point of Namur, against his rival Vauban, Louis XIV., and the great Luxembourg, until, wounded himself, he had only 150 effectives left. He had previously distinguished himself at the siege of Maestricht (1674) by his invention of the mortars which immortalize his name, first employed in that operation, and at the siege of Grave, where he won renown by devising means to transport a whole battalion at once across the wide and rapid Meuse, a daring operation, into the trench of a bastion to which the river served as a wet ditch, which decided the fate of the place. Coehorn already stood very high, not only as an engineer, but as a soldier, the last for conduct in the bloody battles of Snef, Cassel, and St. Denis. At Fleurus, 1st July, 1690, as brigadier-general, with eight battalions, he set at naught the efforts of the finest French cavalry, and covered the retreat of the prince of Waldeck's army, whereupon, the victorious Marshal Luxembourg declared, "the Dutch infantry at Fleurus had outdone the Spanish infantry at Rocroi." In 1695, Coehorn, having demanded full power to use his own methods, retook Namur, trebled in strength, though defended by Megrigny, second only to Vauban and Marshal Boufflers, unexcelled as a tenacious soldier: witness his subsequent defence of Lille in 1708. "Coehorn, the chief-engineer (his title was lieutenant-general of engineers) signalized himself so eminently that he was esteemed the greatest man of the age, and outdid even Vauban, who had gone far beyond his predecessors in the conduct of sieges." In Mar., 1696, Coehorn, lieutenant-general in the field in command of troops, by a daring, prompt, and skilful operation, made himself

master of Givet, and burned the immense magazines and stores of supplies accumulated there by the French. This stupendous blow paralyzed the French operations for the campaign, and until another harvest could be sown, grown, reaped, and garnered. Coehorn continued to increase his glory, fighting and fortifying until the last days of his life, destroying the French lines near Sluys, defended by Boulders, in 1702, and capturing Bonn in 1703; bursting up the French lines at Hanuy, and accumulating stroke upon stroke of genius and daring until 17th Mar., 1704, at the age of sixty-three, a stroke of apoplexy—a disease which had been menacing him for some time—put an end to his existence and usefulness. His encomiums have been confined to no language; his praises have resounded from enemies even more than friends and countrymen. Montalembert, himself a first-class engineer, who alone suggested improvements to Coehorn's system, of which, pure and simple, Bergen-op-Zoom is the finest example, ranks himself among the most decided admirers of this "prince of engineers," whom he styles "a great man." According to the spirit of Straith's admissions, Coehorn possessed the merit of being able to contrive, equally well, defences for localities of any nature. Tyler (R. B. Engineers) says, "Coehorn, greatly to his credit, alone, of all modern engineers, established the one great truth in engineering—viz. that the same fortification cannot apply to places with wet as to those with dry ditches." Coehorn always held "it requires as much genius to defend a fortress well as it does to fortify it with ability," which Vauban corroborated by his observation that "amongst the multitude of the gallant and devoted officers of his day, he knew but few fitted to be governors of a besieged place." Coehorn fortified, defended, and took equally well.

Coehorn possessed a genius that would have made him the idol of the American people, whose making of war displays, as Rossel says, "all the exuberance of life inherent in a people seriously active, in the full force of youth, intelligent, and incapable of fear." Vauban was characterized by an economy of material and life at the expense of time; Coehorn economized neither, provided he attained his end by crushing out resistance. In Coehorn it was force substituted for industry, or rather industry employed to the utmost in multiplying the means of destruction. Coehorn's audacity and resources overwhelmed at once the enemy and the mind with wonder, and as an original thinker he ranks ahead of all the engineers who preceded him, and his works, like those of Shakspeare, are for all time.

No finer eulogy can be found of any man than that of Coehorn in the "Dictionnaire de la Conversation." This presents him as a truly disinterested patriot of ideal Roman simplicity and probity; as an unerring strategist; in fine, as one of those rare characters of whom we read in the annals of the remote past, whose record will not stand the close criticism and analysis applied in these practical days of unbelief as to everything but the absolute and tangible. One comparatively small matter demonstrates Coehorn's prescience. As the bayonet was first "seriously employed" by the French, according to their own writers, in the battle of Turin, 1692 (first bayonet charge in the battle of Spire in 1703), and as Coehorn had armed the Dutch infantry with it many years before, this is pretty good proof, in addition to the many others he has given, that he knew how to profit by improvements in military armament as quickly, or even more, considering the latter's favor and influence, than Vauban. Auguste Demmin, in his "History of Arms and Armor" (448), admits that the *fusil-musket* with socket-bayonet was the weapon "attributed to Vauban which Coehorn, his rival, introduced among the Dutch infantry about 1680." J. WATTS DE PEYSTER.

**Cœlestine.** See CELESTINE.

**Cœ'le-Syria** [Gr. ἡ κοίλη Συρία, "the hollow Syria"], a beautiful valley of Syria between the mountain-ranges of Lebanon and Anti-Lebanon, is about 90 miles long, and has an average width of 7 miles, but in some parts its breadth is far greater. It is now called El Bukaa. It is intersected by the river Litany (anc. *Leontes*). The chief city of Cœle-Syria was Baalbec (*Heliopolis*).

**Cœn'obites** [from the Gr. κοινός, "common," and βίος, "life"], or **Synodites**, the name given to those monks who live in communities, in contradistinction to the anchorites or hermits, who withdraw from all society and live in absolute solitude. The first *conobium* was founded by Pachomius, a disciple of St. Anthony, in 340, at Tabenno, an island of the Nile.

**Cœur d'Alene**, former capital of Kootenai co., Id. (see map of Idaho, ref. 2-A, for location of county). Pop. not in census of 1880.

**Coeymans**, quee'manz, Albany county, N. Y. (see map of New York, ref. 5-J, for location of county), on R. R. and

the Hudson River. It has a mineral spring, flagstone-quarries, and manufactures of brooms, straw-paper, soap, etc. Pop. of township in 1870, 3077; in 1880, 2912.

**Coffee** [from the Arabic *kahwah*; Fr. *café*; It. *caffè*; Ger. *Kaffee*], the seeds of the tree *Coffea Arabica*, of the order Rubiaceæ; also an infusion of these seeds used as a beverage. There are a number of species of *Coffea*, but this one only is known to possess valuable properties. It is a native of Western Africa, Abyssinia, and perhaps of Arabia, but is now naturalized in many tropical countries. The coffee tree in a wild state attains a height of from twelve to twenty feet, and bears but few branches. In cultivation the tree is topped at from six to ten feet in height, and made to assume a pyramidal form, with branches almost from the ground. The leaves are oblong-ovate, and four or five inches long; they are evergreen, opposite, shining, and leathery. The flowers are small, snow-white, and very fragrant, and are clustered in the axils of the leaves. It has a succulent fruit of a dark-red color when ripe, in which are two cells lined with a cartilaginous membrane, each containing a single seed. The seeds are hard, semi-elliptical in shape, and are commonly called coffee-beans or coffee-berries.

Coffee-plantations are often laid out in quadrangles; the trees are pruned to the same height, and the ground is carefully weeded. Where the climate is dry, abundant irrigation is required, but the supply of water is cut off as the fruit begins to ripen, in order to improve its quality. The tree yields its first crop when it is three years old. The coffee tree blooms for eight months in the year, so that its fruits are at any time of very unequal ripeness; in the West Indies and Brazil three gatherings of coffee are made annually. The fruit is placed on mats or large floors adapted to the purpose, where it is dried by the sun's rays, being meanwhile frequently turned. The dried pulp of the fruit and the membrane which immediately encloses the seeds are removed by passing between heavy rollers, and the coffee is afterwards freed from impurities by winnowing. As it is not, however, prepared with the same care in all places where it is cultivated, there are great differences in quality and price.

The earlier history of coffee is involved in some obscurity. It was not known to the Greeks or Romans, but in Abyssinia and Ethiopia it has been used from time immemorial, and in Arabia it was in general use before the end of the fifteenth century, and over the rest of the East in the sixteenth century. In 1690 it was carried by the Dutch from Mocha to Java, where it was soon extensively raised, and young plants were afterwards sent to the botanical garden at Amsterdam, from which the Paris garden obtained a tree. A layer of this was carried in 1720 to Martinique, where it succeeded so well that in a few years all the West Indies could be supplied. The Dutch planted it in Surinam in 1718, and it was introduced into the Mascarene Islands in the same year.

The following are the most important varieties in commerce: Mocha coffee, which comes from Arabia, and is considered superior to every other; it is known by its small gray beans inclining to greenish; Java or East Indian coffee has large yellow beans; Jamaica coffee has beans somewhat smaller and greenish; Surinam coffee has the largest beans; Bourbon has beans yellow and whitish pale. Coffee is also imported from Brazil, Ceylon, Central America, Maracaibo, and Liberia. Leonhard Ranwolf, a German physician, appears to have been the first to make coffee known in Europe by the account of his travels (1573). Soon after the first introduction of coffee, **COFFEE-HOUSES** (which see) arose almost everywhere. In Arabia and the East, coffee is usually drunk in the form of a thick decoction of the unroasted seeds; and for the sultan's coffee the pericarp, with the dried pulp roasted, is employed. The principal commercial supply is from Brazil, Java being second and Ceylon third on the list.

Chicory root, dandelion root, carrot, and the seeds of barley, buckwheat, Indian corn, and rye, are sometimes used as cheaper substitutes for coffee. They are prepared by roasting, like coffee. But they are all wanting in *caffeine*, the most important constituent in coffee, and are therefore very different from coffee in their qualities. Coffee is subject to a great adulteration, most of the articles specified as substitutes being employed for this purpose. But the principal material of mixture is chicory, the use of which for this purpose was legalized in England in 1853.

The leaves of the coffee tree are used by the natives of Sumatra instead of the seeds. They are prepared by drying, and are said to contain a larger proportion of caffeine than the coffee-beans. Coffee owes its peculiar properties to the presence of—1, *caffeine* or *theine* ( $C_8H_{10}N_4O_2$ ), which occurs in the roasted bean to the extent of nearly one per cent., and which is also found in tea, the *Paullinia*, maté, etc.; 2, a volatile oil which, according to some authorities,



is not present in the raw bean, but is developed in roasting; 3, a form of tannic acid called *caffeo-tannic* and also *caffic acid*. The following, according to Payen and others, is the average composition of unroasted coffee:

Free caffein.....	0.8
Legumin (vegetable casein).....	10.0
Other nitrogenous matter.....	3.0
Dextrine, sugar, etc.....	15.5
Caffeo-tannic and caffic acids (with potash, caffein, etc.).....	5.0
Fat and volatile oil.....	13.0
Cellulose.....	34.0
Earthy matter.....	6.7
Water (hygroscopic).....	12.0
	100.0

with a small quantity of two aromatic principles—one oily, and the other soluble in water.

Coffee loses 16 per cent. in weight and gains 30 per cent. in bulk if roasted till it assumes a reddish-brown hue; when roasted till the beans become chestnut-brown, they lose 20 per cent. by weight and gain 50 per cent. in bulk. The percentage of caffeine is greatly reduced by roasting, but the aroma is much increased. The action of the bowels is not retarded by the use of coffee, as is sometimes the case with strong infusions of tea, because there is less tannic acid in coffee than in tea. Coffee is exhilarating, refreshing, and nourishing, and, according to some physicians, tends to lessen the normal or excessive waste of the animal frame. When used in excess coffee is very injurious to health, and on certain constitutions its effects seem to be always deleterious.

CHARLES W. GREENE.

**Coffee** (JOHN), an American general, born in Nottoway co., Va., in 1772, was colonel and brigadier-general of Tennessee volunteers in 1812–13, served with distinction against the Creek Indians, wounded at Emuckfau, Jan. 22, 1814, participated in the attack on Pensacola, and was distinguished in the defence of New Orleans 1814–15; remained in service till June, 1815; was appointed surveyor of public lands Mar., 1817. Died near Florence, Ala., July, 1834.

**Coffee-house** [Fr. *café*], a house or saloon where coffee and other refreshments are served out to customers. Coffee-houses were established at Constantinople in 1554, in London in 1652, and at Paris in 1662. For many years the use of coffee and the frequenting of coffee-houses were assailed by various writers. Before the general introduction of newspapers, coffee-houses were, particularly in England, important centres or sources of information, where people assembled to learn the news and discuss politics.

**Coffee-leaves** are sometimes used as a substitute for tea. They contain 1.2 per cent. of caffeine and considerable caffetannic acid. When dried and treated with boiling water, they yield an infusion of a deep brown color, resembling in taste and odor a mixture of tea and coffee.

**Coffeetown**, on R. R., capital of Yalabusha co., Miss. (see map of Mississippi, ref. 5-G, for location of county), 131 miles N. by E. of Jackson. Pop. in 1880, 749.

**Coffeine**. See **CAFFEINE**, by PROF. C. F. CHANDLER, PH. D., LL.D.

**Coffer** [Fr. *coffre*], a casket for keeping jewels, money, etc. In architecture this term is applied to the sunken panels in vaults and domes, or to deep panels in ceilings. In fortification, coffer is a particular kind of caponnière.

**Cofferdam** [from *coffer*, a "casket" or tight box, and *dam*], in civil engineering, the name of a watertight enclosure for laying the foundation of bridge-piers, dams, wharves, etc. Cofferdams are often constructed of piles in two rows, with clay packed between. When finished, the water is pumped out by steam-power. Where the water is too deep for cofferdams, various forms of the caisson are used; in which case the pier is sometimes gradually lowered to the bottom of the stream. (See **FOUNDATION**.)

**Coffeyville**, city, Montgomery co., Kan. (see map of Kansas, ref. 8-I, for location of county), on R. R. and the Verdigris River, 141 miles S. by W. of Lawrence. Pop. in 1880, 753.

**Coffin** [from the Gr. *κόφινος*, a "basket," and allied to *coffer*, a "casket"; Fr. *cercueil*; Ger. *Sarg*], a box in which the dead are placed for burial. The customs both of burning and burying the dead prevailed among the ancient Greeks and Romans. (See **FUNERAL**.) Their coffins were composed of various materials, the most common being baked clay or earthenware. Some were narrow and triangular in form, the undermost side being much the broadest. The practice among the ancient Romans was to bury the dead, though previous to the recognition of Christianity burning became comparatively common. A kind of stone brought from Assos, in the Troad, was used for coffins; it was said to consume the body, except the teeth, in forty days, and from this circumstance was called *Sarcophagus* (which see). Roman stone coffins have been found in England, some entirely above the ground, others so near the earth's surface that the lids were visible, and when within a church coffin-

lids often formed part of the pavement. The Saxons used wooden coffins, though the common people were simply wrapped in cloth. Coffins of lead were used in the Middle Ages, as well as in more recent times. In our day, highly-ornamented caskets and coffins of elm or other wood are much used, but we have also so-called "burial cases" of iron, often covered with velvet or rich cloth.

**Coffin** (CHARLES), born at Buzancy, in the department of Ardennes, France, 1676, died in Paris June 20, 1749. He was educated in the Collège Duplessis, Paris, and was in 1701 appointed assistant, and in 1712 principal, of Collège Dormans-Beauvais, which position he held to his death. He cultivated Latin poetry with great success. In his earlier days he wrote convivial songs, and his "Ode to Champagne" became very popular, and every year brought him a basket of that costly wine from the wine-merchants of Rheims. When he grew older he wrote hymns, and several of those Latin hymns which he contributed to the Paris Breviary are found in our collections in John Mason Neale's and John Chandler's translation. His works appeared in Paris, 1755, 2 vols.

**Coffin** (GEORGE W.), U. S. N., born Oct. 12, 1845, in Massachusetts, graduated at the Naval Academy in 1863. He served in the Ticonderoga at both the Fort Fisher fights and led the seamen of that vessel in the assault upon the fort on Jan. 15, 1865, where he was wounded in the thigh; commander 1884; commanded the Alert in Greely relief expedition of 1884.

FOXHALL A. PARKER.

**Coffin** (Admiral Sir ISAAC), BART., born at Boston, Mass., of a Nantucket family, May 16, 1759. His father was a Tory, and collector of the port of Boston. Young Coffin entered the navy in 1773, serving against the U. S. in the Revolutionary war. He had, however, throughout life a strong regard for his native land. He was rapidly promoted, and attained in 1830 the rank of admiral of the white. In 1826 he visited Nantucket, where he founded and endowed the Coffin School. Died July 23, 1839.

**Coffin** (JAMES HENRY), LL.D., born at Northampton, Mass., Sept. 6, 1806, graduated at Amherst in 1828. He was professor of mathematics and astronomy in Williams College, Mass. (1838–43), and in Lafayette College, Easton, Pa. (1846–73). He was a distinguished scientist, and published a treatise on "Solar and Lunar Eclipses," and other works. Died Feb. 7, 1873.

**Coffin** (JOHN H. C.), LL.D., born at Wiscasset, Me., Sept. 15, 1815, graduated at Bowdoin Coll., 1834; in 1836 was appointed prof. of mathematics in the U. S. navy. He served at sea and in nautical surveys, was detailed in 1844 for duty at the Naval Observatory, and prepared descriptions and discussions of the work with the mural circle in the "Washington Observations" (1846–49), and a great part of those for 1845. He published also a discussion of the personal equation in bisecting a star by a micrometer thread ("Astronomical Journal," iii, p. 121). He was professor of mathematics or professor of astronomy and navigation in the U. S. Naval Academy (1853–65), and from 1866 to the present time has been in charge of the preparation of the "American Ephemeris and Nautical Almanac."

**Coffin** (JOSHUA), an American genealogist, born at Newbury, Mass., Oct. 12, 1792, graduated at Dartmouth in 1817, was a teacher of the poet Whittier, and published "The History of Ancient Newbury" (1845), and numerous papers, etc. upon family genealogies. Died June 24, 1864.

**Coffin** (TIMOTHY GARDNER), a lawyer, born at Nantucket, Mass., Nov. 1, 1788, was a sailor in youth, but having been disabled by a fall, he sought an education, graduated at Brown University in 1813, and as a lawyer attained the first rank. Died at New Bedford, Mass., Sept. 19, 1854.

**Coffinhal** (JEAN BAPTISTE), one of the most atrocious characters of the French Revolution, born at Aurillac, in the department of Cantal, France, 1764, died in Paris 1794. He studied first medicine, afterward law, and was practising in Paris when the Revolution broke out. He embraced the new ideas with fanaticism, acted for some time as president of the Jacobin Club, and was in 1792 appointed, first justice, then vice-president, of the Revolutionary Tribunal. Some of the most odious verdicts of that tribunal must be laid to his charge. When Lavoisier asked for a respite of some days in order to complete a chemical discovery he had made, Coffinhal answered him: "The Republic has no more use for any chemists." As an adherent of Robespierre he was implicated in his fall. He succeeded in escaping, but was by a friend delivered up to the police.

**Coghetti** (FRANCESCO), an Italian painter, born Oct. 4, 1804, has produced powerful fresco-paintings for several Roman palaces. He made a long study of Raphael, and founded an excellent school, marked by a serious study of the masters. His "Condemnation of St. Stephen" procured for him an order of knighthood.

**Cognac** (anc. *Condate*; modern Lat. *Conacum*), a town of France, department of Charente, on the river Charente, 24 miles W. of Angoulême. It has an old castle, in which Francis I. was born. In 1526 an alliance of France, England, the pope, Milan, and Venice, against Charles V., was concluded here. Brandy of excellent quality is made here, and is the chief article of export. About 6000 butts of Cognac brandy (see BRANDY, by PROF. C. F. CHANDLER) are produced annually. Pop. in 1881, 14,087.

**Cogniard** (HIPOLYTE), French comic writer, long director of the Varieties Theatre, born Nov. 20, 1807, was instrumental in substituting the opéra bouffe on the French stage for the old vaudevilles. He wrote, mostly in collaboration with his brother THÉODORE (born April 30, 1806), a vast number of vaudevilles.

**Cogniet** (LEON), a French historical painter, was born Aug. 29, 1794. His paintings represent scenes of terror, as the "Massacre of the Innocents," "Tintoretto painting his Daughter's Corpse," etc. D. Nov. 23, 1880.

**Cognizance** [Old Fr. *cognizance*; modern Fr. *connaissance*; It. *cognoscenza*; from the Lat. *cognosco*, to "know"], knowledge or notice; jurisdiction or right to try and determine causes; a badge worn by a retainer or dependant to indicate the party or person to which he belongs. In law, an acknowledgment or confession; also the power which a court has to hear and determine a particular species of suit. In heraldry, cognizance is a crest, coat-of-arms, or similar badge of distinction.

**Cogno'men**, a Latin word signifying a surname; the last of the three names usually borne by ancient Romans of good family. Cicero, for example, was the *cognomen* of the great orator, Marcus Tullius Cicero. It served to designate the family (*familia*) to which he belonged, as the other two names—viz. the *prænomen* and the *nomen*—served respectively to denote the individual and the class (*gens*) to which his family belonged.

**Cogno'vit Actio'nem** [Lat., "he has recognized the action"], in law, is a confession of a defendant subscribed by him, and giving authority to a plaintiff to enter up judgment against him. It is executed after an action has been commenced, and is supposed to be given in court. The subject in England is regulated by statutes prescribing at what time in the progress of the case it may be given as a means of protecting the defendant from imposition, and the forms of law with which it should be accompanied, such as proof of the time of its execution and a mode of filing it or a copy of it. Statute law in some of the American States provides a convenient substitute for a *cogno'vit*. Thus, in New York, and in other States following its code, a defendant may offer in writing to the plaintiff to allow him to take judgment for a specified sum or otherwise; and on the acceptance in writing of the offer judgment may be entered accordingly. It is also provided that should the offer not be accepted in the prescribed manner, it shall be deemed in law to be withdrawn and the litigation may continue.

**Cogre'dients** [from *co* (for *con*), "together," and *gradior*, to "go"], "[things] meeting together or agreeing." In mathematics, two set of facients or variables, each set containing the same number, are said to be cogredient if on replacing the variables of the first set by certain linear functions of themselves, those of the second set become also replaced by the same linear functions of themselves.

**Cogs'well** (JONATHAN), D. D., a Calvinistic divine, born Sept. 3, 1782, graduated at Harvard in 1806, was a tutor in Bowdoin College, professor of ecclesiastical history in the Theological Institution at East Windsor, Conn. (1834-44). He published "The Hebrew Theocracy" (1848), "Calvary and Sinai" (1852), and other works. Died at New Brunswick, N. J., Aug. 1, 1864.

**Cogswell** (JOSEPH GREEN), LL.D., an American *littérateur*, born at Ipswich, Mass., Sept. 27, 1786, graduated at Harvard in 1806, visited the East Indies, after his return studied law, and became a tutor in Harvard in 1814. He afterwards studied in Europe, and became a librarian and professor of mineralogy at Harvard (1820-23). With the historian Bancroft he founded the celebrated Round Hill School at Northampton, Mass. He was superintendent of the Astor Library 1848-60. He contributed much excellent matter to periodical literature, and enriched the botanical and mineralogical collections at Harvard University with thousands of European specimens. Died at Cambridge, Mass., Nov. 26, 1871.

**Cogswell** (MASON FITCH), M. D., born at Canterbury, Conn., in 1761, graduated at Yale in 1780, became an eminent surgeon of Hartford, Conn., and was one of the founders of the asylums at Hartford for the deaf and dumb and for the insane. Died in Dec., 1830.—His son, M. F. COGSWELL, JR., M. D. (born Nov. 10, 1809, died Jan. 21, 1865), was also an eminent physician.

**Cogswell** (WILLIAM), D. D., a Congregational divine, born at Atkinson, N. H., June 5, 1787, graduated at Dartmouth in 1811, became general agent of the American Education Society in 1829, professor of history at Dartmouth (1841), professor of theology and president of Gilmanton Theological Seminary in New Hampshire (1844), and was the author of works on theology, etc. Died April 18, 1850.

**Cohe'sion** [from the Lat. *cohareo*, *cohæsum*, to "hold together"], in natural philosophy, is the force by which the particles of homogeneous bodies are kept attached to each other, and with which they resist separation. Adhesion denotes the attractive force existing between two different bodies brought into contact, as a drop of water on a plate of glass; or between two bodies of the same matter, as two lumps of lead when their smooth surfaces have been pressed together. The three different forms which matter assumes—solid, liquid, and gaseous—are determined by the degree of cohesive force existing among the elementary particles. In solids this force is greatest, and is that which causes solidity; in liquids it is less powerful; and in æriiform fluids it may be regarded as negative, the particles having a tendency to repel each other.

**Cohoes**, *ko-hôz'*, or **Cahoes**, a city and R. R. centre of Albany co., N. Y. (see map of New York, ref. 5-J, for location of county), on the right bank of the Mohawk River, at its junction with the Hudson River, on the Erie and Champlain Canals, 9 miles N. of Albany. It has axefactories, the Harmony Manufacturing Company's cotton-mills (one of which is one of the largest, if not the largest and most complete in the world), 20 knitting-mills, 1 pin-factory, 1 rolling-mill, and a horse-railroad, connecting with the city of Troy, 3 miles S. The city receives its supply of water for all purposes from the Mohawk River. The Cohoes Falls are in the city limits. Pop. in 1870, 15,357; in 1880, 19,416.

**Co'hort** [Lat. *cohors*; Fr. *cohorte*], in the armies of ancient Rome, was the tenth part of a legion, and consisted usually of 600 men. The prætorian cohort was a body of picked troops who attended the commander of the army, and at a later period formed the guard of the emperor.

The term "cohort" is applied by some botanists to groups or assemblages of natural orders.

**Coif** [Fr. *coiffe*], an ancient name for a head-dress of any kind; at present especially applied in Great Britain to a cap worn by sergeants-at-law. Hence the serjeantcy is called by Blackstone the "degree of the coif."

**Coimba'toor'**, a district of British India, presidency of Madras, is bounded N. by Mysore, E. by the river Cauveri, which separates it from the district of Salem, S. by the states of Madura and Travancore, and W. by the state of Cochin, the district of Malabar, and the Neilgherri Hills. It is a flat, open country about 900 feet above the level of the sea, surrounded N., W., and S. by mountains rising 9000 feet, but opening eastward into the plains of the Carnatic. The principal rivers are the Cauveri, Bhâwani, Noyel, and Amara-wati, from which numerous canals have been cut in all directions for the purpose of artificial irrigation. Of the total area (7432 square miles), 3877½ square miles, or 2,483,000 acres, were reported as being under cultivation. Excellent cotton and tobacco and good crops of grain, oilseeds, and fruit are raised. Extensive teak-forests are found. Pop. 1,763,274, of whom 1,715,081 are Hindus, 36,026 Mohammedans, 11,443 native Christians, etc. The district of Coimbatore was acquired by the British in 1799, when the war closed, after the death of Tippoo.

**Coimbatoor**, a city of India, capital of the above district, is on the Noyel River, near lat. 11° N. and lon. 77° E., and 1483 feet above the level of the sea. The climate is healthy, but the water is brackish. Pop. 20,000.

**Coim'bra**, a city of Portugal, capital of the province of Beira, on the river Mondego, here crossed by a stone bridge, 115 miles N. N. E. of Lisbon. It is on the railway from Lisbon to Oporto. Built around a conical hill rising abruptly from the river, with many towers, and surrounded by groves of orange and olive trees, it presents a very picturesque external appearance, but the streets are narrow and steep. It is the seat of a Catholic bishop. Coimbra derives its importance from its university, the only one in Portugal. It was founded in 1291, but at Lisbon, and not finally established at Coimbra until 1527. It comprises five faculties, of theology, law, medicine, mathematics, and philosophy, with 52 professors and 21 substitutes, between 600 and 700 students, and a library of 80,000 volumes. There are several fine churches; also manufactures of linen and woollen fabrics, pottery, articles of horn, etc. Coimbra was founded by the Goths, and afterwards occupied by the Moors, from which it was taken by Ferdinand I. of Castile in 1064. It became the capital of Portugal in 1139. Pop. 13,369.

**Coin'**, a town of Spain, in the province of Malaga, about 22 miles W. of Malaga. It has an episcopal palace and several convents; also fine public walks and gardens in the environs. Here are manufactures of linen and woolen fabrics, paper, and soap. Pop. 10,065.

**Coin'age** [Fr. *coin*, a "stamp" or "die," remotely from the Lat. *cuneus*, a "wedge"]. The precious metals were first employed as currency in the form of unstamped bullion, and values and amounts were then determined and expressed by weight; hence the origin of the terms "pound," "livre," "mark," etc. But the commercial character of society and the gradual advance of civilization soon led to the invention of coins, the first step in this direction being the employment of stamped pieces of bullion of indefinite size and form. The finished appearance of the coins issued by existing commercial nations indicates artistic taste and skill of a character which pertains to a highly advanced civilization.

A coin is money consisting of a piece of metal of known weight and composition, possessing real exchangeable worth, its denomination and value being stamped upon its face and guaranteed by the government. Its value is not—except in case of minor or base coins—merely representative (like that of a promissory note), but absolute and intrinsic. The coin-standard of a nation is, with very rare exceptions, the basis of its currency, whatever the character of the latter may be. "Men in their bargains," says Locke, "contract not for denominations or sounds, but for the intrinsic value, which is the quantity of silver (or gold), by public authority, warranted to be in pieces of such denominations."

Gold and silver are peculiarly adapted for coinage, possessing all the necessary qualities. They are capable of exact mechanical subdivision and reunion with comparative ease and without waste; they are durable, readily identified, of perfect sameness, and comparatively indestructible. They possess, moreover, values in the market less fluctuating (at least at the present time) than that of any other available commodity, and a relation between their respective weights, specific gravities, and values which ensures a convenient bulk and the greatest facility for transportation.

There has not always been assigned by law to given quantities of the precious metals the same nominal value as now. Thus, in England, a pound troy of pure gold about the year 1363 was required by law to be coined into fifteen pounds sterling; whilst the same weight of standard gold (eleven-twelfths fine) at the present day is rated at £46 14s. 6d. A troy pound of silver at the former period was coined into twenty-five shillings, but of late years the same weight of standard silver is coined into sixty-two shillings. The market values of gold and silver relative to each other have also undergone great change, the relative value of equal weights of each, now (in 1883) about as 18½ to 1, having been in the early part of the twelfth century as 9 to 1 only.

Within the past sixty years the value of gold has fluctuated from 15½ to 18½ times that of silver (averaging about 16 times), and never falling so low as that of 15 times such value. There is reason to believe that in the future there will be less fluctuation in the production of the precious metals than has taken place since 1849, from which period we have witnessed the wonderful production of gold in California and Australia, and of silver in the Western and South-western sections of the U. S.

Until within comparatively few years the money of account of nearly all European nations, as well as of the U. S., was based either upon a silver standard, or upon one of gold and silver both. Experience has shown that it is preferable that gold be the sole standard, and that the disadvantages attending the application of any other standard are great and inherent. The standard coin which is to be legal tender in payment of unlimited amounts should be made of the heavier and more valuable of the two metals. Silver is about 15½ times as heavy, and about 28½ times as bulky, as gold of equivalent value. Again, a double standard, based upon the assumption that the relative value of gold and silver is invariable, must be imperfect, resting, as it does, upon a false basis. Whenever the relative market value differs appreciably from the arbitrarily fixed coin standard (assumed invariable), the relatively dearer metal (whether gold or silver) is driven from circulation.

It is desirable where a system of specie payment obtains, or where the precious metals enter largely into financial transactions, that both gold and silver should be in simultaneous circulation. This can only be accomplished by making gold the standard of account and legal tender of payment in all amounts, and by so fixing the relation of silver to gold that the silver shall be relatively *overvalued*, and admitted as legal tender of payment only in limited amounts.

An accurate knowledge of the relative market values of

gold and silver is desirable in order that it may be possible to so fix the relative quantity of metal in the coins of like denominations as to ensure the overvaluing of the silver. For this purpose the weight of the silver coins of the standard fineness should be fixed relatively to gold, at a point somewhat lower than that demanded by their nominal values; without, however, permitting the divergence to be so wide as, by the inducement of a large profit, to encourage their fraudulent or unauthorized manufacture by private parties. The ratio of 15 to 1 to represent the relative value of equal weights of gold and silver, respectively, is therefore a desirable one for purposes of coinage, being at once a simple ratio, and near, but sufficiently below, the mean market ratio to ensure the overvaluing of the silver. (See NUMISMATICS.)

The monetary systems of the different nations are in general heterogeneous in their character, and their relations to each other not unfrequently exceedingly complex. That the metallic money of the several commercial countries should differ in any respect is an inconvenience, but the interruption to the freedom of international exchange is greatly augmented when this difference is such as to involve troublesome fractional operations in the process of reduction from the currency of one country to that of another. This want of harmony has for many years, and especially of late, attracted public and merited attention, and earnest attempts are being made to establish an international coinage system on a comprehensive and simple basis. There seems to be no difference of opinion as to the immense advantages to be derived from the establishment of a simple correlated system of international coinage, and the view is rapidly gaining ground that such correlated system should be based on a gold standard—silver to be subsidiary—and that the standard units of the system should possess simple numerical relations as to weight with the metric unit of weight—the gramme—the only unit of weight which promises to be generally accepted in facilitating the international exchange of commodities. It is also important to adopt a standard fineness of a decimal character. The generally approved standard of fineness of coins for international uses is that of nine parts pure metal (gold or silver, as the case may be) to one part of copper alloy.

A memorial of the American Statistical Association, addressed to the Congress of the U. S. in the year 1868, calls attention to certain principles which it urges should govern in the establishment of a system of international coinage. It recommended that our coinage should have simple relations as to weight with the unit of weight of the metric system—the gramme; that the standard as to fineness of our coinage—whether of gold or silver—should continue to be nine-tenths of fine metal to one-tenth of alloy; that the weight in grammes and the fineness of the coins hereafter to be issued should be legibly stamped thereon; that, in pursuance of the foregoing, the gold dollar should contain one and a half grammes of fine gold, or its equivalent, one and two-thirds grammes of standard gold, nine-tenths fine, and that other gold coins should be in proportion; that the silver half dollar and smaller silver coins should contain of fine silver at the rate of twenty-two and a half grammes to the dollar, or their equivalent, twenty-five grammes of standard silver, nine-tenths fine; that the gold coinage, as above described, should be made legal tender in payment of sums in all amounts; and that the silver coin should be made subsidiary, and admitted as legal tender in amounts not exceeding ten dollars in any one payment.

The Association calls attention to the fact that to reduce our gold and our subsidiary silver to these proposed standards, respectively, only insignificant changes—to wit, a reduction of three-tenths of 1 per cent. in the weight of the gold coins, and an increase of five-tenths of 1 per cent. in the weight of the silver coins of the then existing standards—were required. The proposed reduction in the weight of the smaller gold coins is considerably less than the deviation now allowed to the mint. The change above proposed with regard to the subsidiary silver has already been accomplished by act of Congress approved Feb. 12, 1873, and said silver coins are continued as legal tender in amounts not exceeding five dollars in any one payment.

It will be observed that the weight of the silver coins is precisely 15 times the proposed weight of the gold coins of like denomination, but as the value of the gold relatively to silver is sensibly in excess of this ratio, the silver is overvalued, as, according to the experience of commercial nations, it should be.

At a meeting of the American Association for the Advancement of Science, held at Burlington, Vt., in 1867, a resolution was adopted deprecating the establishment of an international system of coinage of which the units should have other than simple relations to the metric unit of weight; and at Salem, in Aug., 1869, the same Associa-

TABLE I.—THE EXISTING COINAGE OF THE UNITED STATES.

TABLE showing the standard weights, expressed both in troy and metric units, of the several coins (gold, silver, nickel, and bronze) of the U. S., now issued under authority of law approved Feb. 12, 1873; together with the standard proportions of fine metal and alloy of each description of coin; also, the tolerance—or rate of deviation—from the standard allowed by law—in the weight, both of single pieces and of large numbers when delivered together, and the tolerance as to fineness; also, the extent to which the several descriptions of coins are made legal tender in payment of debt.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.		
DENOMINATION	Fineness in thousandths.		Standard weight of each coin.		Standard weight of pure metal.		Tolerance of the mint, or deviation allowed—														Ratio of the weight of standard gold coin to that of standard silver coin to that of legal tender.	To what extent
	Pure Metals.	Alloy.	Number of pieces that may be coined from 100 grammes of standard metal.	Standard weight of each coin.		Standard weight of pure metal.		In the weight of single pieces.				Quantity delivered.				Deviation.		Equivalent value of the amount of deviation allowed in each 1000 dollars' worth of coins when delivered in the form of large numbers of coins taken together.				
				Troy.	Metric.	Grammes.	Grains.	Grammes.	Grains.	In fineness.	Troy grains.	Milligrammes.*	Equivalent value of the amount of deviation allowed in 1000 dollars' worth of coins taken singly.	Value.	Troy ounces.	Troy grains.	Milligrammes.*		Value.			
Gold.	900	100	2,991—	516.00	33.4363—	464.40	30.0926 +	1	32.40	96.9—	250	\$5000	.01	4.8	311 +	18.60 +	3.72 +	18.60 +	16.27 +	In all amounts.		
	900	100	5,952—	258.00	16.7181 +	232.20	15.0463 +	1	32.40	193.8—	500	5000	.01	4.8	311 +	18.60 +	3.72 +	18.60 +	15.00	"		
	900	100	11,963—	129.00	8.3591—	116.10	7.5232—	1	16.20	193.8—	1000	5000	.01	4.8	311 +	18.60 +	3.72 +	18.60 +	15.00	"		
	900	100	19,938 +	77.40	5.0154 +	69.66	4.5139—	1	16.20	323.0—	1000	3000	.01	4.8	311 +	18.60 +	6.20 +	18.60 +	15.00	"		
	900	100	23,926 +	64.50	4.1795 +	58.05	3.7616—	1	16.20	387.6—	2000	5000	.01	4.8	311 +	18.60 +	3.72 +	18.60 +	15.00	"		
	900	100	59,815 +	25.80	1.6718 +	23.22	1.5946 +	1	16.20	969.0—	1000	1000	.01	4.8	311 +	18.60 +	18.60 +	18.60 +	15.00	"		
Silver.	900	100	3,674 +	420.00	27.2156—	378.00	24.4940 +	3	97.20	357.1 +	1000	\$1000	.02	9.6	622 1—	2.29—	2.29—	16.27 +	Not exceeding \$5.			
	900	100	8,000	192.90	12.5000	173.81	11.2500	3	97.20	777.6—	1000	500	.02	9.6	622 1—	2.49—	4.98—	15.00	"			
	900	100	16,000	96.45	6.2500	86.81	5.6250	3	97.20	1555.2—	1000	250	.02	9.6	622 1—	2.49—	9.95 +	15.00	"			
	900	100	40,000	35.58	2.5000	34.72	2.2500	3	97.20	3887.9 +	1000	100	.01	4.8	311.0 +	1.24 +	12.44 +	15.00	"			
Copper-nickel.	900	100	20,000	77.16	5.0000	.....	.....	†	194.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not exceeding 25 cents.		
	900	100	51,441	30.00	1.9440—	.....	.....	†	129.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	"		
	900	100	32,151—	48.00	3.1103	.....	.....	2	129.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Not exceeding 25 cents.		
Bronze.	900	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		

\* 1000 milligrammes make one gramme; 1 gramme equals 15.432349 troy grains; 1 troy grain equals 64.79896 milligrammes.

† One-fourth nickel and three-fourths copper; the deviation not being more than one-fortieth in the weight of nickel.

‡ Tin and zinc, five per cent.; copper, ninety-five per cent.

tion expressed, also by resolution, their approval of "the proposed adaptation of the American coinage to the metric system, by making the value of the dollar precisely that of one and a half grammes of fine gold; seeing in this a new step towards the promotion of fraternity among nations by the unification of weights, measures, and coinage, inasmuch as all monetary units which have simple relations to the gramme must have simple relations to each other."

No action on the subject of the change of the weight of the gold coinage has yet been taken by Congress, nor is it believed that such course would be wise unless concurrent action with other nations can be had.

The leading simple metrical systems of gold units proposed may be classed under three heads: *First*. The dollar, florin, franc, and penny units, based upon tergrammes of gold nine-tenths fine (the term tergramme denoting the third part of a gramme). *Second*. Systems having for their basis the decagramme of gold of nine-tenths fineness, which unit has been advocated by Chevalier, Dr. Farr, and other European political economists. (See Report of Dr. Farr to the International Statistical Congress, held at The Hague in 1869.) *Third*. Systems based upon the decagramme of pure gold as the unit.

These three systems, by reason of each bearing a simple relation to the metric unit of weight—the gramme—must of necessity possess simple relations to each other, and may be regarded, essentially, as different phases of one and the same system.

According to certain lately published estimates and statements, by a careful investigator, relative to the four principal existing coin standards, it appears that the British sovereign is used by 35,000,000 people; the franc, by 77,000,000; that the gold dollar unit is used in countries having an aggregate population of 80,000,000; and that the domain of the silver dollar has about 552,000,000 inhabitants.

The first of the three accompanying tables shows, with reference to the existing system of coinage in the U. S., the weight and fineness of the standard coins now authorized to be manufactured and issued from the mint, and the "tolerance," or deviation from the standard, allowed in the coinage, both as to weight and fineness. (See p. 142.) The second table compares the existing system of U. S. coinage with a proposed system on a simplified and strictly metric basis. The third table compares with each other the weights of the coin-representatives of the units of account of several countries, as now existing, and also modifications proposed on the basis of a simplified and strictly metric system.

TABLE II.—UNITED STATES COINAGE.—Existing and Proposed Systems Compared.

DENOMINATION OF COIN.	Aggregate Weight.			Proposed weight of each piece.	
	Existing System.		Proposed System.		
	Grains try.	Equivalent metric grammes.	Metric grammes.	Grammes.	Tergrammes (or thirds of a gramme).
<b>Gold</b>					
(nine-tenths fine).					
3 Double Eagles.....	1548.	100.31—	100	33½	100
6 Eagles.....	1548.	100.31—	100	16½	50
(10 Decagrammes of standard gold of the value of six metric dollars).....			100	10	30
12 Half Eagles.....	1548.	100.31—	100	8½	25
20 Three-dollar pieces.....	1548.	100.31—	100	5	15
24 Quarter Eagles.....	1548.	100.31—	100	4½	12½
60 Dollars.....	1548.	100.31—	100	1½	5
<b>Silver</b>					
(nine-tenths fine).					
8 Half dollars.....		100	100	12½	
16 Quarter dollars.....		100	100	6½	
40 Dimes.....		100	100	2½	
<b>Copper-nickel</b>					
(½ nickel, ½ copper).					
20 Five-cent pieces.....	1543.2+	100	100	5	
50 Three-cent pieces.....	1500.	97.20—	100	2	
<b>Bronze</b>					
(5 per cent. tin and zinc, 95 per cent. copper).					
30 One-cent pieces.....	1540.	93.31+	100	3½	

TABLE III.—COINS OF VARIOUS COMMERCIAL NATIONS.

Number of pieces which may be coined from 100 grammes of gold of the fineness of nine-tenths, and the weight of each piece in grammes; also, the number of pieces which may be so coined under the proposed metric system, and the weight of each piece in grammes and in thirds of a gramme.

DENOMINATION OF COIN.	Existing relations.		Proposed relations.		
	Number of pieces.	Weight of each piece.	Number of pieces.	Weight of each piece, expressed in—	
Dollars (U. S.).....	59.815+	1.672—	60	Grammes. 1½	Ter-grammes 5
Double Eagles (U. S.).....	2.991—	33.436+	3	33½	100
Twenty-Yen pieces (Japan).....	3.	33½	3	33½	100
Victorias (or ten sol pieces of 300 metric pence—proposed English coin).....			10	10	30
Sovereigns (England).....	12.291+	8.136			
Ten-Mark pieces (Germanic Empire).....	25.11	3.982+	25		12
Union Crowns (Vereins-krone of Germany—Trade coin—coined from 1858 to 1872).....	9.	11½	9	11½	33½
Ten-Crown pieces (projected coin for the three Scandinavian kingdoms).....	22.32	4.480+	22½	4½	13½
Ten-Franc pieces (France).....	31.	3.226—	30	3½	10
Half-Imperials (Russia—5 gold roubles or 5.15 silver roubles)....	15.003+	6.665+	15	6½	20

In the above it is not proposed to disturb the value of the pound sterling of Great Britain, or of its representative the gold sovereign, but it is contemplated to substitute the Victoria (or decagramme of gold nine-tenths fine) of 10 sols, or 300 metric pence, as the British unit of account, in place of the pound sterling of 240 sterling pence, or 244 (more exactly 244.09) metric pence.

*Uniform Fineness.*—The difficulties attending the adoption by the leading nations of an international coinage are so great that it is doubtful if this desirable end can be reached for many years to come. In the mean time, if the nations would agree to a uniform standard of fineness for gold coin, and have international checks to maintain such a fineness, the weights of the coin would give the intrinsic value, and thus by a simple calculation any one could estimate the value of the coins of any country where such uniform standard fineness existed. The fineness should be, for ease in calculating and other reasons, nine-tenths.

TABLE IV.—Weight, Fineness, and Value of Foreign Gold Coins, the value estimated at U. S. Coining Rate.

COUNTRY.	DENOMINATION.	Weight.	Fineness.	Value.
		Grains.	Thous.	
Austria.....	Quadruple Ducat.....	215.40	986.1	\$9.15.8
"	One Ducat.....	53.85	986.1	2.28.7
"	Eight Florins.....	99.56	900	3.85.8
"	Four Florins.....	49.78	900	1.92.9
Argentine Rep.	One Argentine.....	124.45	900	4.82.3
"	Half Argentine.....	62.22	900	2.41.1
Belgium.....	One Hundred Francs.....	497.80	900	19.29.4
"	Fifty Francs.....	248.90	900	9.64.7
"	Twenty Francs.....	99.56	900	3.85.9
"	Ten Francs.....	49.78	900	1.92.9
"	Five Francs.....	24.89	900	96.4
Bolivia.....	Ten Bolivianos.....	248.90	900	9.64.7
"	Five Bolivianos.....	124.45	900	4.82.3
"	Two Bolivianos.....	49.78	900	1.92.9
Brazil.....	Twenty Milreis.....	276.63	916.6	10.92.9
"	Ten Milreis.....	138.31	916.6	5.46.0
"	Five Milreis.....	69.16	916.6	2.73.0
Can. America.....	Half Onza.....	254	875	9.57.1
"	Quarter Onza.....	127	875	4.78.5
"	Eighth Onza.....	63.5	875	2.39.2
"	Sixteenth Onza.....	31.7	875	1.19.6
"	Ten Pesos.....	294	875	11.07.8
"	Five Pesos.....	147	875	5.53.9
"	Two Pesos.....	58.8	875	2.21.4
"	One Peso.....	29.4	875	1.10.7
Chili.....	Condor.....	235.38	900	9.12.3
"	Doublon.....	117.69	900	4.56.1
"	Escudo.....	47.07	900	1.82.4
"	Peso.....	23.53	900	91.2
Denmark.....	{ Twenty Crowns } { (Krone).....	138.28	900	5.35.9
"	Ten Crowns.....	69.14	900	2.67.9



TABLE IV.—CONTINUED.

COUNTRY.	DENOMINATION.	Weight.	Fine- ness.	Value.
		Grains.	Thous.	
Egypt	One Hundred Piastres	131.18	875	\$4.94.3
"	Fifty Piastres	65.59	875	2.47.1
"	Twenty-five Piastres.	32.79	875	1.23.5
England	Sovereign	123.27	916.6	4.86.6
"	Half Sovereign.	61.63	916.6	2.43.3
France	One Hundred Francs.	497.80	900	19.29.4
"	Fifty Francs.	248.90	900	9.64.7
"	Twenty Francs.	99.56	900	3.85.9
"	Ten Francs.	49.78	900	1.92.9
"	Five Francs.	24.89	900	96.4
Germany	Twenty Marks.	122.91	900	4.76.4
"	Ten Marks.	61.45	900	2.38.2
"	Five Marks.	30.72	900	1.19.1
Greece	One Hund. Drachmas.	497.80	900	19.29.4
"	Fifty Drachmas	248.90	900	9.64.7
"	Twenty Drachmas.	99.56	900	3.85.9
"	Ten Drachmas.	49.78	900	1.92.9
"	Five Drachmas.	24.89	900	96.4
Hayti	Ten Gourdes.	248.90	900	9.64.7
"	Five Gourdes.	124.45	900	4.82.3
"	Two Gourdes.	49.78	900	1.92.9
"	One Gourde.	24.89	900	96.4
India.	{ Fifteen Rupees } (Mohur)	180	916.6	7.10.5
"	Ten Rupees	120	916.6	4.73.7
"	Five Rupees	60	916.6	2.36.8
Italy	One Hundred Lire.	497.80	900	19.29.4
"	Fifty Lire.	248.90	900	9.64.7
"	Twenty Lire	99.56	900	3.85.9
"	Ten Lire.	49.78	900	1.92.9
"	Five Lire.	24.89	900	96.4
Japan	Twenty Yen.	514.41	900	19.93.8
"	Ten Yen.	257.20	900	9.96.9
"	Five Yen.	128.60	900	4.98.4
"	Two Yen.	51.44	900	1.99.3
"	One Yen.	25.72	900	99.6
Mexico	Twenty Pesos.	522.23	875	19.67.9
"	Ten Pesos.	261.11	875	9.83.9
"	Five Pesos.	130.35	875	4.91.9
"	Two and a half Pesos.	65.28	875	2.45.9
"	One Peso.	26.11	875	98.3
Netherlands.	Ten Florins.	103.7	900	4.01.9
Norway	Twenty Crowns.	138.28	900	5.35.9
"	Ten Crowns.	69.14	900	2.67.9
Peru	Five Incas	89.65	900	3.47.5
"	Two Incas.	35.86	900	1.39.0
"	One Inca.	17.93	900	69.5
Portugal	Coroa	273.68	916.6	10.80.4
"	Half Coroa	136.84	916.6	5.40.2
"	Fifth Coroa.	54.73	916.6	2.16.0
"	Tenth Coroa.	27.36	916.6	1.08.0
Russia	Half Imperial.	100.98	916.6	3.98.6
"	Three Roubles	60.59	916.6	2.39.1
Spain	One Hundred Pesetas	497.8	900	19.29.4
"	Fifty Pesetas.	248.9	900	9.64.7
"	Twenty Pesetas.	99.56	900	3.85.9
"	Ten Pesetas.	49.78	900	1.92.9
"	Five Pesetas.	24.89	900	96.4
Sweden	Same as Denmark.			
Switzerland.	Same as France.			
Turkey	Five Hundred Piastres	556.78	916.6	21.97.6
"	{ Two Hundred and } { Fifty Piastres. }	278.39	916.6	10.98.3
"	One Hundred Piastres	111.35	916.6	4.39.5
"	Fifty Piastres.	55.67	916.6	2.19.7
"	Twenty-five Piastres.	27.84	916.6	1.09.8

TABLE V.—Weight, Fineness, and Value of Foreign Silver Coins, the value estimated at Coining Rate of U. S. Dollar.

COUNTRY.	DENOMINATION.	Weight.	Fine- ness.	Value.
		Grains.	Thous.	
Austria	Two Florin.	381.03	900	\$ 92.3
"	One Florin.	190.51	900	46.1
"	Two Union Thaler.	571.54	900	1.38.5
"	One Union Thaler.	285.77	900	69.2
Argentine Rep.	Peso	385.8	900	93.5
"	Half Peso.	192.9	900	46.7
"	Fifth Peso.	77.16	900	18.7
"	Tenth Peso.	38.58	900	9.3
"	Twentieth Peso.	19.29	900	4.6
Belgium	Five Francs.	358.8	900	93.5
"	Two Francs.	154.32	835	34.7
"	One Franc.	77.16	835	17.3
"	Fifty Centimes.	38.58	835	8.6
"	Twenty Centimes.	15.43	835	3.4
Bolivia	One Boliviano.	385.8	900	93.5
"	Half (50 Centavos)	192.9	900	46.7
"	One Peseta (20 "	77.16	900	18.7
"	One Real (10 "	38.58	900	9.3
"	Half Real (5 "	19.29	900	4.6
Brazil	Two Milreis.	385.8	900	93.5
"	One Milreis.	192.9	900	46.7
"	Half Milreis.	96.45	900	23.3
Can. America.	Fifty Centavos.	254	750	51.3
"	Twenty-five Centavos	127	750	25.6
"	Ten Centavos.	50.8	750	10.2
"	Five Centavos.	25.4	750	5.1
Chili	Peso	385.8	900	93.5
"	Fifty Centavos.	192.9	900	46.7
"	Twenty Centavos.	77.16	900	18.7
"	Ten Centavos.	38.58	900	9.3

TABLE V.—CONTINUED.

COUNTRY.	DENOMINATION.	Weight.	Fine- ness.	Value.
		Grains.	Thous.	
Chili	Five Centavos.	19.29	900	\$ 4.6
Denmark	Two Crowns.	231.48	800	49.8
"	One Crown.	115.74	800	24.9
"	Fifty Oere.	77.16	600	12.4
"	Forty Oere.	61.72	600	9.9
"	Twenty-five Oere.	37.34	600	6.2
"	Ten Oere.	22.37	400	2.4
Egypt	Ten Piastres	192.9	750	38.9
"	Five Piastres	96.45	750	19.4
"	Two and a Half Piast.	48.22	750	9.7
"	One Piastre.	19.29	750	3.8
England	Crown	436.36	925	1.08.7
"	Half Crown.	218.18	925	54.3
"	Florin	174.54	925	43.2
"	Shilling.	87.27	925	21.6
"	Six Pence.	43.63	925	10.8
"	Four Pence.	29.09	925	7.2
"	Three Pence.	21.81	925	5.4
"	Two Pence.	14.54	925	3.6
"	Penny.	7.27	925	1.8
France	Five Franc	385.8	900	93.5
"	Two Franc	154.32	835	34.7
"	One Franc	77.16	835	17.3
"	Fifty Centimes.	38.58	835	8.6
"	Twenty Centimes.	15.43	835	3.4
Germany	Two Marks.	428.66	900	1.03.9
"	One Mark.	171.46	900	41.4
"	Fifty Pfennig.	85.73	900	20.7
"	Twenty Pfennig.	42.86	900	10.3
Greece	Five Drachmas.	17.14	900	4.1
"	Two Drachmas.	385.8	900	93.5
"	One Drachma	154.32	835	34.7
"	Fifty Lepta.	77.16	835	17.3
"	Twenty Lepta.	38.58	835	8.6
"	One Gourde.	15.43	835	3.4
Hayti	Fifty Centimes.	385.8	900	93.5
"	Twenty Centimes.	192.9	835	34.7
"	Ten Centimes.	77.16	835	17.3
"	Five Centimes.	38.58	835	8.6
India.	Rupee.	180	916.6	44.4
"	Half Rupee.	90	916.6	22.2
"	Quarter Rupee	45	916.6	11.1
"	Eighth Rupee.	22.5	916.6	5.5
Italy	Five Lire.	385.8	900	93.5
"	Two Lire.	154.32	835	34.7
"	One Lira.	77.16	835	17.3
"	Fifty Centesimo.	38.58	835	8.6
"	Twenty Centesimo.	15.43	835	3.4
Japan	One Yen.	416	900	1.00.8
"	Fifty Sen.	208	900	50.4
"	Twenty Sen.	83.20	900	20.1
"	Ten Sen.	41.6	900	10.0
"	Five Sen.	20.8	900	5.0
Mexico	Peso	417.79	902.7	1.01.5
"	Fifty Centavo	208.89	902.7	50.7
"	Twenty-five Centavo.	104.44	902.7	25.3
"	Ten Centavo.	41.78	902.7	10.1
"	Five Centavo.	20.89	902.7	5.0
Netherlands.	Two and a Half Florin	385.8	945	98.2
"	One Florin.	154.32	945	39.2
"	Fifty Cent.	77.16	945	19.6
Norway	Two Crowns.	231.48	800	49.8
"	One Crown.	115.74	800	24.9
"	Twenty-four Skillings	92.59	800	19.9
"	Fifteen Skillings.	77.16	600	12.4
"	Twelve Skillings.	61.72	600	9.9
"	Three Skillings.	22.37	400	2.4
Peru	Five Pesetas.	385.8	900	93.5
"	One Peseta.	77.16	900	18.7
"	One Real.	38.58	900	9.3
"	Half Real.	19.29	900	4.6
Portugal	Five Hundred Reis.	192.9	916.6	47.6
"	Two Hundred Reis.	77.16	916.6	19.0
"	One Hundred Reis.	38.58	916.6	9.5
"	Fifty Reis.	19.29	916.6	4.7
Russia	Rouble.	319.92	808	74.8
"	Half Rouble.	159.96	868	37.4
"	Quarter Rouble.	79.98	868	18.7
"	Fifth Rouble.	63.98	868	14.9
"	Tenth Rouble.	31.99	868	7.4
"	Twentieth Rouble.	15.99	868	3.7
Spain	Five Pesetas.	385.8	900	93.5
"	Two Pesetas.	154.32	835	34.7
"	One Peseta.	77.16	835	17.3
"	Fifty Centimes.	38.58	835	8.6
"	Twenty Centimes.	15.43	835	3.4
Sweden	Same as Denmark.			
Switzerland.	Same as France.			
Turkey	Twenty Piastres.	371.21	830	82.9
"	Ten Piastres.	185.60	830	41.4
"	Five Piastres.	92.80	830	20.7
"	Two Piastres.	37.12	830	8.2
"	One Piastre.	18.56	830	4.1
"	Half Piastre.	9.28	830	2.0

As tending to facilitate in Great Britain the transition from the sterling to the metric basis, it may prove interesting to note the fact that the payment of a sterling half-crown a month is almost exactly equivalent to that of a metric penny a day, the average number of days in a calendar month being 30 $\frac{1}{2}$ , the same as the number of metric pence in a sterling half-crown.

Tables IV. and V., prepared by the director of the mint, to accompany his Annual Report, in pursuance of the act of Feb. 21, 1857, show the weight, fineness, and value of foreign gold and silver coins. The third column expresses the weight of a single piece in decimal fractions of the troy ounce. The fourth column expresses the fineness in thousandths. In the fifth column of Table IV. is shown the value as compared with the standard amount of fine gold in the gold coin of the U. S. The values in the fifth column of Table V. have been calculated on the nominal value of the standard silver dollar.

It is worthy of remark that Japan is, as yet, the only country in which the coins which represent the standard units of account are of gold of the fineness of nine-tenths, and possessing as to weight simple relations to the gramme, the metric unit. REVISED BY A. LOUDON SNOWDEN,  
*Supt. U. S. Mint, Philadelphia.*

**Coir** is the fibre of the cocoanut and other palms. It is a valuable material for ropes, mats, etc. The husks are steeped in water in pits for six months or more, and then beaten with a stick till the fibre readily separates. Coir is one of the best materials for cables on account of its lightness, elasticity, and strength. Large quantities of coir rope are made in the Laccadive Islands by the hand, without the aid of machinery. Coir is produced from the fibre of various trees, especially the GOMUTI PALM (which see). It is largely produced in the Malay Islands and extensively used in those regions.

**Coit** (THOMAS WINTHROP), D. D., LL.D., an Episcopalian divine, born at New London, Conn., June 28, 1803, graduated at Yale in 1821, was president of Transylvania University, Lexington, Ky., and became a professor at Trinity College, Hartford, Conn., in 1849. He published a "Theological commonplace Book" (1832), "Puritanism" (1844), and other works. Died June 21, 1885.

**Cojutepec**, a town of Central America, in the republic of San Salvador and in the province of Cuscatlan, about 15 miles E. of the capital. From 1854 to 1858 it served as the seat of government, San Salvador having been ruined by a succession of earthquakes, and in 1872 it took part in the revolt against the existing government, though without any effect, as the attack of the Indian inhabitants was repelled by the garrison. Pop. 15,000.

**Coke** [probably allied to the verb "cook"], the charcoal obtained from bituminous coal by distillation or by heating with an almost entire exclusion of air. The former, called gas-coke, is abundantly produced in gas-works; the latter process is conducted in heaps or in ovens. Coking in heaps (the Meiler method) consists in placing the coal in ridges with wooden stakes driven within, which are afterwards removed for the introduction of lighted coal. During the process of heating much smoke and vapor are thrown out, consisting mostly of tar, water, and coal-gas. When the smoke ceases to be evolved, the air is excluded and combustion extinguished by covering the mound of hot cinder with fine coal-dust. Where this business is large, chimneys of firebrick are erected, around which the coal is placed, the larger masses in the centre, the whole being finally covered with fine coal or dross. Firebrick ovens are also used for coking, and are more economical. In these the coal is introduced through the top, and a little air is admitted by openings. When the smoke has ceased the openings are closed for from twelve to twenty-four hours; the coal is then raked through a door, and water thrown upon it to stop combustion. Caking coal is the most suitable for making coke; even when small it may be used, and a little water sprinkled over it greatly assists the coking operation. The weight of coke usually amounts to between 60 and 70 per cent. of the coal employed; at the same time the coal increases in bulk about one-fourth. It will sometimes absorb moisture from the air to the extent of 30 per cent., and contains an amount of ash ranging from  $\frac{1}{2}$  to 15 per cent. Coke is largely employed in the smelting of metallic ores, etc. where great heat is required.

**Coke** (Sir EDWARD), an eminent English jurist and judge, born at Mileham, in Norfolk, Feb. 1, 1552. He graduated at Cambridge, studied law in the Inner Temple, and was called to the bar in 1578. His legal learning and tact in conducting causes soon procured for him a large practice. He was appointed recorder of Norwich in 1586, recorder of London in 1592, and solicitor-general the same year. He became Speaker of the House of Commons in 1593, and attorney-general in 1594. In 1606 he was appointed chief-justice of common pleas, in which position he resolutely opposed illegal encroachments of the Crown at a time when the subserviency of justice to royalty was general. To still his unwelcome decisions the court made him chief-justice of the king's bench, but found him no less independent and freedom-loving than before. Among other bold judicial acts, he decided that the king had no

right to stay proceedings in a court of law; for which he was deprived of the justiceship in 1616. He sided with the popular party in Parliament, and for his intrepid course was imprisoned in the Tower in 1622. He had a principal part in framing the Bill of Rights, and in carrying it through Parliament. Sir Edward Coke's legal learning was various and profound. His "Reports" far excelled any that had preceded them. "Coke upon Littleton, or the First Institute," is still a standard upon matters of municipal and constitutional law in England. He wrote, besides a second, third, and fourth book of "Institutes," the "Complete Copyholder" and "Reading on Fines." Died Sept. 3, 1633.

**Coke** (THOMAS), D. D., LL.D., the first bishop of the Methodist Episcopal Church, born at Brecon, Wales, Sept. 9, 1747, was educated at Oxford, and became a minister of the Church of England, but subsequently joined Wesley, and became a most laborious and faithful itinerant. He was made a bishop for America by Wesley in 1784, but did not confine his labors to this country. He traversed Great Britain and Ireland frequently, and crossed the Atlantic eighteen times. He founded the Wesleyan missions in the East and West Indies, and expended nearly all his large fortune in the undertaking. He died May 2, 1814, on a voyage to India, and was buried at sea. He was a voluminous writer, and left, among numerous other works, a "Commentary on the Holy Scriptures" (6 vols., 1803-07), and a "History of the West Indies" (1808). (See SRAVEN'S "History of Methodism," and "History of the Methodist Episcopal Church.")

**Col** [from the Lat. *collum*, a "neck"], a French word signifying "neck," is applied to several passes of the Alps, as Col de Balme, Col de Tenda, etc.

**Co'la**, or **Kola-Nut**, the seed of the tree *Cola acuminata*, of the natural order Sterculiaceae, a native of the western tropical parts of Africa, and cultivated in other warm countries. The natives of Guinea believe that to eat a portion of one of these seeds before their meals improves the flavor of whatever they may eat, and that when sucked or chewed they will render even putrid water agreeable to the palate. They are about the size of a pigeon's egg, of a brownish color and bitter taste. They are said to possess properties analogous to Peruvian bark.

**Col'berg**, a fortified seaport-town of Prussia, in Pomerania, on the river Persante near its entrance into the Baltic, about 143 miles N. E. of Berlin, with which it is connected by a railway. It has a handsome Rathaus, an old cathedral, salmon and lamprey fisheries, commerce, and salt-works. It is partly surrounded with swamps which can be readily covered with water. It has sustained several protracted sieges. Pop. in 1880, 16,027.

**Colbert** (JEAN BAPTISTE), a French statesman and financier, was born at Rheims Aug. 29, 1619. He entered the service of Cardinal Mazarin in 1648, and became secretary to the queen in 1654. Mazarin at his death recommended Colbert to the king, who in 1661 appointed him controller-general of the finances, which were then in a ruinous condition. The annual revenue exacted from the people in 1660 was about 84,000,000 livres, but only 32,000,000 were received into the treasury, the rest being kept by the farmers of the revenue. Colbert reformed the financial system, and established order and economy in the government. In the course of twenty years he raised the gross revenue to 115,000,000, while the expense of collecting it was reduced to about 30,000,000. He promoted commerce and manufactures, opened canals and roads, and founded colonies in America. He also made reforms in the department of marine, of which he was appointed minister in 1669. No minister perhaps ever contributed so much to the prosperity of France. He was a liberal patron of literary and scientific men, and was the founder of the Academy of Inscriptions and Academy of Sciences. His influence at court was undermined by Louvois, and his efforts to dissuade Louis XIV. from his ruinous wars and extravagant expenses were unavailing; but he retained the office of controller-general until his death. Died in Paris Sept. 6, 1683. (See PIERRE CLÉMENT, "Histoire de Colbert," 1846; A. DE SERVIEZ, "Histoire de Colbert," 1842; GOURDAULT, "Colbert, Ministre de Louis XIV.," 1870.)

**Col'burn** (WARREN), a mathematician, born at Dedham, Mass., Mar. 1, 1793, taught school in Boston. He published in 1821 a "Mental Arithmetic," which had an extensive circulation. Died at Lowell Sept. 13, 1833.

**Colburn** (Rev. ZERAH), born at Cabot, Vt., Sept. 1, 1804. In early life he had a wonderful faculty of computation, which failed him as he came to maturity. He became a Methodist preacher (1825), and professor of languages at Norwich University (1835). Died at Norwich, Vt., Mar. 2, 1840.

**Colby University**, a Baptist college, incorporated by the legislature of Massachusetts in 1813 as "The Maine Literary and Theological Institution," was first established near Bangor, but subsequently (1818) transferred to Waterville, Me. In 1820 it was chartered by the State of Maine as "Waterville College," which name it bore till 1867, when, having been munificently endowed by Gardner Colby, Esq., a merchant of Boston, the name was changed to that of Colby University.

**Colcha'gua**, a province of Chili, is bounded on the N. by the province of Santiago, on the E. by the Andes, on the S. by the province of Curico, and on the W. by the Pacific Ocean. Area, 3516 square miles. The province is traversed by the rivers Rapel, Mataquito, and Tinguirica. The climate is better than in any other province, and the soil is very fertile. Gold and copper are found, especially in the mountains in the interior. Pop. in 1881, 153,422. Chief town, San Fernando.

**Colchester** (anc. *Camalodunum*), a parliamentary borough and river-port of England, in Essex, on the river Colne, 12 miles from the sea, and on the Eastern Union Railway, 51 miles N. N. E. of London. It is well built on the sides and summit of an eminence, and has imposing remains of a castle built soon after the Norman Conquest. Great quantities of Roman remains have been found here, including bushels of coins of Roman emperors, vases, urns, lamps, etc. It has eight parish churches, some of which are antique structures, several hospitals, a theatre, and a custom-house. There are manufactures of silk and a valuable oyster-fishery. It returns two members to Parliament. Pop. in 1881, 28,374.

**Colchic'eine** ( $C_{17}H_{19}NO_5$ ), an alkaloid prepared from colchicine by the action of acids.

**Col'chicine** ( $C_{17}H_{19}NO_5$ ), a very powerful alkaloid extracted from all parts of *Colchicum autumnale* (meadow saffron). It produces, even in very small doses, violent vomiting and purging.

**Col'chis** [Gr. *Κολχίς*], an ancient province of Asia, was bounded on the N. by the Caucasus, on the S. by Armenia, and on the W. by the Pontus Euxinus (Black Sea). It was celebrated in ancient fable and poetry as the place to which the Argonauts sailed for the golden fleece, and as the home of Medea. It was noted for its wine and fruits, and was the native country of the pheasant, which derived its name from Phasis, a river of Colchis. It is now part of the Russian dominions.

**Cold** [Lat. *frigus*; Ger. *Kälte*], the absence or want of heat. It is scarcely necessary to observe that the distinction between heat and cold is merely relative. The same substance at the same time may give the sensation of cold to one person and that of warmth to another, in case the temperature of the one is much lower than that of the other person. The lowest temperature yet recorded is —220 F.

All warm-blooded animals have a power of maintaining the proper temperature of the body in defiance of external cold, believed to be mainly due to a process analogous to combustion, in which carbon and hydrogen taken in food unite with oxygen derived from the air by respiration. If the combustible materials are not furnished, or if the supply of oxygen be deficient, there must be a depression of temperature. Now, if the temperature of a bird or mammal (except in the case of hibernating animals) be lowered about 30° below its normal standard (which in birds ranges from 108° to 112°, and in mammals from 98° to 102°), the death of the animal is the result. The symptoms following a great depression of the temperature of the body are, retardation of the circulation of the blood, causing lividity of the skin, followed by pallor; a peculiar torpor of the muscular and nervous systems manifests itself in an indisposition to make any exertion, and in extreme drowsiness. The respiratory movements become slower, and the loss of heat goes on with increasing rapidity till death supervenes.

In hibernating animals the power of generating heat within their own bodies is slight, their temperature nearly approximating that of the external air, so that it may be brought down nearly to the freezing-point. At this temperature the vital functions are scarcely perceptible, but when the temperature is again raised vital activity returns. The respirations in marmots fall from 500 to 14 in an hour, and are performed without apparent movement of the chest walls; the pulse sinks from 150 to 15 beats in a minute; and the animal can with difficulty be aroused from torpor.

Cold is a powerfully depressing agent, and in certain conditions is a fruitful cause of disease and death. Its most obvious effects occur in the freezing of parts of the body. In such cases the restoration to a normal temperature must be very gradual, or the frozen part may become affected by gangrene. It is often beneficial to place the

frozen part in water near the freezing-point. It is said to be usual in Russia to rub the part affected with snow. The effects of cold upon the general system may result in bronchitis, pneumonia, or other serious diseases.

**Col de la Seigne** (săfi), an Alpine pass leading from Savoy into the Val d'Aosta in Piedmont, is 7 miles W. S. W. of Mont Blanc. Height, 8422 feet. (See COL.)

**Colden** (CADWALLADER), lieutenant-governor of the province of New York from 1761 to 1775, repeatedly acting as governor in the absence of the chief executive, born in Scotland in 1688, emigrated about 1708 to Pennsylvania, where he practised medicine, invited to New York in 1718 by Gov. Hunter, was the first surveyor-general of the colonies. Died in 1776, of grief, it is said, at witnessing the destruction caused by the great fire of that year. Among his works are numerous essays on medical subjects, and others on natural philosophy, natural history, and the mathematics. He carried on a long correspondence with Linnæus, to whom he sent great numbers of American plants. His memoir upon them, entitled "Plantæ Colden-shamiæ," etc., was published by Linnæus in the "Acta of the Upsala Academy of Science," and is perhaps the earliest botanical treatise written in North America. Linnæus gave the name *Coldenia* to an East Indian plant.

**Colden** (CADWALLADER DAVID), an American lawyer, born in Queen's co., Long Island, April 4, 1769, became mayor of New York in 1818, and a member of Congress in 1822. He wrote a "Life of Robert Fulton." Died Feb. 7, 1834.

**Cold Harbor**, a locality in Hanover co., Va., about 10 miles N. E. of Richmond.

In May, 1864, Gen. Grant, continuing his movement from Spottsylvania, had successfully crossed the Fifth, Sixth, and Second corps over the North Anna River at Jericho Ford and at Chesterfield Bridge, above and below Lee's army. An attempt to cross direct in his front proved unsuccessful, and it being discovered that Lee's position was one of remarkable strength, from which he could be dislodged only by a loss incommensurate with the advantage to be thus gained, Gen. Grant determined to withdraw to the N. bank, which was skillfully accomplished on the night of the 26th of May, and another flank movement was commenced. The advance was led by two divisions of cavalry under Gen. Sheridan, and the Sixth corps, Gen. Wright. Considerable severe fighting was done on the 28th, 29th, and 30th, resulting in the success of the national arms; and on the 31st, Sheridan, with his two divisions, occupied Cold Harbor, driving the Confederates from the place, and maintaining his position until relieved, June 1, by the Sixth corps and the Eighteenth corps (Gen. W. F. Smith), which latter had just arrived (*via* White House) from Butler's army on the James River. At 5 p. m. both Wright and Smith attacked Lee, carrying a good part of his first line; but subsequent attempts to force him from his second line were unsuccessful, and the effort was abandoned after a loss of 2000 men. The portion of the army not engaged in the main attack received repeated assaults, all of which were repulsed with great loss to the enemy. Ineffectual attempts were made by the Confederates during the night to regain the ground lost during the day. The 2d of June was devoted to the redistribution of the army. The Second corps (Hancock) was moved forward, and placed on the left of the Sixth, which was resting on the left of the Eighteenth; the Ninth corps (Burnside) was drawn in to Bethesda Church, and the Fifth corps (Warren) extended to the left, to connect with Smith. In executing this operation both Warren and Burnside sustained attacks, which were repulsed, with the loss of some prisoners, however.

The morning of June 3d opened with rain, but at 4 A. M., the Second, Sixth, and Eighteenth corps furiously assaulted the Confederates in their intrenchments. Barlow's and Gibbons' divisions of the Second corps carried a portion of the enemy's line, but were compelled to withdraw before reinforcements could reach them. An equally gallant and vigorous assault, though less sanguinary, was also made by the Sixth and Eighteenth corps, but without success. Warren, whose line was much extended, was engaged only with his artillery, while Burnside failed to move at the time arranged upon, and a later movement, which promised success, on the left of Lee's line, was recalled, owing to the failure of the attack on the right; and the army intrenched themselves in their position close to the Confederates' main line of works. The attack lasted but about half an hour, yet in that short time Grant's loss was not less than 7000, while Lee's loss did not probably exceed 3000. At a later hour in the day an order was given to renew the attack, but the order was subsequently withdrawn. An attack was made on Gibbons' division about 9 p. m., which was repulsed. The total Federal loss at and around Cold Harbor was upwards of 13,000.

The two armies remained confronting each other till June 12, when Grant, moving rapidly, crossed the Chickahominy at the lower crossings, reaching the James River on the 15th, which was also successfully crossed on pontoons and ferry-boats.

**Cold Spring**, Putnam co., N. Y. (see map of New York, ref. 7-K, for location of county), on R. R. and the E. bank of the Hudson, 52 miles N. of New York. It is pleasantly situated among the Highlands, one mile above West Point, and has a library, a furnace, and manufactures of cannon, machinery, brass castings, etc. Pop. in 1870, 3086; in 1880, 2111.

**Cold Spring**, Suffolk co., N. Y. (see map of New York, ref. 8-K, for location of county), on the E. side of Cold Spring Harbor, has some manufactures and shipbuilding, and formerly was a whaling port, but that business is now pursued on only a small scale. The artificial hatchery of fish, for which the place presents special opportunities, is very successful here. Pop. in 1870, 750; in 1880, 857.

**Cold Spring**, capital of San Jacinto co., Tex. (see map of Texas, ref. 4-J, for location of county). Pop. not in census of 1880.

**Cold's stream**, a border-town of Scotland, in Berwickshire, on the left bank of the Tweed, 15 miles S. W. of Berwick. The river is here crossed by a bridge. Near this place is the famous ford where the English and Scottish armies formerly crossed the Tweed. Here General Monk raised the regiment still known as the COLDSTREAM GUARDS (which see). Pop. in 1881, 2561.

**Coldstream Guards**, a regiment in the Foot Guards or Household Brigade, is the oldest corps in the British army except the First Foot. It was raised at Coldstream in 1660 by General Monk, and was first called Monk's regiment.

**Coldwater**, a city, capital of Branch co., Mich. (see map of Michigan, ref. 8-I, for location of county), on R. R. and Coldwater Creek, midway between Detroit and Chicago. It has manufactures of iron, wood, oil, flour, etc. There is a park, two libraries, and a high school. The State school for pauper children is in Coldwater. Pop. in 1870, 4381; in 1880, 4681; in 1884, 5102.

**Cole** (THOMAS), a landscape-painter, born in Lancashire, England, Feb. 1, 1801, was taken to Ohio by his parents when he was a child. He visited Italy about 1831, and returned to New York in 1832 with several Italian landscapes. He painted a number of fine views of the Catskill Mountains. Among his other works are four allegorical pictures of the "Voyage of Life," a series called "The Course of Empire," a "View of Mount Etna," and a "Dream of Arcadia." Died at Catskill, N. Y., Feb. 11, 1848. (See his "Life" by L. L. NOBLE, 1855.)

**Colebrook**, one of the capitals of Coos co., N. H. (see map of New Hampshire, ref. 3-F, for location of county). The village is on Connecticut River, about 50 miles N. of Mount Washington. It has an academy, manufactures of carriages, woollen, starch, lumber, leather, etc. Pop. in 1880, 635.

**Colebrooke, or Grand Falls**, a post-village and port of entry of Victoria co., N. B., near the Great Falls of the river St. John, which are 180 feet high and very imposing. Steamers ply between Colebrooke and St. John (202 miles) during high water. There is a fine suspension bridge over the falls. Pop. in 1881, 1534.

**Colebrooke** (HENRY THOMAS), an English Orientalist, born June 15, 1765, went to India in 1782, and was employed in the civil service of the East India Company. He became professor of Sanscrit in the College of Fort William. He published a "Sanscrit Grammar" (1805), a "Dictionary of the Sanscrit Language" (1808), "Miscellaneous Essays" (2 vols., 1837), "On the Sacred Books of the Hindoos," and "Algebra of the Hindoos." His works display sound critical judgment and great learning. Died in London Mar. 10, 1837.

**Coleman**, capital of Coleman co., Tex. (see map of Texas, ref. 3-G, for location of county). Pop. not in census of 1880.

**Coleman** (LEIGHTON). See APPENDIX.

**Coleman** (LYMAN), D. D., an eminent American scholar, teacher, and author, born at Middlefield, Mass., June 14, 1796; travelled and studied in Europe and the East; was connected with several literary institutions, and was prof. of ancient languages in Lafayette College, Easton, Pa. He published "Antiquities of the Christian Church" (1841), "Ancient Christianity" (1852), "Historical Text-Book and Atlas of Biblical Geography" (1854), "Prelacy and Ritualism" (1869), and other works. Died Mar. 16, 1882.

**Colenso** (JOHN WILLIAM), D. D., born in Cornwall, Eng., Jan. 24, 1814, died in Natal, Africa, June 20, 1883. He

graduated from Cambridge, was appointed rector of Farn-cott St. Mary, Norfolk, in 1846, and enjoyed a fair reputation as a mathematician, some of his treatises being used as text-books in the schools and universities. In 1854 he was elected bishop of Natal, and in 1862 he published "The Pentateuch, etc.," in which he called in question many of the statements of Moses and denied the inspiration of the Old Testament. The book was condemned by both Houses of Convocation, and the author was deposed by his metropolitan. The privy council, however, declared the deposition invalid in 1865.

**Coleoptera** [from the Gr. *κολεός*, a "sheath," and *πτερόν*, a "wing"], the name of an extensive order of insects, including all those popularly termed beetles, having four wings; the first pair, of a horny consistency, serve as defensive coverings to the second pair, which are larger in size and folded transversely beneath the elytra or wing-covers when the beetle is at rest. In some species the membranous wings are wanting, but the elytra are always present. The head supports two antennae of various forms, but nearly always consisting of eleven joints. Coleoptera have two compound eyes, but no ocelli. The mouth is fitted for gnawing, tearing, or chewing, and exhibits in great perfection the complicated structure which belongs to the mouth of all the masticating or mandibulating insects. The anterior segment of the thorax greatly surpasses in extent the two other segments; the abdomen is united to the trunk by a great part of its breadth. The Coleoptera and their larvæ are very voracious, feeding on both animal and vegetable substances. This is a very numerous order, being estimated to contain 80,000 species or more.

**Colepeper**. See CULPEPER.

**Coleraine**, a seaport-town of Ireland, in the county of Londonderry, is on the river Bann, 4 miles from its mouth, and 47 miles N. N. W. of Belfast. Vessels of 200 tons can come up to the town, and steamers ply regularly between it and Liverpool and Glasgow. It has a court-house and a custom-house; also manufactures of fine linen fabrics called "coleraines," and of paper, soap, etc. Pop. 6236.

**Coleridge** (HARTLEY), an English poet, son of Samuel T. Coleridge, was born near Bristol Sept. 14, 1796. He was a dreamy, wayward, and eccentric genius. He became a fellow of Oriel College in 1818, but he soon lost his fellowship by his intemperance. He published a volume of admired poems in 1833. Among his other works is "The Worthies of Yorkshire and Lancashire" (1835). He had marvellous conversational powers. Died Jan. 6, 1849.—A younger brother, DERWENT, born Sept. 14, 1800, was prebendary of St. Paul's cathedral, had some reputation as a writer, and died Mar. 29, 1883.

**Coleridge** (HENRY NELSON), a cousin of the above, born in 1800, was called to the bar in 1826, published an "Introduction to the Study of the Greek Classic Poets" (1830), and "The Table-Talk of Samuel T. Coleridge" (1835). Died Jan. 26, 1843.

**Coleridge** (JOHN DUKE), born in London 1821, a son of John Taylor Coleridge, was educated at Eton and Balliol College, Oxford, and called to the bar at the Middle Temple in 1846. He was appointed recorder of Portsmouth 1855, created a queen's counsel 1861, and became attorney-general 1871 and lord chief-justice 1873.

**Coleridge** (Right Honorable Sir JOHN TAYLOR), D. C. L., an English jurist, a nephew of S. T. Coleridge, born at Tiverton in 1790, educated at Oxford and the Middle Temple, was called to the bar in 1819, became a serjeant in 1832, judge of the king's bench in 1835, and privy councillor in 1858. His reputation as a lawyer and literary critic is high. D. Feb. 11, 1876.

**Coleridge** (SAMUEL TAYLOR), an English poet and critic, born at Ottery St. Mary, in Devonshire, Oct. 21, 1772, was a son of the vicar of that parish. In 1791 he entered Jesus College, Cambridge, where he attained great proficiency in classical learning. He abruptly quitted Cambridge in 1792, and enlisted in a regiment of dragoons under the assumed name of Silas Tomken Comberbatch. His relatives soon procured his discharge from the army. He visited Bristol in 1794, and became an associate of Robert Southey and other young men who, like himself, had adopted democratic and revolutionary ideas. They formed a project to emigrate to the banks of the Susquehanna and to found a "pantisocracy," in which they proposed to enjoy a community of goods. As they could not raise money enough for the outfit, they were compelled to abandon the enterprise. His friend and patron, Joseph Cottle of Bristol, paid him thirty guineas in advance for a volume of poems (published in 1796). In 1795 he married Sarah Fricker, a sister of Southey's wife, and became a resident of Nether Stowey (Somersetshire), where he asso-

ciated with the poet Wordsworth, and remained nearly three years. During this period he composed the "Ancient Mariner" and other poems. Coleridge and Wordsworth wrote in partnership a collection of "Lyrical Ballads." He held Socinian views in this early part of his mature life, and began to preach in the Unitarian churches, but his success as a preacher was hindered by his instability and want of punctuality. In 1798 he visited Germany with Wordsworth, and studied at Göttingen. He removed to Keswick, in the Lake country, in 1800, and resided with Southey and Wordsworth. The unfriendly critics of the Reviews applied to these three friends the appellation of "Lake Poets," in reference to their local habitation. In 1808 he lectured on poetry and the fine arts in London, and in 1809 commenced the publication of the "Friend," a periodical. His wife and family remained at Keswick, dependent on Southey, while Coleridge led a wandering life, and formed many speculative and literary projects, which he failed to realize. His natural infirmities of character were increased by the use of opium. He passed many of his later years in the house of Mr. Gillman at Highgate, near London, where he began to reside in 1816. Among his works are "Christabel" (1816), "Biographia Literaria" (1817), "Zapolya," a drama (1818), "Aids to Reflection" (1825), and "Literary Remains" (1836). "Osorio, a Tragedy" (first printed in 1873), was the original drama from which his "Remorse" was adapted. He died at Highgate July 25, 1834. (See GILLMAN, "Life of S. T. Coleridge," 1838; COTTELE, "Reminiscences of Coleridge and Southey," 1847.)

**Coleridge** (SARA HENRY), only daughter of the preceding, was born at Keswick Dec. 22, 1802. She passed many of her early years in the house of her uncle, Robert Southey, and was married in 1829 to her cousin, Henry N. Coleridge. She edited several works of her father, and wrote an admired imaginative tale called "Phantasmion" (1837). Died May 3, 1852. Her memoirs and letters, edited by her daughter, were published in 2 vols., 1873.

**Coles** (EDWARD), an American statesman, born in Albemarle co., Va., Dec. 15, 1786, was private secretary to President Madison (1810-16) and minister to Russia (1817-18). Soon after his return he set free his slaves. He was governor of Illinois (1823-26). Died at Philadelphia, then his residence, July 7, 1868. He published a "History of the Ordinance of 1787."

**Colfax**, capital of Grant parish, La. (see map of Louisiana, ref. 8-C, for location of parish), on Red River about 25 miles N. W. of Alexandria. Pop. in 1870, 40; pop. in 1880 not in census.

**Colfax**, on R. R., capital of Whitman co., in S. E. part of Wash. Ter. (see map of Washington Territory, ref. 4-E, for location of county). Pop. in 1880, 444.

**Colfax** (SCHUYLER), an American statesman, born in the city of New York Mar. 23, 1823, was a grandson of Gen. William Colfax, who commanded Washington's life-guards. In 1836 he removed with his mother, who was then a widow, to Northern Indiana. He settled at South Bend, and studied law, and became in 1845 editor of the "St. Joseph Valley Register," a Whig paper issued at South Bend. In 1850 he was a member of the convention which formed a new constitution for Indiana, and he opposed the clause that prohibited colored men from settling in that State. As a Whig candidate for Congress he was defeated in 1851, but was elected in 1854, was six times re-elected, and continued to represent that district until 1869. In 1856 he made an eloquent speech in Congress on the subject of the conflict in Kansas. He was chosen Speaker of the House of Representatives in Dec., 1863. During the civil war he was a friend and confidential adviser of President Lincoln. He performed a journey across the continent to California in 1865, and was again elected Speaker of the House about the end of that year. He gained a high reputation as a presiding officer, and was the most popular Speaker of the House since Henry Clay. In 1867 he was chosen Speaker for the third time. In May, 1868, he was nominated as candidate for the office of Vice-President of the U. S. by the Republicans, who at the same time nominated Gen. Grant for the presidency. They were elected in Nov., 1868, receiving 214 electoral votes out of 294, which was the whole number. Died Jan. 13, 1885.

**Colhoun** (EDMUND R.), U. S. N., born May 6, 1821, in Penna., entered the navy as a midshipman Apr. 1, 1839, became a passed midshipman in 1845, a lieutenant in 1861, a commander in 1862, a captain in 1869, and afterward rear-admiral. He served on the E. coast of Mexico during the Mexican war, commanded the steamer Hunchback at the capture of Roanoke Island and Newbern, N. C., in 1862, and was in several engagements with batteries on Black Water River, Va., during the fall of that year. In reference to the fight at Roanoke Island, Commander Murray

in his official report of Feb. 8, 1862, says: "The Hunchback, Acting-Lieutenant Colhoun, took a position very near the batteries, and sustained considerable damage from the fire of the enemy, which she is now repairing. During the whole of the engagement, and in spite of her injuries, she maintained her proximity to the enemy, to his great apparent embarrassment and to the admiration of the other ships." And in his report to Rear-Admiral Lee of the heavy fighting on the Black Water, Lieutenant-Commander Flusser writes: "I was well supported. Colhoun and French both did their duty." He commanded the monitor Weehawken during the summer and fall of 1863 in her various engagements with the forts and batteries of Charleston harbor. On the 7th of Sept., 1863, while going into action, the Weehawken grounded, and in this perilous situation remained for twenty-four hours, exposed to the fire of Fort Moultrie. Captain Colhoun's conduct on this occasion is thus highly commended by Rear-Admiral Dahlgren in his report of Sept. 8, 1863: "Captain Colhoun has, in my opinion, more than compensated for the misfortune of getting aground by the handsome manner in which he has retorted upon the enemy, and defended the glorious flag that floats above him. At 11.30 A. M. I telegraphed to him, 'Well done, Weehawken! Don't give up the ship.' His vessel is now off, and the crews of the other monitors cheered spontaneously as he passed. I commend Captain Colhoun, his officers, and men to the notice of the department." Captain Colhoun was in both the Fort Fisher fights, and for "his energy, bravery, and untiring zeal" was recommended for promotion by Rear-Admiral Porter in his "commendatory despatch" of Jan. 28, 1865. Retired May 6, 1883. FOXHALL A. PARKER.

**Col'ic** [Lat. *colica*; Fr. *colique*; from the Gr. *καλίκος*, "pertaining to the colon"], a term applied to diseases attended with severe pain of the abdomen; its supposed particular connection with the large intestine is not always certain. The disease is caused, at least in part, by irregular contractions of the muscular coat of the intestines. This complaint arises from various causes and exhibits different symptoms. It is sometimes attended with constipation, and ceases when the regular action of the bowels is restored. A good remedy in such cases is a dose of castor oil (about one ounce for an adult), with thirty or thirty-five drops of laudanum. Warm baths and fomentations are often necessary. When colic resists mild and simple remedies, medical assistance should be procured, for colic is closely allied, as a symptom, to several severe and dangerous diseases.

REVISED BY WILLARD PARKER.

**Coligny, de** (GASPARD), an eminent French admiral and Huguenot, was born at Châtillon-sur-Loire Feb. 16, 1517. He served with distinction at the battle of Cériseles in 1544, and became admiral of France in 1552. In 1557 he was taken prisoner by the Spaniards at Saint-Quentin. He was the second in command of the Protestant army in the civil war which began in 1562, and when the prince of Condé was killed at Jarnac in 1569 he succeeded him as commander-in-chief. The war was suspended in 1570 by a treaty of peace, in which the court acted a treacherous part. Coligny went to Paris to attend the marriage of Henry of Navarre in Aug., 1572, and was received with feigned kindness by Charles IX. He was wounded in the street by a partisan of the duke of Guise, and was killed, two days later (Aug. 24), in the general massacre of St. Bartholomew. (See PÉRAULT, "Vie de Coligni;" BRANTÔME, "Discours sur l'Amiral de Châtillon;" DUFREY, "Coligny, Histoire Française," 4 vols., 1824.)

**Coli'ma**, a state of the Mexican republic, on the western coast. Area, 2393 square miles. The interior is mountainous, the volcano Pica de Colima being the highest point (10,800 feet); the plains are fertile, and produce sugar, rice, cacao, cotton, and tobacco. Capital, Colima. Pop. in 1880, 65,829.

**Colima**, a town of the Mexican republic, capital of the state of Colima, is about 250 miles W. of Mexico. It is situated in a fertile plain. Its port is on the Pacific Ocean, about 30 miles S. W. of Colima. Pop. 23,572.

**Colise'um**, or **Colosse'um** [supposed to have taken its name from a colossal statue of Nero which stood near the Flavian Amphitheatre], a name of the Flavian Amphitheatre in Rome, dedicated A. D. 80, now one of the most magnificent ruins in the world. (See AMPHITHEATRE.)

**Col'lamer** (JACOB), LL.D., an American lawyer and Senator, born at Troy, N. Y., in 1792. He emigrated to Vermont in his youth, graduated in 1810 at the University of Vermont, was admitted to the bar in 1812, and became eminent in his profession. He was a judge of the supreme court of Vermont from 1833 to 1841, was elected a member of Congress in 1843, 1844, and 1846, and was ap-



pointed postmaster-general by President Taylor in Mar., 1849. In July, 1850, he resigned in consequence of the death of Taylor. He was elected a U. S. Senator in 1854, and re-elected in 1860. Died Nov. 9, 1865.

#### Collarino. See ASTRAGAL.

**Col'lege** [Lat. *collegium*, from *collegere*, to "collect"], in the Roman law, signified a number of persons associated together by common functions—a body of colleagues—and was in many respects what we should now call a corporation. Its later meaning applied to any union of persons. Colleges might exist for religious, political, or industrial purposes; examples: college of augurs, of pontiffs, of tribunes, and of artisans, like modern guilds. The body of cardinals, consisting of three orders—bishops, priests, and deacons—is a collegiate corporation, called the Sacred College. A union of electors is sometimes called an electoral college. The term has been applied to organizations of instructors—*e. g.* College of Professional Teachers, Cincinnati, 1832-47, and the College of Preceptors, England. In Germany it is applied to the union of the teaching corps (*Lehrer-collegium*) of a gymnasium or other school. The term is now, however, usually applied to corporations and institutions for instruction, especially in France, England, and the U. S. Colleges for academic purposes appear to have originated at the Paris University, some time after its foundation, at the beginning of the thirteenth century.

Colleges were originally not a part of the universities proper, and appear to have grown out of the voluntary association of students and teachers, and were at first designed primarily for aliment and habitation, some of them being foundations for the poor, and others pension (boarding) institutions for students in easy circumstances. It required the slow evolution of centuries to develop these primitive boarding clubs into great institutions of instruction and of studious retirement.

With the exception of Germany, the mediæval colleges finally obtained a preponderance over the universities proper. On the Continent they did not, however, become independent of the universities, as their regents were appointed from the faculties, and were always under their control. The college as a place of abode and study in connection with the university has disappeared from continental Europe.

In the French system of public instruction, the schools leading to the baccalaureate of letters and of science are the state classical college, now called *lycées*, 86 in number (2349 professors and 40,995 students), and the municipal college (*collèges communaux*), numbering 252, with 3430 professors and teachers and 38,236 pupils. Provision has recently been made to establish non-classical colleges (*établissements de l'enseignement secondaire spécial*), leading to the baccalaureate of science, and also secondary schools for girls. The Collège de France is an institution of the highest order for the cultivation of pure science, with no

prescribed courses of study. Its 40 professors give lectures which are open to the public.

The mediæval colleges at Oxford and Cambridge obtained control over the universities in consequence of the large authority with which Laud invested their heads. An Oxford or Cambridge college is a corporation consisting of a head or master, fellows and scholars. The governing body is in all cases the head and fellows. No one college has the least control in any other, but the plan is much the same in all. These corporations give board and lodging on various terms to such students as choose to enter them and comply with their rules in order to receive their assistance in obtaining the university honors. Each college holds lectures and examinations, awards prizes, and makes its own requirements of its students. At Oxford there are 21 colleges and 5 halls or non-corporate colleges, and at Cambridge 17 colleges. The whole body of colleges taken together, at Oxford and Cambridge, alike constitute the university, whose power and functions are practically limited to holding examinations, conferring degrees, and providing, to an inconsiderable extent, courses of lectures, at which attendance is optional. Of late years colleges have combined their forces for providing common systems of lectures, and there has been a strong desire to reconstruct the teaching power of these universities. Other important colleges in Great Britain are Eton, Winchester, Dulwich, Wellington, University, King's, Owen, and Liverpool. In Ireland there are four—the ancient Trinity College and the three located at Belfast, Cork and Galway. Several colleges for women have lately been established, the chief of which are Girton, at Cambridge, Cheltenham Ladies' College, and City of London College for Ladies.

The colleges of America are modelled on the pattern of those at Oxford and Cambridge; but our colleges have from the beginning conferred degrees in all the faculties, which in England is a function belonging only to the universities. In the U. S. there is no fixed distinction between the terms *college* and *university*, and there is as yet no university pure in the German sense. By establishing the faculties of theology, law, and medicine, some of our colleges have acquired some of the forms and functions of universities. Others, by annexing a preparatory department, approach the character of the French colleges, which receive pupils at nine or ten years of age. The old "colleges" of Harvard, Yale, and Columbia, and the new "universities" of Michigan, Cornell, and Johns Hopkins, approach more nearly to the character of a true university than any others of our institutions for higher education. Many of the colleges, especially the younger ones, are open to both sexes. There is a considerable number of colleges exclusively for women, the most important of which are Vassar, Smith, and Wellesley. The number of "universities" and colleges in the U. S. is 364, with 4241 instructors and 60,011 students. Only sixteen of our American colleges have libraries of over 25,000 volumes.

JOHN D. PHILBRICK.

TABLE I.—Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.

NAME.	Location.	Denomination.	Charter.	Organized.	President.
University of Alabama.....	Tuscaloosa, Ala.....	Non-sectarian.....	1820	1831	B. B. Lewis, LL.D.
Howard College.....	Marion, ".....	Baptist.....	1843	1842	Justin T. Murfee, LL.D.
Southern University.....	Greensborough, Ala.....	Meth. Epis., South.....	1856	1859	Prof. J. S. Moore (Chairman).
St. John's College.....	Little Rock, Ark.....	Non-sectarian.....	1850	1859	Rev. Leo Baier, M. A.
Cane Hill College.....	Boonsborough, ".....	Cum. Presbyterian.....	1852	1852	Rev. F. R. Earle, M. A.
Arkansas Industrial Univ.....	Fayetteville, ".....	Non-sectarian.....	1871	1871	Gen. D. H. Hill, LL.D.
Judson University.....	Judsonia, ".....	Baptist.....	1871	1875	Richard S. James, LL.D.
St. Augustine College.....	Benicia, Cal.....	Prot. Episcopal.....	1868	1867	Rt. Rev. J. H. D. Wingfield, D. D., LL.D.
University of California.....	Berkeley, ".....	Non-sectarian.....	1868	1869	Prof. William T. Reid.
Pacific Methodist College.....	Santa Rosa, ".....	Meth. Epis., South.....	1862	1861	Rev. W. A. Finley, D.D.
Hesperian College.....	Woodlawn, ".....	Christian.....	1869	1863	A. M. Elston, M. A.
Pierce Christian College.....	College City, ".....	Christian.....	1874	1874	James C. Keith, B. A.
University of Southern Cal.....	Los Angeles, ".....	Meth. Episcopal.....	1880	1880	Rev. M. M. Bovard, M. A.
University of the Pacific.....	Santa Clara, ".....	Meth. Episcopal.....	1852	1852	Rev. C. C. Stratton, D. D.
Colorado College.....	Colorado Springs, Col.....	Non-sectarian.....	1874	1874	Rev. E. P. Tenney.
University of Colorado.....	Boulder, Col.....	Non-sectarian.....	1875	1877	Joseph A. Sewell, LL.D.
University of Denver.....	Denver, ".....	Meth. Episcopal.....	1880	1880	Rev. D. H. Moore, D. D.
Yale College.....	New Haven, Conn.....	Congregational.....	1701	1701	Rev. Noah Porter, D. D., LL.D.
Trinity College.....	Hartford, ".....	Prot. Episcopal.....	1824	1826	Rev. G. W. Smith, D. D.
Wesleyan University.....	Middletown, ".....	Meth. Episcopal.....	1831	1831	Rev. John W. Beach, D. D., LL.D.
Delaware College.....	Newark, Del.....	Non-sectarian.....	1867	1870	J. H. Caldwell, D. D.
University of Georgia.....	Athens, Ga.....	Non-sectarian.....	1785	1801	Rev. P. H. Mell, LL.D.
Emory College.....	Oxford, ".....	Meth. Epis. South.....	1836	1837	Rev. Atticus G. Haygood, D. D.
Mercer University.....	Macon, ".....	Baptist.....	1837	1838	Rev. A. J. Battle, D. D.
Atlanta University.....	Atlanta, ".....	Non-sectarian.....	1867	1869	Edmund A. Ware, M. A.
Clark University.....	Atlanta, ".....	Meth. Episcopal.....	1869	1869	Rev. E. O. Thayer, M. A.
Abingdon College.....	Abingdon, Ill.....	Christian.....	1855	1853	Francis M. Bruner, M. A.
Knox College.....	Galesburg, ".....	Non-sectarian.....	1837	1841	Newton Bateman, LL.D.
Lombard University.....	Galesburg, Ill.....	Universalist.....	1851	1852	Rev. Nehemiah White, Ph.D.
Wheaton College.....	Wheaton, ".....	Non-sectarian.....	1861	1855	Rev. Jonathan Blanchard.
Illinois Wesleyan University.....	Bloomington, ".....	Meth. Episcopal.....	1850	1850	Rev. W. H. H. Adams, D. D.
Eureka College.....	Eureka, ".....	Christian.....	1855	1853	Rev. H. W. Everest, M. A.
North-western University.....	Evanston, ".....	Meth. Episcopal.....	1851	1855	Rev. Joseph Cummings, D. D., LL.D.
Monmouth College.....	Monmouth, ".....	United Presb.....	1857	1856	Rev. J. B. McMichael, D. D.
Illinois College.....	Jacksonville, ".....	Non-sectarian.....	1835	1830	R. C. Crampton, M. A. (acting).

TABLE I.—Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.—Continued.

NAME.	Location.	Denomination.	Char- ter.	Organ- ized.	President.
Shurtleff College.....	Upper Alton, Ill.....	Baptist.....	1835	1827	Rev. A. A. Kendrick, D.D.
McKendree College.....	Lebanon, ".....	Meth. Episcopal.....	1834	1828	Rev. D. W. Phillips, M. A.
Lincoln University.....	Lincoln, ".....	Cum. Presbyterian.....	1865	1866	Rev. J. McGlumphy, LL.D.
Illinois Industrial University..	Urbana, ".....	Non-sectarian.....	1867	1868	S. H. Peabody, LL.D.
Chaddock College.....	Quincy, ".....	Meth. Episcopal.....	1878	1853	James T. Long, LL.D.
Augustana College.....	Rock Island, ".....	Evangelical South.....	1865	1863	Rev. T. N. Hasselquist, D. D.
Westfield College.....	Westfield, ".....	United Brethren.....	1865	1865	Rev. Samuel B. Allen, D. D.
Lake Forest College.....	Lake Forest, ".....	Presbyterian.....	1856	1876	Rev. D. S. Gregory, D. D.
North-west College.....	Naperville, ".....	Evangelical Asso.....	1865	1861	Rev. A. A. Smith, M. A.
Blackburn University.....	Carlinville, ".....	Presbyterian.....	1857	1859	Rev. E. L. Hurd, D. D.
Hedding College.....	Abingdon, ".....	Meth. Episcopal.....	1875	1855	Rev. George W. Peck, LL.D.
Carthage College.....	Carthage, ".....	Lutheran.....	1870	1870	Rev. J. A. Kunkelman, M. A.
Ewing College.....	Ewing, ".....	Baptist.....	1874	1867	Rev. John Washburn, D. D.
Irrington College.....	Irrington, ".....	Presbyterian.....	1863	1865	Rev. E. W. Clarke, M. A.
Mt. Morris College.....	Mt. Morris, ".....	German Baptist.....	1840	1840	D. L. Miller.
Indiana University.....	Bloomington, Ind.....	Non-sectarian.....	1828	1828	Prof. David S. Jordan.
De Pauw University.....	Greencastle, ".....	Meth. Episcopal.....	1837	1837	Rev. Alexander Martin, D. D., LL.D.
Moore's Hill College.....	Moore's Hill, ".....	Meth. Episcopal.....	1856	1856	Rev. J. P. D. St. John, M. A.
Wabash College.....	Crawfordsville, ".....	Presbyterian.....	1837	1837	Rev. Joseph F. Tuttle, D. D.
Union Christian College.....	Merom, ".....	Christian.....	1859	1860	Rev. Thos. C. Smith, M. A.
Earlham College.....	Richmond, ".....	Friends.....	1859	1847	Joseph Moore, LL.D.
Hartsville University.....	Hartsville, ".....	United Brethren.....	1851	1852	Rev. C. H. Kiracofe, M. A.
Hanover College.....	Hanover, ".....	Presbyterian.....	1833	1827	Rev. D. W. Fisher, D. D.
Fort Wayne College.....	Fort Wayne, ".....	Meth. Episcopal.....	1847	1848	Rev. W. F. Yocum, M. A.
Concordia College.....	Fort Wayne, ".....	Evang. Lutheran.....	1850	1848	F. Zucker.
Franklin College.....	Franklin, ".....	Baptist.....	1844	1836	Rev. W. T. Stott, D. D.
Ridgeville College.....	Ridgeville, ".....	Free Will Baptist.....	1867	1867	Rev. S. D. Bates, M. A.
Simpson Centenary College.....	Indianola, Ia.....	Meth. Episcopal.....	1867	1868	Rev. Edward L. Parks, M. A.
Iowa State University.....	Iowa City, ".....	Non-sectarian.....	1847	1855	Josiah L. Packard, LL.D.
Norwegian Lutheran College..	Decorah, ".....	Lutheran.....	1866	1861	Rev. L. Larsen.
Central University.....	Pella, ".....	Baptist.....	1853	1854	Rev. George W. Gardner, D. D.
Cornell College.....	Mt. Vernon, ".....	Meth. Episcopal.....	1857	1853	Rev. Wm. F. King, D. D.
Iowa Wesleyan University.....	Mt. Pleasant, ".....	Meth. Episcopal.....	1855	1852	Rev. W. J. Spaulding, Ph.D.
Grissold College.....	Davenport, ".....	Prot. Episcopal.....	1859	1859	Rt. Rev. W. Stevens Perry, LL.D.
Iowa College.....	Grinnell, ".....	Congregational.....	1847	1848	Rev. George F. Magoun, D. D.
Upper Iowa University.....	Fayette, ".....	Meth. Episcopal.....	1857	1857	Rev. John W. Bissell, D. D.
Tabor College.....	Tabor, ".....	Congregational.....	1866	1866	Rev. Wm. M. Brooks, M. A.
Parsons College.....	Fairfield, ".....	Presbyterian.....	1875	1875	Rev. T. D. Ewing, D. D.
Oscalooza College.....	Oscalooza, ".....	Christian.....	1857	1861	G. H. Laughlin, M. A.
Amity College.....	College Springs, ".....	Non-sectarian.....	1853	1857	Rev. S. C. Marshall, M. A.
Drake University.....	Des Moines, ".....	.....	.....	.....	George T. Carpenter, M. A.
Des Moines University.....	Des Moines, ".....	Baptist.....	1865	1866	George D. Purinton, M. A.
German College.....	Mt. Pleasant, ".....	Ger. Methodist.....	1873	1873	Rev. W. Balcke, M. A.
Penn College.....	Oscalooza, ".....	Friends.....	1873	1873	Benjamin Trueblood, M. A.
Washburn College.....	Topeka, Kans.....	Congregational.....	1856	1863	Rev. Peter McVicker, D. D.
Baker University.....	Baldwin City, ".....	Meth. Episcopal.....	1858	1858	Rev. W. H. Sweet, M. A.
State University.....	Lawrence, ".....	Non-sectarian.....	1863	1866	Rev. James Marvin, D. D.
Ottawa University.....	Ottawa, ".....	Baptist.....	1860	1865	T. M. Stewart, M. A.
Highland University.....	Highland, ".....	Presbyterian.....	1858	1856	Rev. Robert Cruikshank, D. D.
Lane University.....	Lecompton, ".....	United Brethren.....	1862	1862	N. B. Bartlett, M. A.
Kentucky University.....	Lexington, Ky.....	Christian.....	1858	1859	Ch. Louis Loos.
Berea College.....	Berea, ".....	Non-sectarian.....	1865	1858	Rev. E. H. Fairchild, D. D.
Georgetown College.....	Georgetown, ".....	Baptist.....	1829	1831	Rev. Richard M. Dudley, D. D.
Centre College.....	Danville, ".....	Presbyterian.....	1819	1822	Ormond Beatty, LL.D.
Eminence College.....	Eminence, ".....	Christian.....	1856	1857	W. S. Giltner.
Central University.....	Richmond, ".....	So. Presbyterian.....	1873	1874	Rev. L. H. Blanton, D. D.
Kentucky College.....	Howkinsville, ".....	.....	1849	1881	R. C. Cave, M. A.
Kentucky Wesleyan College.....	Millersburg, ".....	Methodist.....	1860	1866	D. W. Batson, M. A.
Concord College.....	New Liberty, ".....	Baptist.....	1868	1868	James Rice.
Centenary College.....	Jackson, La.....	Meth. Episcopal.....	1825	1825	Rev. C. G. Andrews, D. D.
Louisiana State University.....	Baton Rouge, La.....	Non-sectarian.....	1853	1860	.....
Straight University.....	New Orleans, ".....	Congregational.....	1869	1870	Rev. W. S. Alexander, D. D.
Leland University.....	New Orleans, ".....	Baptist.....	1870	1873	Rev. Seth T. Axtell, Jr.
University of Louisiana.....	New Orleans, ".....	Non-sectarian.....	1847	1878	Hon. Randall Hunt, LL.D.
Tulane University.....	New Orleans, ".....	.....	1883	1883	Col. Wm. Preston Johnston.
Bowdoin University.....	Brunswick, Me.....	Congregational.....	1794	1802	Rev. Wm. De Witt Hyde.
Colby University.....	Waterville, ".....	Baptist.....	1820	1818	Rev. Henry E. Robins, D. D.
Bates College.....	Lewiston, ".....	Free Will Baptist.....	1863	1863	Rev. Oren B. Cheney, D. D.
St. John's College.....	Annapolis, Md.....	Non-sectarian.....	1784	1789	Rev. W. H. Hopkins, M. A. (acting).
Washington College.....	Chestertown, ".....	Non-sectarian.....	1782	1782	Wm. J. Rivers, M. A.
West Maryland College.....	Westminster, ".....	Methodist.....	1868	1867	Rev. Jas. T. Ward, D. D.
Frederick College.....	Frederick, ".....	Non-sectarian.....	1829	1763	Thomas A. Gatch, M. A.
Baltimore City College.....	Baltimore, ".....	Non-sectarian.....	.....	1839	Wm. Elliott, Jr.
Johns Hopkins University.....	Baltimore, ".....	Non-sectarian.....	1867	1876	Daniel C. Gilman, LL.D.
New Windsor College.....	New Windsor, ".....	Presbyterian.....	1843	1843	Rev. A. M. Jolly, D. D.
Williams College.....	Williamstown, Mass..	Congregational.....	1793	1793	Franklin Carter, LL.D.
Amherst College.....	Amherst, ".....	Congregational.....	1825	1821	Rev. Julius H. Seelye, S. T. D., LL.D.
Harvard University.....	Cambridge, ".....	Non-sectarian.....	1650	1638	Chas. Wm. Eliot, LL.D.
Tufts College.....	College Hill, ".....	Universalist.....	1852	1855	Rev. Elmer H. Capen, D. D.
Mass. Agricultural College.....	Amherst, ".....	Non-sectarian.....	1863	1867	James S. Greenough.
Boston University.....	Boston, ".....	Meth. Episcopal.....	1869	1873	Rev. W. F. Warren, LL.D.
University of Michigan.....	Ann Arbor, Mich.....	Non-sectarian.....	1836	1841	James B. Angell, LL.D.
Olivet College.....	Olivet, ".....	Cong. and Pres.....	1859	1858	Rev. Horatio Q. Butterfield, D. D.
Kalamazoo College.....	Kalamazoo, ".....	Baptist.....	1855	1855	Rev. Kendall Brooks, D. D.
Albion College.....	Albion, ".....	Meth. Episcopal.....	1860	1860	Rev. Lewis R. Fiske, LL.D.
Hope College.....	Holland, ".....	Reformed Dutch.....	1866	1857	Rev. Charles Scott, D. D.
Adrian College.....	Adrian, ".....	Methodist.....	1859	1859	D. S. Stephens, M. A.
Grand Traverse College.....	Benzonza, ".....	Congregational.....	1862	1863	L. H. Maltby.
Battle Creek College.....	Battle Creek, ".....	Seventh Day Adv.....	1874	1874	A. S. Brownberger, M. A.
University of Minnesota.....	Minneapolis, Minn.....	Non-sectarian.....	1868	1867	Prof. Cyrus Northrup.
Hamline University.....	Hamline, ".....	Meth. Episcopal.....	1854	1855	Rev. D. C. John, D. D.
Carleton College.....	Northfield, ".....	Congregational.....	1866	1867	Rev. James W. Strong, D. D.
Macalester College.....	Minneapolis, ".....	Presbyterian.....	1853	1874	Rev. Rockwood McQuestion, M. A.
University of Mississippi.....	Oxford, Miss.....	Non-sectarian.....	1844	1848	Gen. Alex. P. Stewart.
Mississippi College.....	Clinton, ".....	Baptist.....	1850	1851	Rev. W. S. Webb, D. D.
Alcorn University.....	Jackson, ".....	Non-sectarian.....	1871	1871	Hon. Henry R. Revels.
Shaw University.....	Holly Springs, ".....	Meth. Episcopal.....	1870	1868	Rev. W. W. Hooper, M. A.
Christian University.....	Canton, Mo.....	Christian.....	1853	1855	J. C. Reynolds, M. A.
University of Missouri.....	Columbia, ".....	Non-sectarian.....	1839	1840	Samuel S. Laws, LL.D.
Washington University.....	St. Louis, ".....	Non-sectarian.....	1853	1853	Rev. Wm. G. Eliot, D. D.
William Jewell College.....	Liberty, ".....	Baptist.....	1840	1852	Rev. Wm. R. Rothwell, D. D.
Lewis College.....	Glasgow, ".....	Meth. Episcopal.....	1865	1866	Rev. James C. Hall, M. A.
Central College.....	Fayette, ".....	Meth. Episcopal.....	1855	1857	Rev. Eugene R. Hendrix, D. D.
Grand River College.....	Edinburg, ".....	Baptist.....	.....	1859	Thomas H. Storts, M. A.
Lincoln College.....	Greenwood, ".....	United Pres.....	1870	1869	J. A. McKirahan.

TABLE I.—Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.—Continued.

NAME.	Location.	Denomination.	Char- ter.	Organ- ized.	President.
Central Wesleyan College.....	Warrenton, Mo.....	German Meth.....	1865	1864	Rev. Herman A. Koch, D. D.
Lagrange College.....	Lagrange, ".....	Baptist.....	1859	1866	J. A. Cook, LL.D.
Drury College.....	Springfield, ".....	Congregational.....	1873	1873	Rev. Nathan J. Morrison, D. D.
Stewartsville College.....	Stewartsville, ".....	Non-sectarian.....	1879	1863	Rev. W. O. H. Perry, M. A.
Nebraska State University.....	Lincoln, Neb.....	Non-sectarian.....	1869	1871	Rev. Edmund B. Fairfield, D. D.
Nebraska College.....	Nebraska City, ".....	Prot. Episcopal.....	1868	1866	Rev. John McNamara, D. D.
Nebraska Wesleyan Univ.....	Fullerton, ".....	Meth. Episcopal.....	1880	1879	Rev. J. J. Flaherty, M. A.
Doane College.....	Crete, ".....	Congregational.....	1872	1872	Rev. D. B. Perry, M. A.
Nevada State University.....	Elko, Nev.....	Non-sectarian.....	1874	1874	J. S. Mayhugh (President Regents).
Dartmouth College.....	Hanover, N. H.....	Congregational.....	1769	1770	Rev. S. C. Bartlett, D. D., LL.D.
College of New Jersey.....	Princeton, N. J.....	Presbyterian.....	1746	1746	Rev. James McCosh, D. D., LL.D.
Rutgers College.....	New Brunswick, N. J.....	Non-sectarian.....	1770	1771	Merrill E. Gates, LL.D.
Columbia College.....	New York, N. Y.....	Prot. Episcopal.....	1754	1754	F. A. P. Barnard, S.T.D., LL.D., L. H. D.
University City of New York.....	New York, ".....	Non-sectarian.....	1830	1830	Rev. John Hall, D. D., LL.D.
College City of New York.....	New York, ".....	Non-sectarian.....	1847	1848	Alex. S. Webb, LL.D.
St. Lawrence University.....	Canton, ".....	Universalist.....	1856	1858	Rev. A. G. Gaines, D. D.
Alfred University.....	Alfred, ".....	Seventh Day Bap.....	1836	1836	Rev. J. Allen, D. D.
Hamilton College.....	Clinton, ".....	Presbyterian.....	1812	1812	Rev. Henry Darling, D. D., LL.D.
University of Rochester.....	Rochester, ".....	Baptist.....	1850	1850	Martin B. Anderson, LL.D.
Cornell University.....	Ithaca, ".....	Non-sectarian.....	1865	1868	Prof. Charles K. Adams.
Union College.....	Schenectady, ".....	Non-sectarian.....	1795	1795	J. S. Landon, LL.D. (acting).
Hobart College.....	Geneva, ".....	Prot. Episcopal.....	1825	1824	Rev. Eliphalet N. Potter, LL.D.
Madison University.....	Hamilton, ".....	Baptist.....	1846	1820	Rev. Ebenezer Dodge, LL.D.
St. Stephen's College.....	Annandale, ".....	Prot. Episcopal.....	1860	1860	Rev. E. B. Fairbairn, LL.D.
Syracuse University.....	Syracuse, ".....	Meth. Episcopal.....	1870	1871	Rev. Chas. N. Sims, D. D.
University of North Carolina.....	Chapel Hill, N. C.....	Non-sectarian.....	1789	1795	Kemp F. Battle, LL.D.
Davidson College.....	Davidson Col., N. C.....	Presbyterian.....	1837	1837	Rev. T. D. Witherspoon, D. D.
Wake Forest College.....	Wake Forest Col., N. C.....	Baptist.....	1834	1834	Rev. Charles E. Taylor.
Trinity College.....	Trinity Col., N. C.....	Meth. Episcopal.....	1852	1852	Rev. B. Craven, D. D.
North Carolina College.....	Mt. Pleasant, ".....	Evang. Lutheran.....	1859	1859	Rev. L. A. Bikle, D. D.
Biddle University.....	Charlotte, ".....	Presbyterian.....	1877	1867	Rev. Stephen Mattoon, D. D.
Shaw University.....	Raleigh, ".....	Baptist.....	1873	1868	Rev. H. M. Tupper, M. A.
Weaverville College.....	Weaverville, ".....	Non-sectarian.....	1874	1874	E. M. Goolsby, M. A.
Marietta College.....	Marietta, Ohio.....	Non-sectarian.....	1835	1855	Rev. Israel W. Andrews, D. D.
Denison University.....	Granville, ".....	Baptist.....	1832	1831	Rev. Alfred Owen, D. D.
Cincinnati University.....	Cincinnati, ".....	Non-sectarian.....	1823	1873	Thomas Vickers, B. D.
Kenyon College.....	Gambier, ".....	Prot. Episcopal.....	1824	1825	Rev. Wm. B. Bodine, D. D.
Wittenberg College.....	Springfield, ".....	Evang. Lutheran.....	1845	1845	Rev. J. B. Helwig, D. D.
Willoughby College.....	Willoughby, ".....	Methodist.....	1858	1859	W. W. Gist.
Ohio Wesleyan University.....	Delaware, ".....	Meth. Episcopal.....	1842	1842	Rev. Chas. H. Payne, LL.D.
Muskingum College.....	New Concord, ".....	United Pres.....	1837	1837	Rev. F. A. C. Spencer.
Oberlin College.....	Oberlin, ".....	Congregational.....	1833	1833	Rev. Jas. H. Fairchild.
Ohio University.....	Athens, ".....	Non-sectarian.....	1804	1809	Wm. H. Scott.
Otterbein University.....	Westerville, ".....	United Brethren.....	1847	1847	Rev. H. A. Thompson, D. D.
Urbana University.....	Urbana, ".....	New Church.....	1850	1851	Rev. Frank Sewall, M. A.
Antioch College.....	Yellow Springs, Ohio.....	Non-sectarian.....	1852	1853	Rev. D. A. Long, A. M.
Wilberforce University.....	Wilberforce, Ohio.....	Af. Meth. Episcopal.....	1863	1863	Rev. Benjamin F. Lee, D. D.
German Wallace College.....	Berea, ".....	Meth. Episcopal.....	1864	1864	Rev. Wm. Nast, D. D.
Mt. Union College.....	Mt. Union, ".....	Non-sectarian.....	1858	1846	O. N. Hartshorn, LL.D.
Farmer's College.....	College Hill, ".....	Non-sectarian.....	1846	1846	P. V. N. Myers, M. A.
Heidelberg College.....	Tiffin, ".....	Reformed.....	1850	1850	Rev. Geo. W. Willard, D. D.
Richmond College.....	Richmond, ".....	.....	1835	1843	M. Stahl.
Baldwin University.....	Berea, ".....	Meth. Episcopal.....	1856	1856	Aaron Schuyler, LL.D.
University of Wooster.....	Wooster, ".....	Presbyterian.....	1866	1870	Rev. Archibald A. E. Taylor, D. D.
Franklin College.....	New Athens, ".....	Non-sectarian.....	1825	1825	Rev. Geo. C. Vincent, D. D.
Capital University.....	Columbus, ".....	Evang. Lutheran.....	1850	1850	Rev. M. Lay, M. A.
Buchtel College.....	Akron, ".....	Universalist.....	1870	1872	Rev. Orello Cone, D. D.
Hiram College.....	Hiram, ".....	Disciples.....	1867	1867	Rev. Joseph King.
Ohio Central College.....	Iberia, ".....	Non-sectarian.....	1853	1849	Rev. J. P. Robb, M. A.
Ashland College.....	Ashland, ".....	German Baptist.....	1878	1879	Elder R. H. Miller.
Scio College.....	Scio, ".....	Meth. Episcopal.....	1866	1865	John W. Ravelli, Ph.D.
Hebrew Union.....	Cincinnati, ".....	Jewish.....	1874	1875	Isaac Meir Wise.
Rio Grande College.....	Rio Grande, ".....	Free-Will Baptist.....	1875	1876	Albanus A. Moulton, M. A.
Miami Valley College.....	Springborough, ".....	Friends.....	1875	1871	Eugene H. Foster, M. A.
Ohio State University.....	Columbus, ".....	Non-sectarian.....	1870	1875	Edward Orton, Ph.D.
Wilmington College.....	Wilmington, ".....	Friends.....	1875	1870	Jas. B. Unthank, B. S.
Pacific University.....	Forest Grove, Or.....	Evangelical.....	1854	1854	Rev. J. R. Herrick, D. D.
Willamette University.....	Salem, ".....	Meth. Episcopal.....	1853	1844	Thomas Van Scoy, M. A.
Christian College.....	Monmouth, ".....	Christian.....	1865	1866	T. F. Campbell, M. A.
Blue Mountain University.....	La Grange, ".....	Non-sectarian.....	1876	1876	Rev. G. E. Ackerman, D. D.
University of Oregon.....	Eugene City, ".....	Non-sectarian.....	1876	1876	John W. Johnson, M. A.
McMinnville College.....	McMinnville, ".....	Baptist.....	1857	1858	E. C. Anderson.
Philomath College.....	Philomath, ".....	United Brethren.....	1865	1868	Rev. Wayne S. Walker, M. A.
Haverford College.....	Haverford Col., Pa.....	Friends.....	1832	1832	Thomas Chase, LL.D.
Lehigh University.....	S. Bethlehem, ".....	Prot. Episcopal.....	1866	1866	Robert A. Lambertson, LL.D.
University of Lewisburg.....	Lewisburg, ".....	Baptist.....	1846	1847	Rev. David J. Hill, M. A.
Muhlenberg College.....	Allentown, ".....	Evang. Lutheran.....	1867	1867	Rev. H. W. McKnight, D. D.
Pennsylvania College.....	Gettysburg, ".....	Evang. Lutheran.....	1832	1832	Rev. E. T. Jeffers, D. D.
Westminster College.....	New Wilmington, ".....	United Pres.....	1852	1852	Rev. Lucius H. Bugbee, D. D.
Allegheny College.....	Meadville, ".....	Meth. Episcopal.....	1817	1815	Rev. Henry M. McCracken, D. D.
Western University of Penn.....	Pittsburg, ".....	Non-sectarian.....	1819	1819	Rev. Thomas G. Apple, D. D.
Franklin and Marshall Coll.....	Lancaster, ".....	Reformed.....	1853	1853	Rev. James A. McCauley, D. D.
Dickinson College.....	Carlisle, ".....	Meth. Episcopal.....	1783	1783	Rev. James D. Moffatt, D. D., LL.D.
Washington and Jefferson Col.....	Washington, ".....	Presbyterian.....	1802	1802	Rev. Isaac N. Kendall, D. D.
Lincoln University.....	Chester Co., ".....	Non-sectarian.....	1834	1863	Rev. D. D. DeLong, M. A.
Lebanon Valley College.....	Annyville, ".....	United Brethren.....	1867	1866	Rev. J. H. M. Knox, D. D.
Lafayette College.....	Easton, ".....	Presbyterian.....	1826	1832	William Pepper, LL.D. (Provost).
University of Pennsylvania.....	Philadelphia, ".....	Non-sectarian.....	1755	1748	Edward H. Magill, M. A.
Swarthmore College.....	Swarthmore, ".....	Friends.....	1864	1869	Rev. E. E. Higbee, D. D.
Mercersburg College.....	Mercersburg, ".....	Reformed German.....	1865	1865	Rev. J. H. A. Bomberger, D. D.
Ursinus College.....	Freeland, ".....	Evang. Lutheran.....	1870	1870	Rev. H. W. Roth, M. A.
Thiel College.....	Greenville, ".....	Baptist.....	1868	1868	Rev. H. K. Craig, D. D.
Monongahela College.....	Jefferson, ".....	Baptist.....	1765	1765	Rev. E. G. Robinson, D. D., LL.D.
Brown University.....	Providence, R. I.....	Asso. Ref. Pres.....	1841	1839	Rev. W. M. Grier, D. D.
Erskine College.....	Due West, S. C.....	Evang. Lutheran.....	1856	1858	Rev. G. W. Holland, M. A.
Newberry College.....	Newberry, ".....	Non-sectarian.....	1801	1805	Wm. Porcher Miles.
University of South Carolina.....	Columbia, ".....	Baptist.....	1850	1851	Rev. Jas. C. Furman, D. D.
Furman University.....	Greenville, ".....	Non-sectarian.....	1785	1789	H. E. Shepherd, LL.D.
College of Charleston.....	Charleston, ".....	Meth. Episcopal.....	1851	1854	James H. Carlisle, LL.D.
Wofford College.....	Spartanburg, S. C.....	Meth. Episcopal.....	1869	1870	Rev. Edward Cook, D. D.
Clafin University.....	Orangeburg, ".....	Presbyterian.....	1877	1877	Rev. John R. Riley (Chairman).
Adger College.....	Walhalla, ".....	Presbyterian.....	1842	1819	Rev. P. Mason Bartlett, D. D.
Maryville College.....	Maryville, Tenn.....	Cum. Presbyterian.....	1842	1842	Nathan Green, LL.D.
Cumberland University.....	Lebanon, ".....	Non-sectarian.....	1807	1808	Rodes Massie, A. M., D. L. (acting).
Tennessee University.....	Knoxville, ".....	Non-sectarian.....	1807	1808	

TABLE I.—Colleges of the U. S. incorporated and empowered by Charter to confer Degrees in Arts.—Continued.

NAME.	Location.	Denomination.	Char- ter.	Organ- ized.	President.
Greenville and Tusculum Col.	Tusculum, Tenn.	Non-sectarian	1794	1794	Rev. W. S. Doak, D. D.
E. Tennessee Wesleyan Univ.	Athens, "	Meth. Episcopal	1857	1858	Rev. John F. Spence, D. D.
Central Tennessee College	Nashville, "	Meth. Episcopal	1866	1866	Rev. John Braden, D. D.
S. W. Baptist University	Jackson, "	Baptist	1874	1875	Geo. W. Jarman, LL.D.
University of the South	Sewanee, "	Prot. Episcopal	1858	1868	Rev. Telfair Hodgson, D.D. (Vice-Chan.).
Bethel College	McKenzie, "	Cum. Presbyterian	1842	1842	W. B. Sherrill, A. B.
Fisk University	Nashville, "	Congregational	1867	1866	Rev. E. N. Cravath, M. A.
King College	Bristol, "	Presbyterian	1866	1867	Rev. J. D. Tadlock, D. D.
S. W. Presbyterian University	Clarksville, "	Presbyterian	1875	1875	Rev. J. N. Waddell, LL.D.
Baylor University	Independence, Tex.	Baptist	1845	1846	Rev. W. Carey Crane, LL.D.
Waco University	Waco, "	Baptist	1861	1867	Rev. Rufus C. Burleson, D. D.
Henderson College	Henderson, "	Non-sectarian	1870	1873	Lyman Gould, M. A.
South-western University	Georgetown, "	Meth. Episcopal	1875	1875	Rev. Francis A. Mood, D. D. (Regent).
Mansfield College	Mansfield, "	Non-sectarian	1872	1869	Rev. John Collier.
Austin College	Sherman, "	Presbyterian	1849	1850	Rev. E. F. Palmer, D. D.
Trinity University	Tehuacana, "	Cum. Presbyterian	1870	1869	Rev. W. E. Beeson, D. D.
Marvin College	Waxahachie, "	Non-sectarian	1873	1872	Rev. L. M. Lewis, D. D.
State University	Austin, "		1881	1881	Robert L. Dabney, LL.D. (Chairman).
Middlebury College	Middlebury, Vt.	Congregational	1800	1800	
State University	Burlington, "	Non-sectarian	1791	1780	Rev. Matthew H. Buckham, D. D.
Richmond College	Richmond, Va.	Baptist	1840	1832	F. Puryear, LL.D. (Chairman).
Randolph Macon College	Ashland, "	Meth. Episcopal	1830	1832	Rev. Wm. V. Bennett, D. D.
Roanoke College	Salem, "	Lutheran	1853	1853	Julius D. Dreher, Ph.D.
Emory and Henry College	Emory, "	Meth. Episcopal	1839	1838	Rev. David Sullins, D. D.
Hampden-Sidney College	Hampden-S. Col., Va.	Presbyterian	1783	1776	Rev. Dr. McIlvaine.
Washington and Lee Univ.	Lexington, Va.	Non-sectarian	1782	1749	Gen. G. W. C. Lee.
University of Virginia	Univ. of Va.	Non-sectarian	1819	1825	I. F. Harrison, M. D. (Chairman).
William and Mary College	Williamsburg, Va.	Prot. Episcopal	1693	1694	Benjamin S. Ewell, LL.D. (suspended).
West Virginia University	Morgantown, W. Va.	Non-sectarian	1867	1867	D. B. Purinton, M. A. (acting).
Bethany College	Bethany, "	Christian	1840	1841	W. K. Pendleton, LL.D.
West Virginia College	Flemington, "	Free-Will Baptist	1868	1868	Edward N. Ogden, B. A.
Shepherd College	Shepherdstown, "	Non-sectarian	1871	1871	Joseph McMurren, M. A.
Washington University	Seattle, Wash. Ter.	Non-sectarian	1861	1862	A. J. Anderson, M. A.
University of Wisconsin	Madison, Wis.	Non-sectarian	1848	1849	Rev. John Bascom, LL.D.
Galesville University	Galesville, "	Presbyterian	1854	1859	J. W. McLaury, M. A.
Beloit College	Beloit, "	Pres. and Cong.	1846	1847	Rev. A. L. Chapin, D. D.
Lawrence University	Appleton, "	Meth. Episcopal	1847	1849	Rev. E. D. Huntley, LL.D.
Milton College	Milton, "	Seventh-Day Bap.	1867	1867	Rev. T. R. Williams, D. D. (acting).
North-western University	Watertown, "	Lutheran	1864	1865	Rev. Augustus F. Ernst
Racine College	Racine, "	Prot. Episcopal	1852	1852	Rev. Stevens Parker, D. D.
Ripon College	Ripon, "	Cong. and Pres.	1851	1863	Rev. Edward H. Merrell, D. D.
Columbian University	Washington, D. C.	Non-sectarian	1821	1821	James C. Welling, LL.D.
Howard University	Washington, "	Non-sectarian	1867	1867	Rev. Wm. W. Patton, D. D.
National Deaf Mute College	Washington, "	Non-sectarian	1864	1864	Edward M. Gallaudet, LL.D.
University of Deseret	Salt Lake City, Utah.	Non-sectarian	1850	1850	John R. Park, M. D.

TABLE II.—Colleges in the U. S. directed by the Fathers of the Roman Catholic Church.

NAME.	Location.	Char- ter.	Organ- ized.	President.
St. Mary's College	San Francisco, Cal.	1872	1863	Rev. Brother Bettelin.
St. Vincent's College	Los Angeles, "	1869	1867	Rev. M. V. Richardson, C. M.
St. Ignatius' College	San Francisco, "	1859	1855	Rev. R. E. Kenna, S. J.
Santa Clara College	Santa Clara, "	1855	1851	Rev. John Pinasco, S. J.
Pio Nono College	Macon, Ga.	1876	1874	Rt. Rev. Wm. H. Gross, D. D.
St. Ignatius' College	Chicago, Ill.	1870	1869	Rev. Thomas O'Neil, S. J.
St. Viatura College	Bourbonnais Grove, Ill.	1874	1865	Very Rev. Peter Beaudoin, C. S. V.
St. Joseph's College	Teutopolis, "	1881	1861	Very Rev. P. Mauritius Klostermann, O. S. F.
University of Notre Dame	Notre Dame, Ind.	1844	1842	Very Rev. Thomas E. Walsh, C. S. C.
St. Meinrad's College	St. Meinrad, "	1887	1887	Rt. Rev. Firmitan Mundwiler, O. S. B.
St. Benedict's College	Dubuque, Ia.	1873	1873	Very Rev. P. J. McGrath.
St. Mary's College	Athinson, Kan.	1868	1859	Rt. Rev. Innocent Wolf, O. S. B.
Cecilian College	St. Mary's, "	1869	1869	Rev. A. G. Vander Eerden, S. J.
St. Mary's College	Cecilian, Ky.	1867	1860	H. A. Cecil, M. A.
Jefferson College	St. Mary's, "	1837	1821	Rev. David Fennessy, C. R.
College of Immaculate Conception	St. James Parish, La.	1861	1861	Very Rev. J. B. Bigot, S. M.
St. Charles College	New Orleans, "	1856	1842	Very Rev. T. W. Butler, S. J.
Mt. St. Mary's College	Grand Coteau, "	1852	1837	Rev. John Montillot, S. J.
Loyola College	Edmondsburg, Md.	1830	1808	Very Rev. Wm. Byrne, D. D., N. G.
Rock Hill College	Baltimore, "	1853	1852	Rev. Edward A. McGurk, S. J.
Boston College	Ellicott City, "	1865	1857	Rev. Brother Azarias.
College of the Holy Cross	Boston, Mass.	1863	1864	Rev. Jeremiah O'Connor, S. J.
St. Louis University	Worcester, "	1865	1843	Rev. Edward D. Boone, S. J.
St. Vincent's College	St. Louis, Mo.	1832	1829	Rev. R. J. Mayor, S. J.
College of Christian Brothers	Cape Girardeau, "	1843	1844	Rev. J. W. Hickey, C. M.
Creighton University	St. Louis, "	1855	1855	Rev. Brother James.
St. Benedict's College	Omaha, Neb.	1879	1878	Rev. Thos. A. Miles, S. J.
Seton Hall	Newark, N. J.	1861	1868	Rev. P. Mellitus Fritz, O. S. B.
Canisius College	South Orange, "	1861	1856	Rev. Jas. Henry Corrigan, M. A.
College of St. Francis Xavier	Buffalo, N. Y.	1881	1870	Rev. Martin Port, S. J.
St. Bonaventura College	New York City, "	1861	1847	Rev. Samuel H. Frisbee, S. J.
College of our Lady of Angels	Allegany, "	1875	1859	Very Rev. Fr. Theophilus Pospisilik, O. S. B.
St. Joseph's College	Suspension Bridge, "	1863	1856	Very Rev. Patrick V. Kavanagh, C. M.
St. John's College	Buffalo, "	1861	1861	Brother Frank.
Manhattan College	Fordham, "	1846	1841	Rev. F. Wm. Gockeln, S. J.
St. John Baptist's College	New York City, "	1863	1853	Rev. Brother Anthony.
St. Louis College	Brooklyn, "	1873	1870	Rev. A. G. Meyer, C. M.
St. Xavier College	New York City, "	1869	1869	John P. Brophy.
St. Joseph's College	Cincinnati, Ohio.	1831	1831	Rev. J. I. Coghlan, S. J.
Pittsburg Catholic College	Cincinnati, "	1873	1871	Rev. P. J. Hurth, C. S. C.
St. Joseph's College	Pittsburg, Pa.	1878	1878	Rev. P. W. Power.
St. Francis College	Philadelphia, "	1852	1852	Rev. B. Villiger, S. J.
St. Vincent's College	Loretto, "	1858	1851	Brother Lawrence O'Donnell.
Lasalle College	Beatty, "	1870	1846	Rev. Boniface Wimmer, O. S. B.
Augu-tinian College of Villanova	Philadelphia, "	1863	1863	Brother Romuald.
Christian Brothers' College	Villanova, "	1848	1842	Rev. Joseph A. Coleman, O. S. A.
St. Mary's University	Memphis, Tenn.	1872	1871	Brother Maurelian.
Georgetown College	Galveston, Tex.	1856	1855	Rev. A. M. Truchard.
Gonzaga College	Georgetown, D. C.	1815	1789	Rev. James A. Doonan, S. J.
Holy Angels' College	Washington, "	1858	1848	Rev. Robert Fulton, S. J.
	Vancouver City, Wash. Ter.	1861	1862	Rev. Peter Poaps.

**College of New Jersey.** See NEW JERSEY, COLLEGE OF.

**Colle'giants**, a sect of Christians in Holland, so called from their assemblies, which they called "colleges." They rejected all creeds, had no regular ministry, and no form of church government. Their communion was open to all. The name *Rhynsbergere* is sometimes given them, from the town of Rhynsberg, where they had annual meetings.

**Colleton** (JAMES), governor and landgrave of South Carolina (1686-90), called a colonial parliament in 1687, and proposed radical alterations of the laws. He became exceedingly unpopular with the High-Church party, and was impeached and removed from office in 1690, and driven from the province.

**Collet'ta** (PIETRO), an Italian historian and general, born at Naples Jan. 23, 1775. He was a general in the army of Murat (1812-14), and was minister of war at Naples in 1820, but became an exile in 1821. He wrote a "History of the Kingdom of Naples from 1734 to 1825" (1834). Died at Florence Nov. 11, 1833.

**Col'lidine** ( $C_8H_{11}N$ ), an alkaloid found with many others in the products of the destructive distillation of bones and other animal substances, of coal, of quinine, and of cinchona. It is a colorless oily liquid, having an aromatic odor.

**Col'lier** (HENRY WATKINS), an American judge, born in Lunenburg co., Va., Jan. 17, 1801, became judge of the Alabama circuit (1827-37), chief-justice for Alabama (1837-49), and governor (1849-53). Died Aug. 28, 1855.

**Collier** (JEREMY), an English non-juring bishop, born in Cambridgeshire Sept. 23, 1650. He graduated at Cambridge in 1676, and was ordained a priest in 1677. He was a zealous Jacobite, and wrote several works against the government of William III. In 1696 he gave absolution to Freind and Parkins, who were condemned to death for treason. A sentence of outlawry was passed against him, after he had fled to escape prosecution. His chief works are a "Short View of the Profaneness and Immorality of the English Stage" (1698), which caused a great commotion, and "Essays on Several Moral Subjects" (3 vols., 1697-1705). The "Short View" provoked replies from Congreve, Vanbrugh, and Dr. Filmer. It was a work of no great merit, but it had its effect. The author followed it up by a "Defence," a "Second Defence," a "Farther Vindication," etc., and the fight went on for fully ten years. But finally the playwrights were worsted in the contest, and the bellicose tract of the sturdy moralist shamed the English stage out of its grossness. Died April 26, 1726.

**Collier** (JOHN PAYNE), born in London Jan. 11, 1789, died there Sept. 13, 1833. He studied law and was admitted to the bar, but his tastes were decidedly literary, and his essays in various periodicals on the dramatists of the Elizabethan age soon began to attract attention. He drew the works of Peele, Greene, Nash, Lodge, Middleton, Marlow, and Webster from the unmerited obscurity into which they had fallen. One of his earliest works, "The Poetical Decameron" (1820), was exclusively devoted to that object, and was followed in 1825 by his edition of "Dodsley's Old Plays," and in 1831 by his "History of Dramatic Poetry." Gradually he approached the central figure of the whole period, and in 1835 he published "New Facts regarding the Life of Shakspeare;" in 1836, "New Particulars;" in 1839, "Further Particulars;" and in 1842-44, his "Life of Shakspeare," which in 1846 he followed up by his "Memoirs of the Principal Actors in the Plays of Shakspeare." He was a warm advocate of the early date, and the consequent authority, of the written marginal notes in a copy of the folio edition of Shakspeare: and the publication of those emendations caused a very animated controversy; they were used more or less by all later editors of Shakspeare's works, though they were not generally accepted by Shakspearian critics. One of Collier's last publications was his "Bibliographical Account of Rare Books" (1865, 2 vols.).

**Colleries.** See MINES AND MINING, by PROF. F. L. VINTON, E. M.

**Collima'tion** [from the Lat. *collimo*, to "aim"], **Line of**, a term used in astronomy to denote the line which joins the optical centre of the object-glass of the telescope with the spider-line, which is designed to mark the middle of the field of view in the focus of the eye-glass. The line of collimation gives the direction of the point in the heavens at which the telescope aims, and of which the position is recorded by the observer from the readings of the circles of the instrument. Adjustment for collimation is the process by which the spider-line in the focus, or (if there are several) the central line of the system, is brought truly to the optical axis of the instrument. As there are usually two systems of lines, collimation may be either vertical or horizontal.

**Collima'tors**, fixed telescopes, often employed in observatories to assist in collimating the principal or working instrument. They are so situated that the working telescope may look directly down the axis ("down the throat") of the collimator, the spider-lines of the latter being the objects observed in the process of collimation.

**Collin d'Harleville** (JOHN FRANÇOIS), a French dramatist and poet of much merit, whose works still survive on the stage, was born May 30, 1755, at Mervoisien, near Chartres. His first work was a comedy, "The Inconstant," performed in 1786. He afterwards produced "The Optimist," "Castles in Spain," "The Old Bachelor," "The Governess," and many other plays, besides several poems—one of them entitled "Melpomene and Thalia," an allegory. His collected dramatic works form four volumes in 8vo, first published in 1805. Died at Paris Feb. 24, 1806.

**Collin'ear** [from the Lat. *col* (for *con*), "with," and *lin-ear*, a "line"]. Two or more figures or systems of points are collinear when the relation between them is such that to any point in either system corresponds but one point in the other or others, while to the several points of a right line in either system correspond those of a right line in the others. In establishing such a relation between two plane figures, four pairs of corresponding points may be chosen arbitrarily; this being done, all other pairs are defined. It is always possible to give the planes of two collinear figures such a position that the one figure shall be the projection of the other with respect to some centre of projection in space. The term collinear appears to have originated with Möbius, in whose "Barycentric Calculus" the nature of this relation is thoroughly examined. It includes the relations of affinity and similarity, and is identical with the "homographic" relation as defined by Chasles.

**Col'lingwood**, a port of Lake Huron, on the S. shore of Georgian Bay, in Nottawasaga township, Simcoe co., Ontario (Canada). It has large manufactures of lumber, leather, flour, beer, and other commodities; has good schools, two weekly newspapers, a lighthouse, and a large trade. Collingwood is the N. terminus of the Northern Railway, 94 miles N. by W. of Toronto, and has regular lines of steamers to various lake ports. Pop. in 1881, 4445.

**Col'lingwood** (CUTHBERT), LORD, an English admiral, born at Newcastle-upon-Tyne Sept. 26, 1750, entered the navy in 1761. He was an intimate friend of Lord Nelson, and was distinguished as a naval tactician; followed Admiral Graves to America (1774), and was made lieutenant after the battle of Bunker Hill (1775). In 1780 he became a post-captain. He took part in the naval victory which Lord Howe gained over the French in June, 1794, and rendered important services at the battle off Cape St. Vincent in Feb., 1797. In 1799 he gained the rank of rear-admiral; in 1804, that of admiral. He was the second in command at the battle of Trafalgar, Oct., 1805, and the chief command devolved on him before the end of the action in consequence of the death of Nelson. For his part in this victory he was raised to the peerage. Died at sea near Minorca Mar. 7, 1810.

**Collin'ic Ac'id** ( $H.C_6H_5O$ ), an aromatic acid produced by the action of oxidizing agents on gelatine and similar bodies.

**Collins** (ANTHONY), an able and liberal English writer on theology, was born in Middlesex June 21, 1676. He was an intimate friend of John Locke, and was a subtle disputant. Among his works, which excited much commotion and were censured by the clergy, are "Priestcraft in Perfection" (1709), a "Vindication of the Divine Attributes," a "Discourse on Free Thinking" (1713), and a "Discourse on the Grounds and Reasons of the Christian Religion" (1724). His "Discourse on Free Thinking" was attacked by Bentley and Swift, and raised such a storm that Collins saw fit to go to Holland for some time. In his "Discourse on the Grounds and Reasons of the Christian Religion" he tries to show that since the fulfilment of prophecy is the only valid proof of Christianity, and such fulfilment is accomplished only by fraud, Christianity has no valid proof. Died Dec. 13, 1729. The book received no less than thirty-five refutations, of which the most remarkable were those by Edward Chandler, Arthur Sykes, Clarke, and Sherlock. To Chandler, who maintained that a number of prophecies were literally fulfilled, Collins replied by his "Scheme of Literal Prophecy Considered" (1727). (See CAIRNS, "Unbelief in the Eighteenth Century," Edinburgh, 1881.)

**Collins** (ARTHUR), an English antiquarian of great industry and of high authority, was born in 1682. He was author of the "Peerage of England" (1709), "Baronetage of England" (1720), and other works. Died at Battersea Mar. 16, 1760.

**Collins** (CHARLES), D. D., was born in North Yarmouth, Me., April 17, 1813, and graduated in 1837 at Middletown,



Conn. He was distinguished as an educator in the Methodist denomination, having been president of Emory and Henry College, Va., Dickinson College, Pa., and of the State Female College, Memphis, Tenn. He was an effective writer in the periodicals of his denomination, and author of a volume entitled "Methodism and Calvinism Compared." D. at Memphis, Tenn., July 10, 1875.

**Collins** (JOHN) was born in 1717, governor of Rhode Island (1786-89), and a member of the first Congress under the Constitution. Died in 1795.

**Collins** (NAPOLEON), U. S. N., born May 4, 1814, at Madison, Ind., entered the navy as a midshipman Jan. 2, 1834, became a passed midshipman in 1840, a lieutenant in 1846, a commander in 1862, a captain in 1866, and a commodore in 1871. He commanded the steamer *Anacostia*, Potomac flotilla, in the fights with the Aquia Creek batteries during the summer of 1861, and the gunboat *Unadilla* at the battle of Port Royal Nov. 7, 1861. On the 7th of Oct., 1864, in the steam-sloop *Wachusett*, Commander Collins ran alongside of and captured the privateer *Florida* at anchor in the harbor of Bahia, Brazil. D. Aug. 9, 1875. FOXHALL A. PARKER.

**Collins** (THOMAS WHARTON). See APPENDIX.

**Collins** (WILLIAM), an eminent English lyric poet, born at Chichester, Dec. 25, 1721, was educated at Oxford. He became a resident of London in 1744, and was a friend of Doctor Johnson. He produced in 1747 an admirable ode on "The Passions," and lyric poems, among which are odes to Mercy and Evening. He was subject to melancholy, and was confined in an asylum in the latter part of his life. Died June 12, 1759. Among his works is the "Dirge in Cymbeline." (See JOHNSON, "Lives of the Poets.")

**Collins** (WILLIAM), an English landscape-painter, born in London Sept. 18, 1787, became a student in the Royal Academy in 1807. His favorite subjects were familiar and rural scenes and views on the sea-coast. He was elected a Royal Academician in 1820, and visited Italy in 1836, after which he painted several Italian scenes which were much admired. Among his works are "Cromer Sands," "Prawn-Fishers," and a "Frost Scene." Died Feb. 17, 1847.

**Collins** (WILLIAM WILKIE), a novelist, a son of the preceding, was born in London in 1824. He was first articulated to a tea-merchant; then entered Lincoln's Inn. But his tastes were decidedly literary, and in 1848 he published an excellent biography of his father, with selections from his journals and correspondence, in two volumes. After this success he devoted himself exclusively to literature and published a number of novels, which, though sometimes of a rather questionable taste, became very popular, and were translated into both French and German. The most remarkable among his novels are "Antonina" (2d ed. 1850), "Basil" (1852), "The Dead Secret" (1857), "Woman in White" (1859-60), "Armada" (1866), "Man and Wife" (1870), "No Name," "The Moonstone," "Poor Miss Finch" (1872), "The New Magdalen" (1873), "Two Destinies" (1876), "The Haunted Hotel" (1878), "The Fallen Leaves" (1879), "Heart and Science" (1883), etc. His drama "The Lighthouse" was first played in private at Tavistock House, but then brought out with great success at the Olympic Theatre. The same was the case with another drama of his, "The Frozen Deep."

**Collinson** (PETER), F. R. S., an English merchant and naturalist, born in Westmoreland Jan. 14, 1693. He lived in London, and was a member of the Society of Friends. He promoted botanical science by importing foreign seeds and plants, and wrote several scientific memoirs. He rendered valuable gratuitous services to the Philadelphia Library. Died Aug. 11, 1768.

**Collinsville**, R. R. junction, Hartford co., Conn. (see map of Connecticut, ref. 4-D, for location of county), on the Farmington River, 25 miles W. N. W. of Hartford. It has a large axe-factory, paper mills, and manufactures of ploughs and cutlery. Pop. in 1880, 1376.

**Collinsville**, Ill. See APPENDIX.

**Collis'ion** [Lat. *collisio*, from *collido*, *collisum*, to "strike together"], in mechanics, the impact of two bodies, one or both of which were previously in motion. The laws of the direct impact of two spherical bodies are deduced from the principle that the sum of the momenta of the impinging bodies, estimated in a fixed direction along the line of motion, is not altered by the collision. The velocities of the bodies after impact, however, depend upon the hardness and elasticity of these bodies. If inelastic and completely incompressible, they will move after impact as one body, with a velocity and in a direction which is ascertained by dividing the algebraical sum of their previous momenta by that of their masses. If compressible and not wholly without elasticity, a certain compression takes place on collision, and is immediately followed by a more or less

perfect restitution of form, according to the degrees of elasticity which the bodies possess. In this case the bodies will not move as one body after collision, but the impinging body will move more slowly than the other, and may even have the direction of its motion reversed.

**Collision**, in maritime law. (See ROAD, LAW OF THE, by J. N. POMEROY, LL.D.)

**Collo'dion** [from the Gr. *κόλλωδης*, "sticky," from *κόλλα*, "glue"], a clear, colorless, gummy liquid, insoluble in water or alcohol, but soluble in ether, consisting of pyroxyline or gun-cotton dissolved in a mixture of alcohol and ether. When dried, it gives a transparent residue, becoming electric by friction, and exploding less readily by heat, percussion, etc. than ordinary gun-cotton. It is used principally in photography, though it also finds application in surgery and medicine for covering wounds to exclude the air, coating caustic substances, etc. Small quantities of gun-cotton for the preparation of collodion are made by immersing cleaned cotton in a solution formed by dissolving nitrate of potassium in concentrated sulphuric acid. Larger quantities are made by treating cotton with a mixture of concentrated commercial sulphuric and nitric acids. Some water is added, in order to cause the formation of the lower nitro-compounds of cellulose; but if too much water is added, the cotton dissolves, instead of forming the desired compound. The operation is conducted at a temperature of about 150° F., and great care and judgment are required throughout the process. After treatment the cotton is washed with cold water, the use of alkalis for neutralizing the excess of acid having a bad effect on the quality of the collodion if it is to be used for photography. The best gun-cotton for this purpose shows an increase of 25 per cent. in weight over that of the cotton originally employed. In making the solution of the gun-cotton, if too much alcohol is employed the sensitiveness of the film and its capacity for adhering to glass are impaired; if too little, the film is apt to contract after sensitizing. Photographers make use of two kinds of collodion—the "plain" and the "iodized," the latter being the plain collodion which has received the addition of some iodides or bromides, generally the iodides of cadmium and ammonium. Plain collodion is often of two kinds—"positive" and "negative," the pyroxyline for these being prepared according to a slightly different formula. For the "positive collodion" less water is used in the preparation of the pyroxyline.

Small balloons, lighter than those made from gold-beaters' skin, are sometimes made with collodion. The liquid is poured into a flask and shaken about until the interior is completely covered, the ether and alcohol are then evaporated off by a blast directed into the flask. By drawing the air out of the flask by means of a tube suitably adjusted, the film is detached, the balloon collapses, and may be drawn out. It is then distended and dried.

C. F. CHANDLER.

**Collot-d'Herbois** (JEAN MARIE), a French Jacobin, born in Paris in 1750, originally a strolling player, was a member of the Convention, and a partisan of Robespierre, notorious for his violence and cruelty. He became a member of the Committee of Public Safety in 1793, and was sent to Lyons, where he caused hundreds to be put to death. In the crisis of the 9th Thermidor, 1794, he acted with the enemies of Robespierre. In 1795 he was transported to Cayenne, where he died Jan. 8, 1796.

**Col'um**, a Latin word signifying "neck," is applied in botany to that part of the axis of a plant whence the stem and root diverge. In the beginning it is a space easily distinguishable, but is afterwards externally obliterated.

**Coll'yer** (REV. ROBERT), D. D., an able and eloquent Unitarian divine and a popular lecturer, born at Keighly, England, Dec. 8, 1823. In 1847 he came to the U. S., and became a Methodist preacher. Three years later he embraced Unitarian views. He was pastor of Unity church, Chicago, from 1859 to 1879, when he became pastor of the Church of the Messiah in New York City, where in a comparatively short time he gathered a large and elegant congregation. He visited Europe in 1884.

**Colman** (BENJAMIN), D. D., a Congregational divine, born at Boston, Mass., Oct. 19, 1813, graduated at Harvard in 1692. On a passage to England he was taken prisoner by a French vessel in 1695, but finally visited England, and returned to America in 1699. He became pastor of the Brattle street church, Boston (at that time an independent church), with which he was connected till his death (Aug. 29, 1874).

**Colman** (GEORGE), an English dramatic author, was born at Florence, April 28, 1733. He produced in 1760 "Polly Honeycomb," and in 1761 the "Jealous Wife," comedies, and a good metrical translation of Terence (1764). In 1777 he became the proprietor of the Hay-

market Theatre. He wrote and adapted several other dramas. Died Aug. 14, 1794.—His son, GEORGE COLMAN, born Oct. 21, 1762, became director of the Haymarket Theatre in 1785, and wrote numerous successful comedies and farces, among which are "John Bull" (1805), "Inkle and Yarico," and "The Heir-at-Law." He published autobiographic memoirs, entitled "Random Recollections" (2 vols., 1830). Died Oct. 26, 1836.

**Colman** (HENRY), an American agricultural writer, born in Boston Sept. 12, 1785. He was minister of a Unitarian church at Salem, Mass., from 1825 to 1831, and was afterwards appointed agricultural commissioner for that State. He visited Europe in 1842, after which he published, besides other works, "European Agriculture and Rural Economy." Died in London Aug. 14, 1849.

**Colman** (SAMUEL), an American artist, born at Portland, Me., in 1832. He ranks high as a painter of American and European landscapes. His first picture was exhibited in 1850.

**Col'mar** [Lat. *Columbarium*], a city of Elsass, is finely situated on the river Lauch, near the base of the Vosges, 36 miles S. S. W. of Strasburg. It is well built, and contains a cathedral built in 1363, a theatre, a college with a library of 60,000 volumes. The old ramparts have been converted into boulevards. Colmar has extensive manufactures of cotton fabrics, cutlery, paper, hosiery, and ribbons. It grew up around a royal residence called "Columbaria" (the "dove-cot"), first mentioned in the eighth century. It obtained a charter of incorporation in 1226, was made a free imperial city by Frederick II., and was ceded to France in 1697. Pop. in 1880, 26,106.

**Colne**, a market-town of England, in Lancashire, is on a high ridge at the junction of the Midland Railway with the Lancashire and Yorkshire Railway, 32 miles N. E. of Manchester. It has manufactures of woollens, cottons, calicoes, and mousselines-de-laine. Coal and limestone abound in the vicinity. Colne is an ancient town, and many Roman coins have been found here. Pop. in 1881, 11,970.

**Col'ocynth** [Gr. *κολοκυνθίς*; Lat. *colocynthis*], a well-known purgative medicine, the dried and powdered pulp of the colocynth gourd, a fruit about the size and color of an orange, with a smooth, thin, solid rind. *Cucumis Colocynthis*, the plant which produces it, is nearly allied to the cucumber. It is common in Southern Europe, Asia, and Africa, and is grown also to some extent in the U. S., especially by the Shakers. The fruit, when it begins to turn yellow, is gathered, peeled, and dried quickly. It is chiefly in the form of "compound extract of colocynth" that it is used in medicine. In large doses it is a drastic, irritant poison. It owes its cathartic properties to a bitter neutral principle called colocynthin. The seeds of the plant have no cathartic principle. The extract of colocynth is used in pills in combination with other purgatives, and frequently with extract of hyoscyamus. In small doses colocynth acts as a safe and useful purgative, and when associated with hyoscyamus the latter prevents much of the pain which usually results from the use of colocynth by itself.

**Colocyn'thin** ( $C_{56}H_{84}O_{23}$ ), the bitter principle of colocynth. It is resolved by the action of acids into colocynthin ( $C_{44}H_{64}O_{13}$ ) and sugar, and is, for this reason, supposed to be a glucoside.

**Colo'gna**, a town of Italy, in the province of Verona, 20 miles S. E. of Verona. It has manufactures of silk. Pop. in 1881, 7801.

**Cologne** [Ger. *Köln*; anc. *Oppidum Ubiorum*, afterwards *Colonia Agrippina*], a fortified city of Prussia, the capital of the province of Rhenish Prussia, on the left bank of the Rhine, 24 miles S. E. of Düsseldorf; lat.  $50^{\circ} 56' N.$ , lon.  $6^{\circ} 58' E.$  It is at the intersection of several important railways, and is connected with Deutz by a handsome iron bridge across the river and a bridge of boats. Cologne is a fortress of the first rank. It is built in semicircular form close to the river. The streets are narrow and dirty. Outside the walls are fine gardens and promenades. It has an archbishop's palace, an observatory, a botanic garden, a public library, a museum, a theatre, an arsenal, with a curious collection of armor, a seminary for the education of Catholic clergymen, three gymnasias, and one pro-gymnasium, a normal school, and a fine town-house. Here are several remarkable and ancient churches—viz. that of Saint Peter, containing a picture of the crucifixion of Saint Peter painted and presented by Rubens; the church of Saint Mary, founded about 1000 A. D.; and that of Saint Ursula, which is said to contain the bones of 11,000 virgins who were massacred by the Huns. The greatest object of interest is the cathedral, which, begun in 1248 and finished in 1880, is the noblest specimen of Gothic architecture in Europe. It is in the form of a cross, is 510 feet long and 231 feet wide. The towers are about 525 feet high. The construction of this edifice was suspended by the Reformation.

Early in the present century the national enthusiasm of the Germans raised large sums of money to repair and complete it, and Zwirner was appointed architect of the work; it was completed in 1880. Cologne has large manufactures of silk and woollen fabrics, cotton yarn, velvet, hosiery, lace, hats, thread, clocks, and *eau de cologne*. About 1,500,000 bottles of this perfume are annually exported from this town. It derives also much prosperity from the navigation of the Rhine, and has an active trade in grain, wine, oil, etc. Cologne originated from the Roman colony planted on that spot by Claudius in 51 A. D., and called, in honor of his wife, *Colonia Agrippina*. It was annexed to the German empire in 870 A. D., and was afterward one of the most populous and wealthy cities of the Hanseatic League. The archbishops of Cologne were princes and electors of the German empire during several centuries. Pop. in 1880, 444,772.

**Colombia, United States of**, a South American republic, in the N. W. part of the continent, bounded N. by Central America and the Caribbean Sea, N. E. and E. by Venezuela and Brazil, S. by Ecuador, W. by the Pacific Ocean. It includes the Isthmus of Darien or Panama, and has a coast-line on both oceans, between which there is a tidal difference. It is situated between  $0^{\circ} 36'$  and  $12^{\circ} 25'$  N. lat. and  $69^{\circ} 14'$  and  $83^{\circ} W.$  lon. Its area is estimated at 320,638 square miles.

**Surface.**—Colombia is intersected by three great ranges of the Andes (see *ANDES*), the West, Central, and East Cordilleras; the last is much the largest, and consists of a series of vast table-lands cool and pleasant. The highest peak is Tolima, 18,317 feet above the sea. These plains, called *llanos*, are fertile and populous. The river-valleys are lower, and, though very fertile, hot and humid. The chief rivers are the Magdalena and its affluent the Cauca, the Meta and Guaviare, affluents of the Orinoco, and the Yapura and Apaporis, branches of the Amazon. There are some mountain-streams W. of the Andes.

**Minerals.**—Gold, silver, platinum, lead, copper, iron, coal, and precious stones.

**Soil and Vegetation.**—The soil is generally rich; the forests contain mahogany, cedar, wax palm, cinchona, caoutchouc, fustic, Brazil-wood, and other dyes and medicinal plants; the productions are tobacco, coffee, cocoa, wheat and other cereals, cotton, rice, sugar-cane, plantains, bananas, indigo, vegetable ivory, and tropical fruits. The plains have vast herds of cattle and horses, and many hides and much jerked beef are exported.

**Animals.**—The jaguar, puma, tapir, monkey or lemur, alligator, armadillo, deer, llama, etc.

**Climate** hot and unhealthy in the lowlands and river valleys; yellow fever is endemic at Cartagena and other places on the coast, and Chagres or Panama fever, a deadly malarial disease, on the isthmus; there are heavy and almost constant rains in the forests of Darien; the highlands have a temperate and healthy climate.

**Finances.**—Public home debt in 1880, \$20,000,000; foreign debt, Jan., 1878, \$53,000,000; revenue, 1880, \$4,910,000; expenditure, \$6,266,930.

**Railways and Canal.**—There were 66 miles of railway open in 1880, 47 miles across the Isthmus of Panama. Count de Lesseps has undertaken a ship-canal across the isthmus. (See *SHIP-CANALS*.)

**The imports** from Colombia to the U. S. in 1880 were \$8,441,972, mostly free of duty; the exports from the U. S. to Colombia in 1880, \$5,228,836; the total imports and exports are about double these sums. The transit trade across the Isthmus of Panama is nearly \$90,000,000, and is increasing.

**History.**—First settled by Spaniards in 1510; called New Granada; subject to Spain until 1811, when it revolted; united with Venezuela and Ecuador in the republic of Colombia, but this dissolved in 1831, and each became an independent republic; a civil war between Federalists and Liberals continued thirty years; in Sept., 1861, name of New Granada changed for United States of Columbia; constitution adopted May, 1863; a free republic, all religions tolerated; government, a president and vice-president elected for two years; senate of 27 members, three from each state; house of representatives, 66 members; other regulations much like U. S.; almost constant revolutions since 1863.

**Population**, 2,951,323, of whom more than one-half are whites and half castes. There are nine states—Antioquia, Bolivar, Boyaca, Cauca, Cundinamarca, Magdalena, Panama, Santander, and Tolima. The Church of Rome is the State-Church, but other denominations are tolerated. Popular education is very low.

**Principal towns.**—Bogotá (capital), pop. 40,883; Panama, 18,378; Cartagena, 7800; Santa Martha, 3500; Aspinwall, 4000. L. P. BROCKETT.

**Colom'bic Acid** ( $C_{42}H_{46}O_{13}$ ), the acid contained in Colombo root.

**Colom'bin**, or **Colombo Bitter** ( $C_{21}H_{29}O_7$ ), the active principle of Colombo root.

**Colombo**, a seaport-town and the capital of Ceylon, on its W. coast, in lat.  $6^{\circ} 55' N.$ , and lon.  $79^{\circ} 45' E.$ , and near a rocky headland, the *Jovis extremum* of Ptolemy. It is fortified and defended by seven batteries, besides several bastions, etc. The harbor is small, and is only safe during the S. E. monsoon. The mean temperature is about  $80^{\circ} F.$ , and the average annual rainfall is 72.4 inches. Colombo has a lighthouse, a military hospital, a government-house, and churches for the English, Dutch, and Portuguese. The houses are mostly of one story, each having a verandah in front. Many of the Europeans reside in the suburb Colpetty. Most of the foreign trade of Ceylon is transacted at this port. It was occupied by the Portuguese in 1517, taken by the Dutch in 1603, and conquered in 1796 by the British, who still possess it. Pop. in 1881, 111,942.

**Colombo** (REALDO), [Lat. *Realdus Columbus*], an Italian anatomist, born at Cremona, succeeded Vesalius as professor at Padua in 1544. He was the reputed discoverer of the pulmonary circulation. He wrote an important work on anatomy, "*De Re Anatomica*" (1559). Died about 1576.

**Colombo Root**, the root of *Cocculus palmaris*, a menispermaceous vine from Eastern Africa. It contains colombin, berberine, and colombic acid, starch, coloring-matter, etc. It is one of the most useful of the mild tonics.

**Co'lon** [Lat. *colon*; Gr. *κῶλον*], in anatomy, is that part of the large intestine which leads from the cæcum to the rectum. In the adult of the human species it is about four and a half feet long, and consists of four portions—the right or ascending, the transverse, and the descending colon, and the sigmoid flexure (so called from its resemblance in shape to the ancient form of the Greek letter *sigma*, C for Σ). The colon, owing to the peculiar arrangement of its muscular fibres, consists of a series of pouches, which serve to detain the contents of the intestine on their way to the rectum. The colon is provided with numerous glands, which assist in removing the waste matters from the blood. It is believed also to have the power to some extent of digesting food; and it is certain that persons who are unable to swallow food have often been kept alive for a long time by nourishing liquids thrown into the intestinal canal by enema.

**Colonaet**. See SLAVERY.

**Colonel** [from the Fr. *colonne*, a "column," i. e. the chief of a column], the title of the highest officer of a regiment in the armies of the U. S., England, France, and other countries. The colonel is the officer next higher than lieutenant-colonel, and next lower than brigadier-general. In the British army at the present time the position of a colonel is a sinecure, the real active commander of the regiment being the lieutenant-colonel. Every British regiment has a colonel, who is a general officer, and whose command is merely honorary, but he receives high pay, which varies from £500 a year in the infantry of the line to £1800 a year in the Horse Guards.

**Colonial Congress, The First**, was held in the city of New York in May, 1690. Immediately after the attack on Schenectady the government of Massachusetts sent a circular letter to all the colonies as far S. as Maryland inviting them to send commissioners to New York to discuss and adopt some common plan of defence; and, indeed, the Congress, consisting of delegates from Mass., Conn., and N. Y., planned the campaign against Canada.

**Colonial Corps**, in the British army, are certain regiments of native troops in the East and the West Indies, South and West Africa, etc., which are officered (except in Malta) by the British. The native troops of British India are not included in the colonial corps, being paid from the Indian revenues, and not from the army estimates.

**Col'oniza'tion Soci'ety, The American**, an association formed in 1816 for the purpose of transporting negroes from the U. S. to Africa. Many years earlier, Samuel Hopkins, D. D., had advocated such an enterprise. Among the principal founders of the society were Charles F. Mercer of Virginia, the Rev. Doctor Finley of New Jersey, and Bishop Meade. The constitution of the society was adopted at a meeting held in Dec., 1816. In 1820 the society sent out a company of eighty-six colonists to Liberia. Bushrod Washington was the first president of the society. They afterwards sent out nearly 10,000 free colored persons to Liberia, which became in 1847 an independent republic. Henry Clay was for many years president of the Colonization Society.

**Colo'na**, the name of a celebrated noble and powerful

Roman family which has produced many eminent generals, ecclesiastics, cardinals, and authors. This family acquired distinction as early as the twelfth century. In the succeeding centuries they were adherents of the Ghibelline party. Otho Colonna was elected pope in 1417. (See MARTIN V.) The Colonna palace in Rome is celebrated for its rich treasures of art.

**Colonna** (Fra FRANCESCO), a Dominican monk, born at Venice about 1449, was professor of theology at Padua, and author of a work "*Hypnerotomachia Poliphili*" (1499), a singular *mélange* of fables, antiquities, and architecture. Died in 1527.

**Colonna** (VITTORIA), a celebrated Italian poetess, a daughter of the constable of Naples, was born in 1490. She married in 1507 the marquis of Pescara, afterwards a famous general killed in battle in 1525. She was eminent for virtue and beauty, as well as poetical genius. She composed poetical laments on the death of her husband, and many religious poems ("*Rime Spirituali*," 1548). In 1541 she retired into a convent at Orvieto. Died Feb., 1547. "The rare virtues and consummate talents of this lady," says Hallam, "were the theme of all Italy in that brilliant age of her literature." (See Mrs. HENRY ROSCOE, "*Vittoria Colonna: her Life and Poems*," 1868.)

**Colonnade** [from the It. *colonna*, a "pillar"], a range of columns attached to or detached from the body of the building they are designed to ornament and support. When it surrounds the building on the exterior, the colonnade is called a *peristyle*; when detached from the general line and projecting forward, it is called a *portico*; but when comprised under the same cornice as the building itself, it is styled a *colonnade*.

**Col'ony** [Lat. *colonia*, from *colonus* (from *colo*, to "till," to "cultivate"), a "husbandman," a "settler"], a term denoting a settlement formed in a distant region or country by emigrants who are under the protection and supreme government of the mother-country. The British colonies in Australia and America are practical instances of the colony in this sense; but there are other dependencies (like the Indian empire) which deviate more or less from the true characteristics of a colony. Territories have afforded profitable residence without being colonies; the most conspicuous of this class is the British empire in Hindostan, where the British people scarcely hold land or concern themselves in agriculture, from which the term colonist is taken. The Greeks established communities in Asia Minor, Africa, Italy, and France, for Marseilles was a Greek colony, founded by the inhabitants of Phocæa about 600 B. C.

The principle of colonial responsibility to a central government was brought to great perfection by the policy of Rome, that not only every conquered territory, but every district where citizens settled, should be an integral part of the empire. There were various grades of colonies—some where there was the full privilege of Roman citizenship, and others where citizenship was of an inferior grade. The Italian colonies of the Levant in the Middle Ages bore some resemblance to those of ancient Rome. The settlements of the barbarians who destroyed the Roman empire were not colonies, for the tribes were not connected with any parent state; and the Normans, who spread over Europe at a later period, were unconnected in the countries where they settled with the government of the states whence they migrated. Hardly a trace of the genealogy of the Normans of England or France can be found anterior to their settlement in the latter country, so little connection did they preserve with the country of their ancestors. With the exception of the Italians in the Levant, the Spanish and Portuguese were the first among modern Europeans to establish true colonies. The Spanish monarchs aimed at the creation of a new empire in America, which was looked on as the property of the Spanish crown. Other governments of Europe subsequently colonized America, Africa, and Asia. The permanent settlement of British colonists in America dates from the reign of James I. The settlers were privileged companies with royal letters-patent, but practically they were almost independent (with the exception of those whose charters were resumed by the Crown). They were largely dissenters seeking refuge from the grievances of the Established Church.

The great advantage of a colony is that it widens the field of enterprise and gives a larger choice of the means of livelihood. It is especially an addition to the existing stock of a very valuable and important kind of raw material—viz. land. It is to the agriculturist, then, that it generally holds out its first inducements. In modern times penal colonies have been established by several European nations, but in most cases the idea has again been abandoned as unsatisfactory. (See TRANSPORTATION.)

**Col'ophon** [etymology doubtful] is the name of the last page of ancient books. The colophon formerly gave

the date, printer's name, etc., with much of the information now conveyed on the title-page.

**Colophon** [Gr. Κολοφών], an ancient Greek city of Ionia, in Asia Minor, on the river Ales or Halesus, about 9 miles N. of Ephesus. It was one of the seven cities which claimed the honor of being the native place of Homer.

**Colophony** [Gr. Κολοφωνία ρητίνη—i. e. "Colophonian resin," from its place of export, Colophon], the chemical name of resin of pine, or rosin. (See RESINS and ROSIN, by PROF. C. F. CHANDLER, PH.D., LL.D.)

**Col'or** [Lat. color; Gr. χρώμα]. Among the various appearances of external objects is that which depends solely on the kind of light which those objects reflect or transmit to the eye. Several other properties, as form, roughness, smoothness, etc., may be discerned by the sense of touch, but color, properly speaking, can be perceived by the sight alone. According to the classification of Newton, there are seven primary colors—viz. red, orange, yellow, green, blue, purple, and violet; but according to some other eminent authorities (including the celebrated optician Brewster), the number of primary colors may be reduced to three—red, yellow, and blue (or green); all the other colors being in their view produced by different combinations of those three elements. The cause of the appearance called color may be simply stated thus: if a body absorbs every other kind of light and reflects or transmits red light only, it will appear of a red color; if it absorbs every kind except yellow light, it will appear yellow, and so on. (See OFFICES.)

**Colora'do**, a river of Texas, rises in the high tablelands in the N. W. part of the State. Its general direction is south-eastward. It passes by Austin City, Bastrop, and Columbus, and enters Matagorda Bay near the town of Matagorda. Total length, estimated at 850 miles. Steamboats can ascend it above Austin City.

**Colorado, or Rio Colorado** (i. e. "Red River"), a large river of the U. S., rises among the Rocky Mountains by two branches—namely, Green and Grand rivers—which unite in Utah about lat. 38° N. It flows generally south-westward, and passes through the north-western part of Arizona to the south-eastern border of Nevada. It afterwards runs nearly southward, forms the boundary between Arizona and California, and enters the head (or N. end) of the Gulf of California. The entire length, including Green River, is estimated at 1200 miles. It is navigable for small steamboats for 300 miles or more. Among the most wonderful natural objects in North America is the Great Cañon of the Colorado, between lon. 112° and 115° W. Here the river flows between walls of rock which are nearly vertical, and are in some places 6000 feet high. This cañon is more than 300 miles long.

**Colorado**, kol-o-rah'do, called the "Centennial State," because admitted into the Union in 1876, a central State of



Colorado Seal.

the "New West," between 37° and 41° N. lat. and 102° and 109° W. lon.; 280 miles from N. to S., and 370 from E. to W. Area, 103,645 square miles, equal to New York, Pennsylvania, New Jersey, and Delaware.

Colorado, by census of 1880, ranked 35 among the States in population, 36 in value of agricultural products, and 31 in value of manufactures.

**Topography and Surface.**—The Great Plains, from the Missouri River to the Rocky Mountains, rise gradually till at the foot-hills they are 6000 to 7000 feet high. The E. third of Colorado belongs to this lofty plateau; the Rocky Mountains and their parks and the valleys beyond occupy the rest of the State. The principal chains are Colorado Front Range; North Colorado or main range, uniting at South Park with Front and Saguache ranges,

and forming Sangre de Cristo range; the Park range, W. of the great parks; the Saguache range, which is now conceded to be the Great Divide of the Rocky Mountains; W. of this, numerous spurs and short chains running N. W., W., and S. W., and beyond and between them a lofty plateau extending to the E. wall of the great Utah Basin. Through this plateau the Grand, Green, and Gunnison Rivers, affluents of the Colorado of the West, cut their deep cañons. The parks, of which the North, Middle, South, San Luis, Egeria, Estes, Animas, and Huerfano are the largest, are broad valleys, originally the beds of inland lakes or seas. There are forty-two peaks in Colorado over 14,000 feet, and some hundreds between 11,000 and 14,000 feet high. The rivers of Colorado are the N. fork of Platte, South Platte, Republican, Arkansas, Rio Grande, San Juan, Gunnison, Grand, White, Green, and their affluents. None of these are navigable. The cañons of the Arkansas, Rio Grande, San Juan, Gunnison, Grand, and Green are from 2000 to 5000 feet deep, and of wonderful and terrible magnificence. There are numerous small lakes; San Luis is the largest.

**Minerals.**—Gold and silver are found in twenty-one of the thirty-five counties of the State; copper alone and with gold, lead alone and with both silver and gold, zinc alone and with silver, iron with gold and alone in great quantities; platinum, quicksilver, tellurium in combination with gold, silver, and copper; coal, both bituminous and anthracite (the latter probably from the tertiary altered by volcanic action); gypsum, salt, kaolin, pottery clays, and many precious stones.

**Vegetation and Soil.**—The arable lands of Colorado comprise 15,000 miles or more of its area, and the grazing lands at least 70,000 miles or more. The arable lands are generally fertile, but most of them require irrigation, and produce enormous crops under its influence. The grazing lands require less water—only enough to water the flocks and herds. Some of the irrigating canals, both in the N. and S. parts of Colorado, are very large and long. One, of an English company, is 54 miles long; another, 34 miles; others less. The mountain-slopes are generally covered with forests of pine, spruce, fir, etc., but the consumption of timber is enormous. The native grasses of Colorado are rich and nutritious; the flowers mostly sub-alpine, but very beautiful. The yield and quality of the cereal and root crops are excellent. Fruits are liable to be winter-killed. The crops, by census of 1880, were: Wheat, 1,425,014 bushels; Indian corn, 455,968; oats, 640,900; barley, 107,116; rye, 19,465; potatoes, 383,123; hay, 85,062 tons.

**Animals.**—The grizzly bear W. of Rocky Mountains, the black and brown bear and the jaguar in the W., the cougar in the N. W., the gray wolf E. and W., the prairie wolf E. of Rocky Mountains; the buffalo, not in large herds, E. only; the mountain or wood buffalo rarely in mountains; the elk (wapiti), Virginia, and mule deer are numerous; antelope on the plains, big-horn or mountain sheep and the Rocky Mountain goat antelopes in the mountains, and all the rodents and munchers. Birds of prey and game birds are very plentiful, and song-birds in the mountains. The Rocky Mountain locust and the Colorado beetle, or potato-bug, if originating here, do most of their mischief elsewhere. There are remarkable fossils of mammals and reptiles now extinct in Fremont and other counties. Wonderful results of ages of erosion can be seen in the "City of the Gods" in the N. W., the "Garden of the Gods," etc. The census of 1880 reports 42,257 horses, 2581 mules and asses, 346,839 cattle, 746,443 sheep, and 7656 swine. The value of live stock in 1880 in Colorado was \$8,703,342.

**Climate.**—Owing to the general elevation, the climate of Colorado is temperate; rather too cool than too hot. The mean annual temperature of the towns, which range from 5000 to 11,000 feet above the sea, is from 48.5° to 49.3°; summer mean, 64.6° to 69.2°; winter mean, 31.3° to 32.8°; extremes, 93° to 99° maximum in summer, with from six to thirty days, according to elevation, above 90°; minimum in winter, -3° to -12°, with an average of six to twenty days below zero. The nights are always cool; average rainfall, 18.84 inches, and is increasing. Consumptives will do well if they do not seek an elevation much above 6000 feet, and if they will stay there; a return E. is often fatal.

**Industries.**—The largest industry of Colorado is the mining, smelting, and reducing of the precious and other metals. Gold-mining has passed through three stages since 1859—placer and hydraulic mining; refractory ores, sulphurets, and tellurides of gold and iron; and the present era of free milling gold and easily reducible ores. In silver-mining there has been a constant succession of surprises. Sulphurets of lead and silver, the argentiferous galena so common elsewhere, do not abound in Colorado, but instead there are silver and copper, silver and zinc,

silver and iron, ruby silver, horn silver, silver with manganese and iron, chloride of silver, tellurides, and, largest and best of all, carbonates of lead and silver. Then, too, the way in which the silver ores occurred was new; there were some pockets, some fissure veins, some chloride belts, and in and around Leadville no fissure veins, but blankets or layers of carbonate of lead charged more or less with silver and of great extent, but not of great depth. These new conditions have made silver-mining very interesting in Colorado. Prior to 1870 the gold product of Colorado had been \$27,213,081; that of silver, \$330,000; of copper, \$40,000. It was not till 1872 that the annual output of silver exceeded that of gold; and though the gold product is four times that of 1874, it is now only half that of silver. The entire output of gold, silver, copper, and lead from 1859 to 1881 was \$120,600,000, of which \$62,000,000 was gold, \$55,000,000 silver, \$950,000 copper, \$2,650,000 lead. The product of silver in 1880 was nearly \$16,000,000; that of gold, about \$5,500,000. In 1881 the output of bullion was stated at \$22,957,160. The carbonates of silver and lead have built up since 1877 one city (Leadville), with its suburbs, of over 30,000 inhabitants, and the newly-discovered mines a dozen or more of from 4000 to 10,000. The coal industry is acquiring much prominence; cattle-herding, sheep-raising, and the wool-traffic also engage much capital and many hands. The smelting and reduction of metals and the stamping and amalgamating of the free milling gold also employ large numbers. The census of 1880 shows 599 manufactories; total value of manufactures for the year, \$14,260,159.

**Railways.**—In 1883 there were 2356 miles of railroad in operation in Colorado; cost of railroads and equipment, \$89,304,648; amount of dividends on stocks, \$436,121. More than \$9,000,000 were expended in railway construction in 1881.

**Finances.**—State debt, net, in 1880, \$212,814; local debt, net, \$3,381,482; total debt, State and local, net, \$3,594,296. The assessed valuation in 1880 was: real estate, \$35,604,197; personal, \$38,867,496; total, \$74,471,693; total taxation, \$2,152,008.

**Banks.**—In Nov., 1881, there were 12 national banks in operation in Colorado, having \$1,070,000 capital; 51 private banks and banking-houses, with \$547,827 reported capital and \$2,705,441 deposits.

**Education.**—There is an excellent public school system in Colorado and a rapidly growing school fund; graded and high schools in the larger towns; a State university at Boulder, a college at Colorado Springs, a State agricultural college at Fort Collins; special schools and collegiate schools of high character.

COUNTIES.	* Ref.	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Arapahoe	2-G	6,829	38,644	Denver	35,629
Archuleta	6-C	.....	.....	Pagosa Springs	223
Ben.	4-G	592	1,654	W. Las Animas	454
Boulder	2-E	1,939	9,723	Boulder	3,069
Chaffee	4-D	.....	6,512	Buena Vista	2,141
Clear Creek	3-D	1,596	7,823	Georgetown	3,294
Conejos	6-C	2,504	5,605	Conejos	339
Costilla	6-D	1,779	2,879	San Luis	341
Custer	5-D	.....	8,080	Rosita	1,008
Delta	3-B	.....	.....	Delta	.....
Dolores	5-B	.....	.....	Rico	894
Douglas	3-E	1,388	2,486	Castle Rock	88
Eagle	2-C	.....	.....	Red Cliff	.....
Elbert	3-G	.....	1,708	Kiowa	.....
El Paso	4-E	987	7,949	Colorado Sps.	4,226
Fremont	4-D	1,064	4,735	Canon City	1,501
Garfield	2-B	.....	.....	Glenwood Sps.	.....
Gilpin	2-D	5,490	6,489	Central City	2,626
Grand	2-D	.....	417	Grand Lake	.....
Gunnison	4-B	.....	8,235	Gunnison	888
Hinsdale	5-C	.....	1,487	Lake City	.....
Huerfano	5-E	2,250	4,124	Waldenburg	377
Jefferson	3-E	2,390	6,804	Golden	2,730
Lake	3-C	522	23,563	Leadville	14,820
La Plata	6-B	.....	1,110	Durango	.....
Larimer	1-D	838	4,892	Fort Collins	1,356
Las Animas	6-G	4,276	8,903	Trinidad	2,226
Mesa	3-A	.....	.....	Grand Junction	.....
Montrose	4-B	.....	.....	Montrose	.....
Ouray	5-B	.....	2,669	Ouray	864
Park	3-D	447	3,970	Fair Play	450
Pitkin	3-C	.....	.....	Aspen	.....
Pueblo	5-E	2,265	7,617	Pueblo	3,217
Rio Grande	5-C	.....	1,944	Del Norte	729
Routt	1-B	.....	140	Hahn's Peak	.....
Saguache	5-C	304	1,973	Saguache	325
San Juan	5-B	.....	1,087	Silverton	264
San Miguel	5-A	.....	.....	Telluride	.....
Summit	2-B	258	5,459	Breckenridge	1,657
Weld	1-G	1,636	5,646	Greeley	1,297
Total	.....	39,864	194,327	.....	.....

\* Reference for location of counties. See map of Colorado.  
† Organized since census of 1880.

**Churches.**—All the religious denominations are well represented, the Catholics perhaps leading in adherent population, but the Methodists, Congregationalists, Baptists, Episcopalians, Presbyterians, Lutherans, etc., following very closely.

**Population.**—In 1860, Colorado had 34,277 inhabitants; in 1870, 39,864, besides 7480 tribal Indians; in 1880, 194,327 (white 191,126, colored 3201, including 612 Chinese and 154 Indians), besides 2530 Utes (tribal); 1700 were removed to Utah in 1880. Pop. in 1883, about 300,000.

The principal towns are Denver (capital), population in 1880, 35,629; Leadville, 14,820; Silver Cliff, 5040; Colorado Springs, 4226; Georgetown, 3294; Boulder, 3069; Pueblo, 3217; Golden, 2730; Central City (with Black Hawk and Nevada), 2550; Trinidad, 2226; Buena Vista, 2141; Pitkin, 1891; Breckenridge, 1657; Greeley, 1297; Rosita, 1008.

**History.**—Civilized Cherokees attempted to explore it in 1857, but were driven back by Indians; in 1858 explored at two points—near Pike's Peak by a company from Kansas, and in the S. W. by Georgians under Baker, who was afterward killed by the Indians at the Colorado River; both found gold. In 1859, Clear Creek gold deposits discovered; great emigration in 1859, 1860, and 1861; Territory organized in 1861; gold plenty, but difficult of extraction; not much silver till after 1870; fine climate and fine grazing lands; soil very rich and productive when irrigated; irrigation practised in the N., herding in the E., and gold-mining in the central part of Territory. Colorado contributed its full quota for the civil war. Attempts were made for its admission as a State in 1865-67, but were vetoed by President Johnson, and in 1873 denied by Congress; admitted in 1876, and, soon after, great discoveries of carbonates of lead and silver in Lake county turned the tide of immigration there. There have been some troubles with the Utes, but they are now mostly removed to Utah.

#### Governors.

##### TERRITORIAL.

##### STATE.

William Gilpin	1861-62	John L. Routt	1876-Jan. '79
John Evans	1862-65	Frederick W. Pitkin	1879-83
Alexander Cummings	1865-67	James B. Grant	1883-85
A. Cameron Hunt	1867-69	Benjamin H. Eaton	1885-87
Edward M. McCook	1869-73		
Samuel H. Elbert	1873-74		
John L. Routt	1874-76		

L. P. BROCKETT.

Colorado, Tex. See APPENDIX.

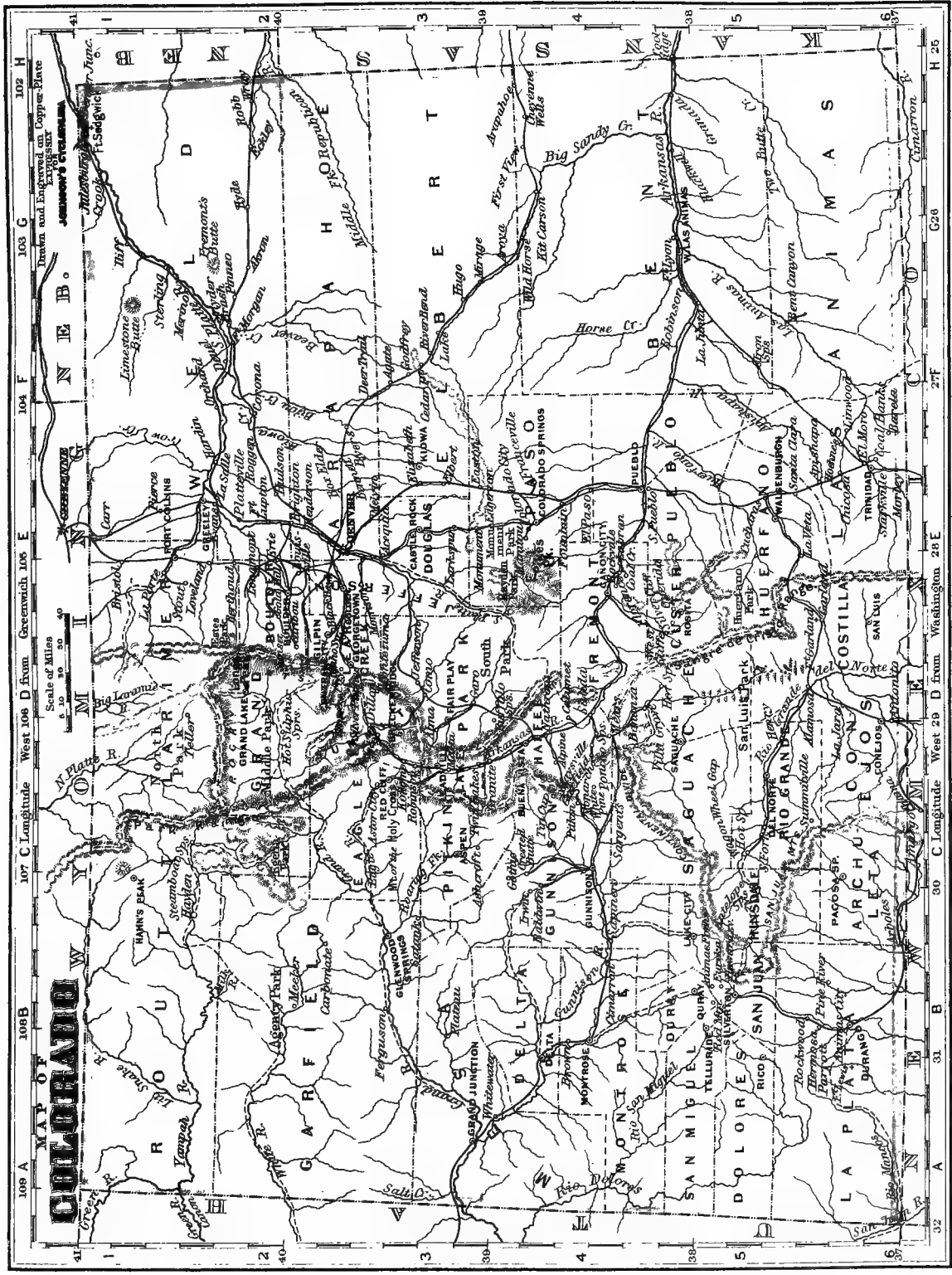
**Colorado College**, at Colorado Springs, Col., was founded in 1874 by the Colorado Association of Congregational churches. It is under the management of a board of trustees, representing different denominations and filling its own vacancies. The Colorado Springs Company, which founded the town, has generously given to the college about 100 acres of land. The college occupies a handsome building of stone erected by the contributions of citizens of Colorado Springs. The faculty consists of the president and six professors. The plan of instruction comprises the college course of four years, corresponding, in general, to the academic course of Eastern institutions, but with considerable freedom in the choice of studies, the department of mining and metallurgy, and the academy, with two courses of study—first, the classical, which furnishes a preparation for the college course; and second, the normal course. The college aims to give due prominence to the study of the English language and literature. The location of the college is especially advantageous for the practical study of geology and mineralogy and of mining and metallurgy. This Rocky Mountain region furnishes the student unsurpassed opportunities for original investigation in these lines of study. The college has a library of 6000 volumes, and a good beginning has been made in gathering collections in the departments of natural science. WINTHROP D. SHELTON.

**Colorado Springs**, a city, capital of El Paso co., Col. (see map of Colorado, ref. 4-E, for location of county), on R. R., 75 miles S. of Denver. It was originally called Fountain Colony. It is close to the famous mineral springs at Manitou, and its scenery and drives are very fine. It has an institute for the mute and the blind, a college, and good schools. The climate is delightful, especially in the winter. Pop. in 1880, 4226, mostly health-seekers.

**Color-Blindness**, want of sensibility in the eye to differences of color. This defect exists in different degrees, but is not necessarily accompanied with any other imperfection of vision. In extreme cases the colors most strongly contrasted seem not to differ except as to degree of brightness or dullness. Very remarkable examples are given by Brewster in his "Natural Magic." Color-blindness is sometimes called Daltonism, because the distinguished John Dalton and his brothers suffered from it.

**Coloring-Matters.** Nature abounds in these prin-





**COLORADO**

Scale of Miles  
0 10 20 30 40

Drawn and Engraved on Copper Plate  
by  
**JAMESON & CO.**

32 A 31 B 30 C Longitude West 29 D from Washington 28 E 27 F 26 G 25 H 24 I 23 J 22 K 21 L 20 M 19 N 18 O 17 P 16 Q 15 R 14 S 13 T 12 U 11 V 10 W 9 X 8 Y 7 Z 6 A 5 B 4 C 3 D 2 E 1 F



ciples, and art has added to the number. The colored appearance is not an inherent property of the body itself, but due to its effect upon ordinary light, which is composed of rays of all colors. If a body absorbs nearly all the light, it appears black; if it absorbs scarcely any, but throws it off, it will appear white; but if the body contains any substance (pigment) that has the power of decomposing white light, its color will depend upon which of the rays it absorbs and which it reflects. Strictly speaking, therefore, the color of a pigment is due to light which it cannot absorb, and which is reflected to the eye of an observer. (See DYE-STUFFS, DYEING, and PIGMENTS, by PROF. C. F. CHANDLER.)

**Colos'sæ** [Κολοσσαί or Κολασσαί], an ancient city of Asia Minor, situated in Phrygia, on the river Lycus. It was nearly destroyed by an earthquake in 65 A. D. Saint Paul's Epistle to the Colossians was addressed, in 62 (some say 58-60) A. D., to the believers at Colossæ. Its site is about 3 miles N. of the modern *Chonos* or *Khonos*.

**Colos'sal** [from *colossus*], in the fine arts, a term applied to any work remarkable for extraordinary dimensions. It is, however, more especially applied to works in sculpture. It seems probable that colossal statues had their origin from the attempt to astonish by size at a period when the sciences of proportion and of imitation were in their infancy. In Babylon we learn from Daniel that the palaces contained statues of great size, and in the present day the ruins of India present us with statues of extraordinary dimensions. The Egyptians surpassed the Asiatics in these gigantic monuments. The taste for colossal statues prevailed also among the Greeks. The principal Roman colossus was the figure of himself, as the sun, set up by Nero before the Golden House; it was in bronze, the work of Zenodorus; and if, as Pliny says, it was 110 feet high, it was larger than the Colossus of Rhodes.

**Colos'sians, The Epistle of Saint Paul to the**, was written at the same time and place as those to the Ephesians and Philemon, probably during the apostle's first imprisonment at Rome. It seems to be directed against certain Jewish heresies of the Alexandrian or Gnostic type.

**Colos'sus** [Gr. Κολοσσός] of Rhodes, a brazen statue of Apollo, or perhaps of the sun-god, executed by Chares of Lindus, and completed in 280 B. C., was one of the Seven Wonders of the World. The statement that one foot rested on each side of the harbor of Rhodes, and that ships passed under it in full sail, does not rest on good authority. It was 105 feet in height, and was ascended by a winding staircase. It was overthrown by an earthquake about 224 B. C., and was never re-erected. Its fragments remained on the spot till 672 A. D.

**Colos'trum** [a Latin word of uncertain etymology], the first milk yielded after accouchement. It contains more sugar, more butter, and rather less casein than true milk, and also contains a much greater proportion of phosphates and chlorides, which may possibly give to colostrum the evacuant properties which it is said to possess. It also has a great number of leucocytes, called "colustrum corpuscles."

**Colquhoun** (PATRICK), a Scottish political economist, born at Dumbarton Mar. 14, 1745. He became a merchant in Glasgow, and promoted the manufacture of muslin in Scotland. In 1761 he went to Virginia, and in 1789 settled in London. He published, besides other works, a "Treatise on the Police of the Metropolis" (1796) and "On the Population, Wealth, etc. of the British Empire." He applied his mind to the elevation of the poor classes. Died April 25, 1820.

**Colquitt, or Col'quit**, capital of Miller co., Ga. (see map of Georgia, ref. 7-F, for location of county), on Spring Creek, about 100 miles S. of Columbus. Pop. in 1880, 119.

**Colquitt** (WALTER T.), an American lawyer and Senator, born in Halifax co., Va., Dec. 27, 1799. Having removed to Georgia, he was elected a member of Congress in 1838, and a Senator of the U. S. in 1842, by the Democrats. Died in Macon, Ga., May 7, 1855.

**Colt** (SAMUEL), a celebrated American inventor, born at Hartford, Conn., July 19, 1814. He invented a pistol called a revolver, for which he obtained a patent in 1835. He began about 1848 to manufacture revolvers at Hartford, where he erected an extensive armory. Colt's revolvers soon attained a world-wide reputation, and were adopted as cavalry arms by most civilized nations. (See REVOLVER.) Died Jan. 10, 1862.

**Colton** (CALVIN), LL.D., an American writer and Episcopal clergyman, born at Longmeadow, Mass., in 1789. He wrote, besides other works, "Four Years in Great Britain" (1835) and a "Life of Henry Clay" (3 vols., 1844). Died at Savannah, Ga., Mar. 13, 1857.

**Colton** (WALTER), an American writer, born in Rutland, Vt., May 9, 1797. He was a chaplain in the navy. Among his works are "Ship and Shore in Madeira, Lisbon, etc." (1835), "Deck and Port" (1850), and "Three Years in California" (1850). Died in Philadelphia, Jan. 22, 1851.

**Colub'ridæ** (Coluber, a genus), a family of serpents, variously limited, but, according to the best authorities in the U. S., containing most of the non-venomous apodid typical snakes. Nearly one hundred and fifty species and varieties inhabit the U. S. Among the best known are the king snake (*Ophibolus getulus*), black snake (*Bascanion constrictor*), and garter snake (*Eutenia sirtalis*), etc.

**Colum'ba**, SAINT, called also **Saint Colm**, was born at Gartan, county Donegal, Ireland, in 521 A. D. In 563 A. D. he set out on his mission to Scotland. He founded in Iona, one of the Hebrides, an abbey and a college which had a high reputation. Died in 597 A. D.

**Col'umban', or Columban**, SAINT, an Irish monk, born in Leinster Nov. 21, probably in 543 A. D. He founded the monastery of Luxeuil, near Besançon, in France, about 590 A. D., and was the author of a monastic rule. He was a man of real learning and genius. Died in Italy in 615 A. D., after two years' residence there.

**Columb'arium** [a Latin term originally signifying a "dove-cote"], among the ancient Romans a sepulchre containing niches like pigeon-holes (whence the name), in which were placed burial-urns for receiving the ashes of slaves and dependants after incineration.

**Colum'bia, or Or'egon**, a river of the U. S., is the largest American river that enters the Pacific Ocean. It rises on the western slope of the Rocky Mountains in British Columbia, about lat. 50° N. and lon. 116° W. It flows north-westward nearly 150 miles, and then southward to Washington Territory, in which it unites with a large branch called Clark's River. Below this junction it pursues a very tortuous course to the northern boundary of Oregon. From this point it flows westward in a nearly direct line, and forms the boundary between Oregon and Washington Territory until it enters the Pacific. It is a rapid stream, passing through many mountain-gorges, and its navigation is much obstructed by falls. The tide ascends to the Cascades, a series of rapids, where the river passes through the Cascade Range, 140 miles from its mouth. At its mouth is a bar covered with twenty feet of water at low tide. Vessels of 300 tons or more can ascend the river to the Cascades. At the Dalles, in Oregon, the river is contracted to a channel about 100 yards wide between basaltic rocks. Steamboats ply daily on the Columbia, both below and above the DALLES (which see). Entire length, estimated at 1400 miles. A large affluent, called Lewis or Snake River, enters it near lat. 46° 20' N. The scenery of the Columbia is sublime, especially where it passes through the Cascade Range.

**Columbia, Dak.** See APPENDIX.

**Columbia**, capital of Adair co., Ky. (see map of Kentucky, ref. 4-G, for location of county), 100 miles S. S. W. of Frankfort. Pop. in 1870, 506; in 1880, 549.

**Columbia**, capital of Caldwell parish, La. (see map of Louisiana, ref. 7-D, for location of parish), on the Washita River. Pop. in 1870, 235; in 1880, 219.

**Columbia**, capital of Marion co., Miss. (see map of Mississippi, ref. 9-G, for location of county), on Pearl River, 90 miles S. by E. from Jackson. Pop. of tp. in 1870, 1548; in 1880, 1659.

**Columbia**, on R. R., capital of Boone co., Mo. (see map of Missouri, ref. 4-G, for location of county), 10 miles N. of the Missouri and 24 miles E. of Boonville. It is the seat of the State university and the Christian and Baptist female colleges. It has a library. Pop. in 1870, 2236; in 1880, 3326.

**Columbia**, capital of Tyrrell co., N. C. (see map of North Carolina, ref. 3-K, for location of county), on a creek or inlet of Albemarle Sound, 182 miles E. of Raleigh. Pop. in 1880, 166.

**Columbia**, R. R. junction, Lancaster co., Pa. (see map of Pennsylvania, ref. 6-H, for location of county), on the left bank of the Susquehanna River (here nearly one mile and a quarter wide), 80 miles by railroad W. of Philadelphia. A railroad bridge across the river connects Columbia with Wrightsville. It contains waterworks, a female institute, two rolling-mills, a mill for railroad iron, engine and boiler works, several iron-furnaces, a patent rake manufactory, and a fine library. Here is an extensive market and dépôt for lumber, which is brought down the river by rafts. Pop. in 1870, 6461; in 1880, 8312.

**Columbia**, an important R. R. centre, the capital of

South Carolina and of Richland co. (see map of South Carolina, ref. 5-E, for location of county), is on the left (E.) bank of the Congaree River, just below the confluence of the Saluda and Broad, 137 miles by railroad N. N. W. of Charleston; lat. 33° 57' N., lon. 81° 7' W. It is the seat of South Carolina College, called since 1865 the South Carolina University, founded in 1804. Columbia has a State-house, penitentiary, an asylum for the insane, supported by the State, a Presbyterian theological seminary, a Methodist female college, one cotton factory, foundries, sash and door factories, an orphans' home, waterworks, a park, and large libraries connected with the theological seminary (18,300 vols.) and South Carolina University (30,000 vols.). It is at the head of steamboat navigation. It was taken by Gen. Sherman's army Feb. 17, 1865, and was then much injured by fire. Pop. in 1870, 9298; in 1880, 10,036.

**Columbia**, R. R. junction, capital of Maury co., Tenn. (see map of Tennessee, ref. 7-E, for location of county), on Duck River, 46 miles S. W. of Nashville. It is the seat of Jackson College, and has two female seminaries. Pop. in 1870, 2550; in 1880, 3400.

**Columbia, British.** See BRITISH COLUMBIA.

**Columbia City**, R. R. junction, capital of Whitley co., Ind. (see map of Indiana, ref. 3-F, for location of county), 19 miles W. N. W. of Fort Wayne. Pop. in 1870, 1663; in 1880, 2244.

**Columbia College**, an institution of learning in New York City, originally chartered as "King's College" by George II., Oct. 31, 1754. Moneys had been previously raised for the endowment of the college, under acts of the provisional assembly authorizing lotteries for the purpose, of which the first was passed as early as 1746. It received also a liberal grant of land from Trinity Church, and on a portion of this its first building was erected. The Episcopal denomination has always had a controlling influence in its governing board, but it is not, and has never been, sectarian in its teaching. Its original site was near the City Hall Park, and was approached through Park place, which has since been extended over it. In 1857 the college was removed to East Forty-ninth street, where for twenty-five years it occupied buildings not originally erected for it; but these have been replaced by others more suitable, the library building just opened (1883) being one of the most spacious, commodious, and elegant academical edifices in the country. The occurrence of the public troubles which led to the war of the Revolution seriously interfered with the business of the college, and finally arrested its operations altogether. On the night of May 10, 1775, the president, Dr. Cooper, being a zealous loyalist, fled, through fear of popular violence, and no commencement was held that year. Early in the following year the building was converted into a military hospital, and all the students were dispersed. Business was resumed in May, 1784, when the college, under its present title, was placed under the government of a board styled "The Regents of the University." The body which now bears this name in the State of New York is of more recent creation. A medical department was connected with the college from 1767 to 1813, when it was discontinued. In 1860 the "New York College of Physicians and Surgeons" became connected with Columbia College. The law department (established in 1858) has met with great success. The number of law-students (1882-83) was 400. The law-graduates of 1883 numbered 147. The school of mines (organized in 1864) embraces six distinct courses of scientific study: (1) mining engineering; (2) civil engineering; (3) metallurgy; (4) geology and natural history; (5) analytical and applied chemistry; (6) architecture. In 1880 there was established a school of political science, which numbers at present nearly 50 students. The college has in its five faculties more than 60 professors and instructors, and nearly 1600 students (1883). In 1883 the libraries of the various schools were concentrated into one general library, which embraces now (1883) between 50,000 and 60,000 volumes, including the botanical library, which was the gift of the late eminent naturalist Dr. John Torrey, who presented to this college, at the same time, his immense herbarium, embracing over 50,000 specimens. This collection has recently been more than doubled in magnitude by the addition to it of the extensive herbarium of Prof. Meisner of Bale, presented by Mr. J. J. Crooke of New York in 1872. It is now probably the largest and most complete in the world, except the royal collection at Kew, England. The cabinets and apparatus of the college for the illustration of the various branches of physical and chemical science, and of geology, mineralogy, and natural history, are surpassed for completeness and excellence by few. The gross income of the college for 1883 was more than \$340,000, largely derived from ground-

rents. This income is rapidly increasing, and the financial prospect of Columbia College is excellent.

The presidents of the college have been—Samuel Johnson, D. D. (1753-63); Myles Cooper, S. T. D., LL.D. (1763-75); Rev. W. Moore (1784-87); Dr. W. S. Johnson (1787-1800); C. H. Wharton, D. D., LL.D. (1800); Rt. Rev. Benjamin Moore (1800-11); W. Harris, S. T. D. (1811-29); Hon. W. A. Duer (1829-42); N. F. Moore, LL.D. (1842-49); Charles King, LL.D. (1849-64); and Rev. F. A. P. Barnard, S. T. D., LL.D., L. H. D. (1864).

F. A. P. BARNARD.

**Columbiad**, a sea-coast howitzer, of cast-iron, proposed by the late Colonel George Bomford, chief of ordnance, and introduced (about) 1812. Some of these guns were in service during the war with England, 1812-15. Three calibres were recommended—50-pounders, 100-pounders, and 150-pounders—for coast defence, particularly against shipping, as a single shell of the larger sizes exploding in a vessel's side, or on her decks, would, it was thought, produce great injury, if not complete wreck.

Meyer's *Technologie des Armes à feu* mentions under date 1815, "the explosion of an English vessel hit by an American shell before New York;" and again, under the same date, "Very good results were obtained in America from ovoidal (spherico-cylindrical) percussion shells of the calibre of 100, which are fired from a kind of cannonade designated by the name of Columbiad." This is the first notice given by this diligent and accurate author of the existence of such a gun, or of a percussion shell, in the world. He seems to have searched thoroughly from the commencement of the Christian Era.

Halleck ("Military Art and Science," page 280) states (in a note), after designating large howitzers as "*Paixhans Guns*," or "*Columbiads*,"—"the description of one of Colonel Bomford's Columbiads which was at Governor's Island, New York Harbor, was taken to France by a young French officer, and thus fell into the hands of General Paixhans, who immediately introduced them into the French service."

Whether General Paixhans received as above the description of the columbiad or not, there would seem to be no doubt that this gun was the first howitzer of cast-iron of like calibre and length that was successfully used for shell-firing. 8-inch and 10-inch howitzers had been proposed and made at earlier dates—that is, chambered guns shorter than cannon and longer than mortars, and having trunnions in advance of their vents, and near the centre of gravity of the gun—but these guns were of bronze, generally shorter than the columbiads, and were not designed or used for shell-firing at low angles, but for heavy projectiles, to obtain great range.

In 1749, France adopted the 8-inch siege howitzer, but suppressed it in 1803 as useless, upon Gassendi's recommendation, retaining only a 54-inch field howitzer. In 1804, 9-inch and 11-inch howitzers, proposed by Villantroy, were made at Douai of eight calibres length, and were fired with lead-filled shells at high angles; and in 1810, at Seville in Spain a 10-inch howitzer of seven calibres length was cast to obtain a long range at the siege of Cadiz.

From 1809 to 1819, according to Meyer, Paixhans was interested in experiments to prove the superiority of hollow projectiles over hot shot for naval warfare, and the destructive effects of bursting shells. In 1819 he presented his treatise *Nouvelle Force Maritime*, but not published until 1822, in which he first proposes his *Canon-Obusier*, an 8-inch howitzer shell gun of cast-iron. The English claim that General Millar, who introduced a like gun in 1824, proposed it in 1820.

In the U. S. the 8-inch howitzer and 10-inch howitzer shell guns were remodelled in 1841 and 1844, intending these last, called *Columbiads*, to be fired with solid shot and with one-sixth their weight of powder; but subsequently they were reserved for shell-firing only, and a new pattern (without a chamber and heavier) was adopted in 1858; two of which (one cast solid and one hollow, and as proposed by Gen. Rodman, cooled from the interior) were subjected to comparative proof, both enduring the remarkable number of 4082 rounds, with solid shot and service charge, without destruction.

In 1861, the Rodman exterior form of guns was adopted for the Columbiads, as for all others, and calibres of 13, 15, and 20-inch smooth-bore, 10-inch and 12-inch rifled, and 13 and 15 mortars, adopted for sea-coast guns.

Col. Bomford, the inventor of the columbiad, distinguished himself through his long military career by many other valuable suggestions in artillery science. Among others, he proposed and carried out the first practical experiments demonstrating the proper exterior lines of a cannon, as shown by the pressure of the fired charge at regular distances from the bottom of the bore. He also proposed

the 12-inch gun of 1846, and while testing its capabilities carried on a series of experiments proving the best and simplest form of fuse-shells fired from heavy guns, with the safety-caps sufficient to protect the fuse from extinction by ricochet on land or water. P. V. HAGNER.

**Columbia, District of.** See DISTRICT OF COLUMBIA.

**Columbiana**, on R. R., capital of Shelby co., Ala. (see map of Alabama, ref. 4-D, for location of county), 72 miles N. N. E. of Selma. Pop. in 1880, 496.

**Columbian College**, Washington, D. C., was incorporated by an act of Congress in 1821. Its founders were mainly members of the Baptist denomination. The name of Luther Rice, so honorably connected with the cause of foreign missions, is no less honorably connected with the educational movement which led to the establishment of this institution. The college proper has sent forth 425 graduates, of whom 120 have entered the Christian ministry; 5 have been foreign missionaries; 18 have been professors in colleges, and 4 have been college presidents. The medical department has sent forth 450 graduates. The law department, though of comparatively recent foundation, has already contributed 998 members to the legal profession, some of whom have attained to distinction at the bar and to stations of public honor. By an act of Congress, approved Mar. 3, 1873, the corporation of the Columbian College was changed into "The Columbian University," and the friends of the institution are now organizing schools of science, technology, and of the fine arts as a part of its university system, that it may avail itself of the magnificent libraries and collections of the capital. The presidents of the institution have been as follows: Rev. William Staughton, D. D., Rev. Stephen Chapin, D. D., Rev. Joel S. Bacon, D. D., Rev. Joseph G. Binney, D. D., Rev. Geo. W. Samson, D. D. The present president is James C. Welling, LL.D. The university in 1883 had 24 instructors, 298 students, and property to the value of \$450,000. JAMES C. WELLING.

**Columbidæ** [from *Columba*, the principal genus], a family of birds forming the transition from the passerine to the gallinaceous orders. They agree with the true gallinaceous birds in the character of the bill, and in the soft membrane at the base of it; the sternum is deeply notched. A dilated crop is developed from both sides, in which they differ from all other birds. The stomach is a true gizzard, and the lower larynx has a single pair of muscles. The male assists his mate in rearing the young, which are at first supported by a milky fluid secreted in the crop. The Columbidæ resemble the passerine birds in their powers of flight, in living in a state of monogamy, in building their nests in trees and crevices of rocks, and generally in laying but two eggs at a time. In domestication there have arisen many remarkable varieties, as carrier-pigeons, fan-tails, tumblers, etc. The domesticated varieties are descended from the rock-dove, *Columba livia*, of the Old World. The study of these varieties has been thoroughly carried out by Mr. Darwin, and seems to have suggested his theory of the origin of species. (See PIGEON.)

**Col'umbine** (*Aquilegia*), a genus of perennial plants of the order Ranunculacææ. They have five petals, all alike, with a short spreading lip, produced backward into large hollow spurs, much longer than the calyx; pistils five. The *Aquilegia vulgaris*, or common columbine, a native of Europe and of the Rocky Mountains in the U. S., is cultivated in gardens for its showy flowers. The *Aquilegia Canadensis*, a native of the U. S., has beautiful scarlet flowers of curious structure.

**Colum'bium**, or **Nio'bium**, a rare metal originally discovered in columbite from Massachusetts by Hatchett in 1801. Wollaston in 1809, in investigating minerals containing columbium, expressed the belief that the metal was identical with tantalum, and this view was generally accepted until 1846, when H. Rose showed that the two were distinct, though tantalum occurs in many of the columbium minerals. Rose, indeed, inclined to the belief that what had been described as columbium really consisted of two metals, which he called niobium and pelopium. Further investigations showed him that but one metal was the basis of the supposed two; so the name pelopium was dropped, and the name niobium was retained, the symbol Nb being now used for columbium. The black powder produced by heating columbium compounds with sodium has been supposed to be the metal, but Delafontaine states that this powder is the protoxide, and that the metal is a steel-gray powder obtained by igniting the chloride NbCl<sub>3</sub> in a current of hydrogen. With tantalum, columbium forms a group distinct from the other elements. The principal minerals in which columbium is found are columbite, a columbate of iron and manganese; bragite, a columbate of yttrium and iron; samarskite, a urano-columbate of yttrium

and iron; pyrochlore, a columbate of lime, cerium, etc.; æschynite, a titanio-columbate of cerium, iron, lanthanum, etc. Some of these minerals contain tungsten. They are found in small quantities in a few localities in Europe and the U. S. The combining number of columbium is 94.

**Columbo.** See COLOMBO ROOT.

**Columbus**, a city and R. R. centre of Georgia, capital of Muscogee county (see map of Georgia, ref. 5-F, for location of county), is on the E. bank of the Chattahoochee River, which here forms the boundary between Georgia and Alabama. It is 100 miles W. S. W. of Macon and 292 by railroad W. of Savannah. Steamboats ply at all seasons between Columbus and Appalachiola, Fla., light drafts only being used in summer. It has six cotton-factories, and the falls of the river at this point afford a water-power sufficient for 100,000 spindles. It has machine-shops and foundry, besides planing and flouring mills. The public schools for white and colored are unsurpassed by any in the State. Columbus has pleasant suburbs, noted for the beauty of their scenery and the taste of their private residences. Pop. in 1870, 7401; in 1880, 10,123.

**Columbus**, R. R. junction, capital of Bartholomew co., Ind. (see map of Indiana, ref. 8-E, for location of county), on East Fork of White River, 41 miles S. S. E. of Indianapolis. Pop. in 1870, 3359; in 1880, 4813.

**Columbus**, R. R. junction, capital of Cherokee co., Kan. (see map of Kansas, ref. 8-K, for location), 50 miles S. of Fort Scott. Pop. in 1870, 402; in 1880, 1164.

**Columbus**, a city and R. R. junction of Hickman co., Ky. (see map of Kentucky, ref. 5-B, for location of county), on the Mississippi River, 196 miles by rail below St. Louis. Pop. in 1870, 1674; in 1880, 1338.

**Columbus**, R. R. junction, capital of Lowndes co., Miss. (see map of Mississippi, ref. 5-H, for location of county), is on the navigable Tombigbee River, 235 miles by rail from Mobile. It has a female seminary, a university and two public academies, and a very large trade, especially in cotton. Pop. in 1870, 4812; in 1880, 3955.

**Columbus**, a city, capital of Platte co., Neb. (see map of Nebraska, ref. 6-J, for location of county), on the Platte River and the Union Pacific R. R., 92 miles W. of Omaha. It has a bridge across the Platte, a high school, and various industries. Pop. in 1880, 2131; in 1885, 2573.

**Columbus**, capital of Polk co., N. C. (see map of North Carolina, ref. 3-C, for location of county), about 90 miles W. of Charlotte. Pop. in 1880, 71.

**Columbus**, an important R. R. centre, seat of justice of Franklin co., and the capital of the State of Ohio (see map of Ohio, ref. 3-E, for location of county), is pleasantly situated on both sides of the Scioto River, but principally on the eastern side, and 70 miles from its mouth, 110 miles N. E. of Cincinnati, and 350 miles from Washington, D. C. It is in lat. 39° 57' N. and lon. 83° 3' W. from Greenwich. Previous to 1863 the city occupied an area of 1100 acres; its area was increased that year to 2700 acres. In 1871 its corporate limits were enlarged to 6777 acres, or 10.59 sq. m.

**Commerce.**—Its commerce is quite large for an inland city. There were shipped to Columbus in 1882 over 1,850,000 tons of coal. The lumber trade is also very extensive. In 1881 the wholesale trade amounted to over \$18,000,000.

**Manufactures.**—The census of 1880 showed 316 manufacturing establishments; capital, \$5,379,401; average number of hands employed, 5490; wages paid during the year, \$1,961,394; value of products, \$9,646,679. About 18,000 carriages per annum are manufactured here. The manufacture of furniture employs a capital of over \$200,000; products in 1882, \$600,000. Car-building employs \$400,000 capital; products in 1882, \$938,000. The rolling-mills, iron-furnaces, and pipe-works employ \$1,000,000 capital; products in 1882, over \$3,000,000. Boot and shoe manufacture employs over \$300,000 capital; products in 1882, nearly \$1,000,000. A great variety of other articles are manufactured here, employing altogether about 9000 men, and producing in 1881 over \$13,000,000.

**Railroads.**—Columbus is well supplied with railroads, there being 13 standard-gauge roads that enter the Union Dépôt, affording communication by short lines with all parts of the State and country.

**Finances.**—There are four national and thirteen private banks, with an aggregate capital of \$1,129,803, and deposits of over \$5,000,000. The receipts of the post-office for the year ending June 30, 1883, were \$117,504.

**Education.**—Columbus is the seat of Capital University (Lutheran); cost of buildings, \$80,000. It has 5 professors and 4 tutors. Its library contains 2500 volumes. The regular course requires two and a half years. Its income is derived from the Lutheran synod of Ohio. The Ohio State University has 15 professors. It has funds as fol-



lows: Proceeds from sale of land, \$526,467; donation of Franklin co., O., to the college in bonds, \$300,000; other sources, \$12,073; total, \$833,540. It was opened for students in 1873: 353 students in 1883. The Columbus Medical College has 13 professors, 123 students, and 46 graduates (1883), with a well-filled cabinet. A hospital of 100 beds will be erected at once. The Starling Medical College has 13 professors, 59 students (1883), and an endowment of \$35,000 by Lyne Starling. This college contains a well-stored museum and an unrivalled chemical laboratory, with hospital. The public schools are as follows: 26 school-buildings, with 188 school-rooms; there is one high school, with 16 teachers; 52 grammar schools, with 58 teachers; and 89 primary schools, with 89 teachers. Total number of pupils enrolled 8433, out of 12,969 of school age. The assessed value of school property is \$29,958,756; its estimated cash value, over \$50,000,000. The total cost of the schools for the year 1881-82 was \$115,969.25.

*Private Schools.*—Among the private schools, is a well-sustained art school. The Catholics have 7 schools, with 2000 pupils, and 2 academies, with 400 pupils, all supported by contributions from members of the Church.

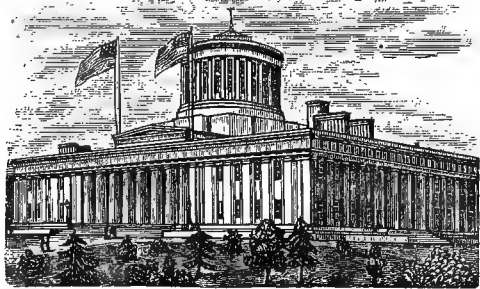
*Libraries.*—Ohio State Library has 50,077 volumes. The Public Library has 14,248 volumes; income derived from taxation. The seminary (Catholic) library has 2500 volumes; Law Library (State) has 8200 volumes. The library of the State Board of Agriculture has 2500 volumes.

*Newspapers and Periodicals.*—Daily, 4, circulation, 14,000; weekly, 17; semi-weekly 1; periodicals, monthly, 13, semi-monthly, 1, bi-monthly, 2.

*Churches.*—Number, 47. Those of remarkable architectural beauty are the St. Joseph's Cathedral (Roman Catholic), which cost \$300,000, built of sandstone; next come the Trinity (Episcopal) and the First and Second Presbyterian.

*Benevolent and Charitable Institutions, etc.*—There are 65 associations of this kind; among them are 14 Masonic (3 colored), 17 Odd Fellows (3 colored). There are 2 hospitals, 1 county infirmary, 1 insane asylum, 1 deaf and dumb institution, 1 institution for the blind, 2 orphan asylums, 1 home for the friendless, 1 institution for feeble-minded children, and several voluntary societies for the relief of suffering.

*Public Buildings of Note, and Parks.*—The State-house is a grand and attractive edifice, of great solidity and magnitude, Doric in its style of architecture. It covers two acres of ground, is a bold and noble structure, and is built of beautiful gray limestone. The cost of the building



State Capitol (Columbus O.).

complete was \$2,129,188. The time consumed in building it was fifteen years. Height of building from ground to top of blocking course, 61 feet; to pinnacle of cupola, 158 feet; total number of rooms in the building, 53. The Institution for the Blind cost \$436,954. The architectural character is English, of the later period of Elizabeth, of cut stone. The Deaf and Dumb Institution is built of brick, elaborately trimmed with lime and sandstone; cost, \$769,485. The front of the building is 270 feet long. It is surmounted by seven towers, the central one 115 feet high. The new Insane Asylum, consists of, first, ashlar stone three feet four inches high; on this cut-stone belt-course rests the brickwork proper of the superstructure. It is one mile around the outside walls, and cost \$2,280,293. The new Institution for Feeble-minded Youth, just built, will cost over \$500,000. The Ohio Penitentiary, with 1500 cells, cost \$726,388. St. Joseph's Cathedral (Roman Catholic) is a vast and noble structure, Gothic in the style of its architecture. The material of the walls is sandstone. Dimensions, 92 by 185 feet. It will cost \$300,000. The spire is to be 250 feet in height. Trinity Church (Protestant Episcopal) is Gothic in style, built of sandstone, in the shape of a cross; it is an imposing edifice; cost, \$70,000. The city hall, 187½ feet long by 80 wide, cost \$210,000, and the opera-house cost \$120,000. There is an Odd Fellows' Temple costing \$75,000. A new union dépôt cost \$300,000.

There are three well-located public parks of good size and three smaller ones.

*The waterworks* are public, and cost \$872,738; length of pipe laid, 69½ miles. There are 433 fire-hydrants and 830 stop-valves. The daily supply of water for 1882 was 3,062,224 gallons, to which will be added (1883) machinery to pump 10,000,000 gallons daily. The works furnish the most perfect fire protection known; with over \$30,000,000 in the tax duplicate, only \$32,208 was lost by fire in 1882.

*The gasworks* are owned by an incorporated company; the stock is \$400,000; 44 miles of pipe have been laid. There are 3400 private consumers, and 101,000,000 feet of gas were furnished in 1882.

*History.*—Columbus was selected for the capital of Ohio in 1812, and is located within a few miles of the centre of the State. Chillicothe was originally the seat of government. In Feb., 1810, the legislature appointed five commissioners to examine and select the most eligible site. In their report to the legislature, dated Sept. 12, 1810, the commissioners recommended a site opposite Franklinton, now a part of Columbus (made so by annexation in 1872). At the session in 1812 a company composed of Lyne Starling, John Kerr, Alexander McLaughlin, and James Johnson proposed that the legislature establish the seat of the State government on the high bank E. of the Scioto River, nearly opposite Franklinton. The same company made proposals for the erection of a State-house, penitentiary, and other public buildings, the same to be completed by 1817. An act was passed Feb. 14, 1812, accepting the proposals and bond of the company, and permanently establishing the seat of government on the lands named therein, the legislature to commence their sessions there on the first Monday of Dec., 1817, and there continue to May, 1840, and from thence until otherwise provided by law. The refugee lands upon which the State capital was located comprised a narrow tract of four miles wide from N. to S., and extending forty-eight miles eastward from the Scioto River. On the 18th of June, 1812, the same day on which the U. S. declared war against Great Britain, the first public sale of lots took place. The town was incorporated on the 10th of Feb., 1816. A U. S. court-house was erected in 1820, and new government buildings are now (1885) being erected.

*Population.*—At the time Columbus was laid out as a town in 1812, it was an almost unbroken forest, with no resident within its limits. Three years afterward, in 1815, its population was 700; in 1820, 1450; in 1830, 2437; in 1840, 6048; in 1850, 17,382; in 1860, 18,554; in 1870, 31,274; in 1880, 51,647; and in 1882, 60,103.

J. J. JANNEY, for Ed. of "STATE JOURNAL."

**Columbus**, a city, capital of Colorado co., Tex. (see map of Texas, ref. 5-I, for location of county), on R. R. and the W. bank of the Colorado River. It is the seat of Colorado College. Pop. in 1880, 1959.

**Columbus**, Columbia co., Wis. (see map of Wisconsin, ref. 6-D, for location of county), on R. R. and Crawfish River. Pop. in 1870, 1888; in 1880, 1876.

**Columbus** [It. *Colombo*; Sp. *Colon*], (CHRISTOPHER), the discoverer of America, was born at Genoa in 1436. His origin was humble and obscure, and accounts of his early life are meagre. His son and biographer, Fernando Colombo, wrote: "The admiral tells us himself in a letter that his occupation, like that of his ancestors, was to traffic on the sea." His father, Dominico Colombo, according to some writers, was a wool-carder. In a will made 1594 he calls himself "formerly a weaver" (*olim textor pannorum*). His mother's name was Susanna Fontanarossa. Of his education and early life Columbus wrote thus in a letter to the king of Castile (1501): "In my young years I was a sailor, and I have continued to follow the sea to this day; it is the art which they should pursue who wish to know the secrets of this world. I occupied myself much with navigation; with astronomy, geometry, arithmetic I was not less familiar. I had a hand sufficiently skilled and enough of knowledge to draw the terrestrial globe, with the position of cities, mountains, rivers, and all ports that there were. While quite young I studied books of cosmography, history, philosophy, and other sciences; it is that which has aided me in my undertaking." He studied at the University of Pavia, and went to sea at fourteen. He mentions in letters the command of a cruiser in the service of René, count of Provence, and voyages to the Archipelago, as well as one in 1477 to the isle of Thule, which he says the moderns call Friesland (a supposed typographical error for Iceland). There is an account of a cruise upon four Venetian galleys, richly laden, when Columbus jumped from his burning ship and swam two leagues by the aid of an oar to the Portuguese coast, and walked to Lisbon, where he found several Genoese. He married Filipa Moñis de Palestrello. Her father was an able navigator, governor of Porto Santo, but poor, and leaving little but charts and instru-

ments. Columbus supported his family, and helped sustain his father and educate his brothers by making maps and charts. He went on expeditions to West Africa. He lived some time at Porto Santo, where his wife bore a son named Diego. Here he heard of great reeds and a bit of carved wood seen out at sea floating from the west. The idea of a western ocean-way to India gradually occupied his mind, fed by ancient tradition and contemporary speculations. Toscanelli, an Italian mathematician, had written, at the instance of King Alfonso of Portugal, instructions for a western route to Asia. With him Columbus entered into a correspondence, which greatly strengthened his theories. He applied for means to accomplish this voyage to Genoa and to John II. of Portugal, who long kept him waiting with half promises. His wife died, and he left Portugal in indignation. He lived (1484-86) at the Franciscan convent of St. Mary's of Rabida in Andalusia, whither he had wandered, impoverished, with his son. The prior took an interest in his plans, and gave him letters to Fernando de Talavera, confessor to Queen Isabella. He plied the court with untiring solicitations, following the king and queen on all their expeditions against the Moors, until he was granted two small vessels, with the title of viceroys or governor-general of all the lands that he might discover. On the 3d of Aug., 1492, he sailed from Palos, with 120 men, in the Niña, Pinta, and Santa Maria. He stopped several weeks at the Canary Islands. After he had sailed a great distance over an unknown sea, the crew became dismayed, impatient, and finally mutinous. They had begun to talk of throwing him overboard when land was discovered, on the 12th of Oct., 1492. This was San Salvador (Cat Island), or perhaps Watling's Island, one of the Bahamas. He soon discovered Cuba and Hispaniola (Hayti), and returned to Spain in Mar., 1493. He was received with abundant demonstrations of honor and joy by the public and the court, which gave him the title of admiral. In Sept., 1493, he sailed with seventeen ships on a second expedition, during which he discovered Jamaica, Porto Rico, and other islands, founded a colony in Hispaniola, and returned to Spain in June, 1496. He commenced a third voyage in May, 1498, and visited the Terra Firma at the mouth of the Orinoco. Francisco de Bobadilla was sent to the West Indies in 1500, with power to supersede Columbus as governor. By his order Columbus was carried in chains to Spain in 1501. The public expressed such indignation at this ill-treatment that King Ferdinand disavowed the conduct of Bobadilla, but declined to reinstate Columbus in his office. Having sailed on his fourth voyage in May, 1502, he explored the coasts of Honduras and Costa Rica, but was shipwrecked and escaped to Jamaica, which island he left, after long hardships, for Spain, June 28, 1504. Died May 20, 1506, at Valladolid. An interesting portrait of him belongs to the New York Geographical Society.

The life of Columbus by his son, Don Diego Colon, appeared in Barcia's "Historiadores Primitivos" (vol. i., Madrid, 1749). The relation of the first voyage by himself was published (Madrid, 1825-37) in Navarrete's "Viajes de los Españoles," first and second volumes. This also appeared with notes by Cuvier, Balbi, Rémusat, and others in "Relations des quatre voyages, suivies par divers lettres et pieces inédites" (3 vols., Paris, 1825). Torre has published a collection of his writings in Italian. (See also his Life by IRVING, ARTHUR HELPS, LAMARTINE, and SPOTORNO, Leipzig, 1823, and HUMBOLDT's "Examen Critique de l'histoire de la géographie.") The authenticity of Columbus' discoveries has of late been sharply questioned.

**Columbus, or Colon (Diego)**, the eldest son of the preceding, was born at Lisbon about 1472. He accompanied his father on the second voyage, and became governor of the West Indies soon after his death. He married Doña Maria de Toledo, a daughter of one of the grandees of Spain. His right to the office of viceroy of the New World was recognized by Charles V. Died in 1526.

**Columbus, or Colon (Don Fernando)**, the biographer of the discoverer, was an illegitimate child of the same and Beatrix Henriques, a noble lady of Cordova. He was born Aug. 15, 1488, accompanied his father on his fourth voyage, and afterwards devoted himself to study and contemplation, collecting around him men of science and gathering a library of 12,000 volumes, which he willed to the cloister of St. Paul in Seville. Died about 1541.

**Columbus, or Colon (Louis)**, son of Admiral Diego, withdrew his rights to the vicereignty of India 1540, and received the title of duke of Veragua and marquis of Jamaica and a pension. With Diego, the fourth admiral, son of Christopher, second son of the great Columbus, the male line became extinct.

**Columbus Cit'y**, near Columbus Junction, Louisa co., Ia. (see map of Iowa, ref. 6-K, for location of county),

40 miles N. of Burlington. Pop. in 1880, 605; of Columbus Junction, 792.

**Columbus Grove, O.** See APPENDIX.

**Columnella**, in botany, the remaining central column or axis formed of the placentas when the carpels of certain fruits have separated; also the axis of the capsules of mosses. In conchology, the upright pillar around which the whorls of univalve shells are wound is called the columella.

**Columella** (LUCIUS JUNIUS MODERATUS), the celebrated Latin writer on agriculture, was a native of Gades (Cadiz), in Spain, owned a great estate, Ceretanum (whose location, however, is uncertain), travelled much in Spain, Gaul, Italy, and Africa, and spent the latter part of his life in Rome, where he wrote his book "De re rustica" in the middle of the first century A. D. The book, which is written in a somewhat diffuse though not inelegant style, treats, in many cases with great minuteness, of the soil, the animals, the grains, vegetables, fruits, etc. Very interesting are his remarks on the cultivation of the vine, nearly the same as would be made on the subject in our time. The 10th book, on gardening, is written in verse. The best edition is that by SCHNEIDER (Leipzig, 1794). There is an English translation dated 1745.

**Column** [Lat. *columna*], in architecture, a cylinder of stone or wood used to support a roof, an entablature, or an arch. In countries where forests abound the earliest columns would be made of the trunks of trees, and in India, in Assyria, Persia, and Asia Minor we find the stone columns of a later age imitating in the shapes of their shafts the forms of carpentry, and in the capitals the blocks of wood by which the shafts were surmounted for the purpose of giving a better bearing to the weight the column must carry. But we may be sure that utility would be the first consideration, and that it was late when the artist began to decorate the parts that originally were merely constructive. The Egyptians did not confine themselves to the use of cylindrical columns, but had them of many forms—square, hexagonal, and Pöcocke (quoted by Gwilt) mentions one, at least, triangular in plan. Some of them are smooth on the surface, and these are ornamented with hieroglyphics. Others look as if they were composed of bundles of rods or stems tied together at intervals by bands. These are less elegant in form than the Gothic columns which they recall, and were perhaps no more based upon an imitation of stems of trees bound together in the one case than in the other. Certainly, the clustered columns of the Gothic architecture were not based upon any such imitation. The porticoes of some of the grottoes at Beni-Hassan are supported by pillars, polygons of sixteen sides in plan, "each slightly fluted, except the inner face, which was left flat for the purpose of introducing a line of hieroglyphics." These columns have no bases, and each is crowned with an abacus only slightly exceeding the diameter of the summit, which in its turn is only slightly less than that of the bottom of the column. From their resemblance to the Doric column of the Greeks, those of the Beni-Hassan grottoes have been called Proto-Doric, but there is no proof whatever of any connection between the two.

The Greeks in early times employed the so-called Doric and Ionic columns, of which the Ionic seems to have been by far the earlier brought over from Asia, though all the most ancient temples of Greece whose ruins are in existence to-day belonged to the Doric style. As the reader will find descriptions and engravings of each of the Greek "orders" as they are called, "Doric," "Ionic," and "Corinthian," in their proper places, we shall not describe them here. It is necessary to remark, however, that while there can be no doubt that many features in Indian architecture and in the architecture of Assyria, Persia, and Asia Minor are reminiscences of wooden forms, there is no such reminiscence to be found in the Greek Doric, though there may be possibly in the capital of the Ionic column. The Doric is essentially a stone construction, and its supposed origin in the imitation of carpentry forms is purely imaginary. The Greek columns were generally composed of many cylindrical pieces, placed one upon another until the requisite height was attained. These were cut in the nearest quarry, and being attached in couples by means of an axle fixed in holes drilled in the centre of each, intended finally for iron clamps, they were rolled as wheels to the site of the building they were to adorn. When they had been placed in position, and well strengthened by iron clamps, the outer surfaces were dressed to give the column the look of being made of a single stone. When the material was of fine marble, this could be perfectly done, as the Greeks excelled in making joints, but where the stone was coarse or defective, they covered the whole shaft with a coating of stucco.

The Greeks ornamented all their shafts with longitudinal incisions, which we call flutes. In the so-called Doric col-

urns these incisions are about twenty in number: this is the case with all the Athenian examples, but "at Paestum the exterior order of the great temple," says Gwilt, "has twenty-four, the lower interior order twenty, and the upper interior sixteen only." These flutings are separated from each other in all Greek examples by a sharp edge, but "their horizontal section varies in different examples. In some the flutes are formed by segments of circles; in others the form approaches that of an ellipse." The sole use of these flutes is to break up the light on the surface of the column, and to increase the effect of perpendicularity. The Doric column, as found in the Parthenon at Athens, was the last result of the exquisite sense of refinement in form possessed by the Greek architect, and every portion of it is in symmetry with those scientific laws which in the last analysis are one with beauty. The Romans employed the Corinthian in preference to any of the other orders, though the Greeks rarely used it except in small buildings, such as the Temple of the Winds and the Monument of Lysicrates. The Romans also made use of a capital formed by a union of the Corinthian and the Ionic, to which the name of "Composite" has been given, but it has nothing to recommend it.

When the Christian religion arose in the decaying days of the Roman empire, the new sect had need of buildings for their worship, and in erecting new ones made use of the materials abundantly supplied at first by the ruins of the temples and palaces. In this way the Roman columns were worked into buildings with which they had no affinity, and it was only with the exhaustion of the supply, and with the necessity of new materials, that the antique forms were developed naturally to meet the new requirements, and the Gothic column was created—an old body with a new soul. In the Gothic system there is no longer a fixed order of proportions, as with the Greeks, but the architect followed the law of his own eye, both in proportion and in decoration, and the consequence is a great variety in both, and great inequality in excellence. The Gothic columns were developed from the precedent forms of both Greek and Roman architecture, and we find in the vast variety of their capitals and bases all three forms in embryo.

In the time of the Renaissance there was an effort to return to the classic forms, but the result was chiefly a new combination and a new individuality. The Gothic could not be entirely shaken off, nor the spirit of the classic fully entered into, and the Renaissance column therefore has distinct traces of the influences under which it was formed. Since the introduction of iron no new developments of the column have been introduced, as might have been hoped, but builders have contented themselves with imitating in the new material the forms that belong to stone and wood alone, and which have no meaning when employed in a material different in its nature from both.

CLARENCE COOK.

**Column** [from the Lat. *columna*, a "pillar"] signifies, in military tactics, a mass of soldiers several ranks in depth, as opposed to line. There may be columns of brigades, of regiments, of divisions, or of companies, presenting a depth depending on the number of elements in the column. In a battalion the formation is called *open column* when the distance between the elements of the column is such as to admit of their wheeling into line; when the distance is only a few yards it is termed *close column*, or "column closed in mass;" when intermediate between these two, it is "column at half distance." Battalions are drawn up in column with either the right or left in front, or the battalions may be doubled upon their centres. To pass from column to line is to "deploy;" to pass from line to column is to "ploy." The relative advantages of column and line in drawing up troops for action are among the matters closely studied by the commanders of armies. Sometimes the name column is given to a small army, especially when engaged in active operations.

**Colure** [Lat. *colurus*; Gr. *κόλουρος*, from *κόλος*, "clipped," and *οὐρά*, a "tail," perhaps because a part is always below the horizon], one of the two great circles of the celestial sphere which intersect each other at right angles in the poles of the equator. The equinoctial colure passes through the equinoctial points, and the other is called the solstitial colure.

**Colusa**, capital of Colusa co., Cal. (see map of California, ref. 3-B, for location of county), on the Sacramento River, 50 miles in a direct line N. N. W. of Sacramento. Pop. in 1870, 1051; in 1880, 1779.

**Col'ver** (NATHANIEL), D. D., a Baptist divine, born at Orwell, Vt., in 1794, died at Boston Sept. 25, 1870. He received only a very limited education, was by trade a tanner, and served as a volunteer in the war of 1812. He began his ministry at Union Village, N. Y., in 1836, and was successively settled in Boston (1843), Detroit, Cin-

cinnati, and Chicago (1860). He was an able preacher, of great power with the masses, and eminent as an abolitionist. After the war he founded in Richmond, Va., the Colver Institute for educating young colored men for the ministry. He published three lectures on Odd Fellowship.

**Colville**, W. T. See APPENDIX.

**Colvocores'ses** (GEORGE M.), an American naval officer, born in Greece, entered the navy as midshipman in 1832, served with honor in the civil war, and was placed on the retired list as captain in 1867. He was murdered at Bridgeport, Conn., June 3, 1872.

**Col'well** (STEPHEN), an American author, born in Brooke co., Va., Mar. 25, 1800, practised law and became an iron-merchant of Philadelphia; wrote religious, political, and commercial works. Died Jan. 15, 1871.

**Colyar** (ARTHUR ST. CLAIR). See APPENDIX.

**Colym'bidæ** [from *Colymbus*, one of the genera], the name applied to web-footed birds having short wings, and legs placed so far back that when standing they assume an erect position, and a compressed bill, pointed at the tip. The three principal genera are the divers, including the loon (*Colymbus*), which have the front toes webbed; and the grebes (*Podiceps* and *Podilymbus*), with the feet lobed, each toe with a separate membrane. They are aquatic in their habits, and possess great powers of diving and swimming. Several species occur in America.

**Col'za**, a variety of rutabaga or Swedish turnip (*Brassica campestris*), which is cultivated for its seeds, from which oil similar to rapeseed oil is made in Europe. The oil is used for lamps, lighthouses and machinery, and the leaves and refuse seeds after the oil is expressed are fed to cattle and sheep. The roots are not bulbous.

**Co'ma** [from the Gr. *κόμη*, "hair"], in astronomy, the nebulous envelope of a comet's nucleus. In botany, the name is sometimes given to the head or top of a tree, and also to the hairy crest of certain seeds.

**Coma** [Gr. *κόμα*, "heavy sleep"], a medical term signifying a state of lethargy or unnatural profound sleep. It occurs in apoplexy, epilepsy, and other diseases of the brain. The patient is quite or nearly insensible to external impressions. Coma is also seen in narcotic poisoning. In the fatal forms the breathing is stertorous, the pupils of the eyes contracted or dilated, insensible to light, and immovable.

**Co'ma Berenice's** (i. e. "Berenice's Hair"), a small constellation of the northern hemisphere, between Boötes and the tail of Leo. (See BERENICE.)

**Comac'chio** (anc. *Comacla*), a fortified town of Italy, province of Ferrara, is 3 miles from the Adriatic and 29 miles E. S. E. of Ferrara. It is situated in the marshes of Comacchio, in which great numbers of eels are caught. These and other fish are cured in an excellent manner. It is the seat of a bishop, and has salt-works. Pop. 8900.

**Comana**, an ancient city of Cappadocia, generally sur-named *CHRYSE* or *AUREA*, "the golden," in order to distinguish it from *Comana* in Pontus, stood on the river Sarus (Sihun), in a deep valley of the Anti-Taurus range, and was celebrated for the magnificence and splendor with which the goddess Mā, the Greek Enyo, was worshipped there. Indeed, the city was nothing more than an appendix to the temple, and was governed by the high priest. More than six thousand persons were engaged in the service of the temple, and enormous estates, yielding a royal revenue, were set apart for defraying the expenses. Its site has not been identified.

**Comana**, an ancient city of Pontus in Asia Minor, stood on the river Iris (Tocatsu), and is said to have originated as a colony from Comana in Cappadocia. The goddess of the moon was, at all events, worshipped in the city with a pomp and magnificence which reminds one of the Mā-worship in Cappadocia. This circumstance, as well as its central position, made the city a favorite emporium of the Armenian and other merchants. Remains of Comana are still to be seen near the village of Gumenek, which stands on the Tocatsu, 7 miles from Tocat.

**Comanche**, capital of Comanche co., Tex. (see map of Texas, ref. 3-G, for location of county). Pop. in 1880, 704.

**Coman'che In'dians**, or **Camanches**, a warlike tribe of American savages who roam over the northern part of Texas and of Mexico. They are nomadic, and range over a wide extent of territory, including part of New Mexico and the valley of the Rio Grande. They have large numbers of horses. Their principal occupations are robbery and war. They always fight on horseback, and have some firearms, but more commonly use the bow and arrow. They are by treaty placed upon a large reservation in the S. W. part of the Indian Territory, with some Kioways and Apaches. The Comanches were estimated in

1872 at 3180 souls. They appear to be of the same stock with the Shoshonees or Snakes.

**Comarca** [It.], a judicial district. *Comarca di Roma*, the district of Rome and its vicinity, including in particular Tivoli and Tivoli.

**Comatula**. See FEATHER STAR.

**Co'ma-Vig'il** (i. e. "wakeful coma"), a name sometimes applied to the semi-comatose state observable in certain cases of fever, etc.

**Comaya'gua**, formerly **Valladolid**, a city of Central America, the old capital of Honduras, on river Humuva, about 180 miles E. of Guatemala. It is the seat of a bishop, and has a cathedral, a college, a hospital, and several convents. It was founded in 1540 by Alonso de Cáceres. It was once much larger, but has been visited repeatedly by war and pestilence. Pop. 7500.

**Comb** [from the Lat. *como*, to "comb or dress the hair," and more remotely from *coma* (Gr. κόμη, "hair"; Anglo-Saxon, *camb*; Ger. *Kamm*; Lat. *pecten*; Fr. *peigne*), an implement used for cleaning the hair, as well as for adjusting and keeping it in place. The ancient Greek and Roman combs were made of box-wood, but, later, ivory combs came into use among the Romans, as they had long before among the Egyptians. Combs are made of tortoise-shell, ivory, horn, wood, bone, metal, and India-rubber. The old method of cutting the teeth is by a saw, which has two blades of steel set parallel to each other, with a space between them equal to the thickness of the intended tooth. The teeth are then finished by means of thin, wedge-shaped files. By these processes the material corresponding to the spaces between the teeth is wasted; but combs are now made by a method in which the otherwise wasted material is made to form the teeth of a second comb. The plate of material is cut through by means of a cutter, consisting of two thin chisels inclined to each other; between these, and connecting the ends, is a small cross-chisel. When this cutter descends with sufficient force upon the plate, it will cut one of the teeth; while the cutter is rising, the table carrying the plate is made to advance a distance equal to the thickness of one tooth, and thus the successive cuts are made. The plate is easily parted into two combs, the teeth of which only require filing and finishing. India-rubber combs are made by pressing the material into the required form in moulds, and "vulcanizing" or combining it with sulphur afterwards.

**Combaco'num**, an ancient city of Hindostan, in the Carnatic, 20 miles E. of Tanjore. It is regarded as a holy city by the Hindus, and has numerous pagodas and tanks, the water of which is supposed to be capable of washing away sin. Pop. estimated at 40,000.

**Combe** (ANDREW), M. D., born in Edinburgh Oct. 27, 1797, wrote "The Principles of Physiology Applied to the Preservation of Health" (1834), often reprinted, and the "Physiology of Digestion" (1836). Died Aug. 9, 1847.

**Combe** (GEORGE), a phrenologist, a brother of the preceding, born in Edinburgh Oct. 21, 1788, practised law in his native city for many years. He produced in 1819 "Essays on Phrenology" and "The Constitution of Man Considered in Relation to External Objects" (1828; 9th ed. 1860). He married in 1833 a daughter of Mrs. Siddons, the actress. In 1838 he visited the U. S. and delivered lectures on phrenology. Died Aug. 14, 1858.

**Combermere**, VISCOUNTS (1827), BARONS Combermere (1814, United Kingdom), and baronets (1677).—WELLINGTON HENRY STAPLETON COTTON, second viscount, born Nov. 24, 1818, was M. P. for Carrickfergus 1847-57, and succeeded his father Feb. 22, 1865.

**Com'bermere** (STAPLETON COTTON), VISCOUNT, an English general, born Nov. 17, 1773. He served in India, and in 1810 obtained command of the cavalry under the duke of Wellington. At the battle of Salamanca, 1812, he was severely wounded. In 1814 he was raised to the peerage, in 1825 he became commander-in-chief in India, and a field-marshal in 1855. Died Feb. 21, 1865.

**Combi'nant**, in mathematics, is a covariant (or invariant) of two or more quantities, which possesses the additional property of remaining unaltered, a factor excepted, when the quantities are replaced by linear functions of themselves.

**Combination**. See CO-OPERATION, by HON. THOMAS HUGHES, M. P., and TRADE UNIONS.

**Combination, Alternation of Position**. See PERMUTATION.

**Combreta'cea** [from *Combretum*, one of the genera], a natural order of exogenous plants, trees, or shrubs, mostly natives of tropical countries, and distinguished by a convolute embryo. They possess astringency, and some of them are employed in dyeing. The order comprises about

200 known species. There are in the Southern U. S. several unimportant shrubs of this order, and one large tree, the *Terminalia Catappa*, which grows in Florida and the East and West Indies, and produces an edible nut resembling the almond.

**Combs** (LESLIE), GENERAL, a lawyer, born in Kentucky in 1794. He served with great distinction as an officer in the war of 1812, afterwards practised law in his native State, and became a prominent Whig politician and general of militia. D. Aug. 21, 1881.

**Combust'ion** [Lat. *combustio*, from *con*, intensive, and *uro*, *ustum*, to "burn"], the process of burning, which usually consists in the union of oxygen with the combustible substance. The evolving of heat and light which attends the process of combustion announces intense chemical action. Some substances burn at ordinary temperatures, such as phosphorus, which glows when exposed to the air; wood, coal, etc. require to be raised in temperature before they possess the power of combining with the oxygen of the air. Chlorine and some other gases may be made to support combustion in certain limited circumstances. Different combustible substances give off different amounts of heat. The mode in which the heat evolved may be measured is either—1. To observe the quantity of ice which a given weight of the combustible will melt when burning; 2. To notice the weight of water which the combustible will convert into steam; or, 3. To estimate the number of pounds of water which the burning body will raise from 32° to 212° F. The amount of heat evolved appears not to be proportional to the quantity of oxygen required to burn the various combustibles. The quantity of heat given out during the combustion of any burning body is the same whether the burning takes place rapidly or slowly, yet the sensible heat may vary according to the rapidity of the process.

COMBUSTION, SPONTANEOUS. See SPONTANEOUS COMBUSTION.

**Com'edy** [Gr. κωμῳδία, probably from κῶμος, "festivity," and ᾠδή, a "song"; Lat. *comœdia*; It. *commedia*; Fr. *comédie*], a species of drama, of which the characteristics in modern usage are—that its incidents and language resemble those of ordinary life; that the termination of its intrigue is happy; and that it is distinguished by greater length and greater complexity of plot from the lighter theatrical piece entitled a farce. The original Attic comedy was a burlesque tragedy in form, in substance a satire on individuals, and founded on political or other matters of public interest. The Attic comedies are usually assigned to three schools—the "old," the "middle," and the "new comedy." The old comedy lasted till the end of the Peloponnesian war. It was characterized by personalities, great freedom and irregularity, and was a powerful political engine. The middle comedy was more finished, less personal and direct in its aims, satirizing systems and opinions rather than individual men; it ceased with the Macedonian conquest. The new comedy was very much like our modern comedy in scope and general character.

**Come'gys** (CORNELIUS G.), M. D., a native of Delaware, and professor of the institutes of medicine in Miami University, Oxford, O., published in 1858 a "History of Medicine," 8vo.

**Come'nius** (JOHN AMOS), a Slavic educational reformer and philologist, born in 1592, was a Moravian minister, and taught school at Lesna, in Poland. In 1631 he published "*Janua Linguarum Reserata*" ("The Gate of Languages Unlocked"). He went to Sweden in 1642, and was employed by Oxenstiern in reorganizing the schools. In 1648 he settled at Amsterdam. Among his other works are "*Opera Didactica*" (1657) and "*Orbis Sensualium Pictus*" (1658), the original child's picture-book. Died Nov. 15, 1671.

**Co'mes** (gen. **Com'itis**), a Latin word signifying a companion among the later Roman emperors, was the title of an officer with territorial jurisdiction. It was nearly equivalent to count or earl. (See COUNT.)

**Com'et** [Gr. κομήτης (from κόμη, "hair"); Lat. *cometa*, so called because its tail was supposed to resemble a lock of hair], a celestial body revolving about the sun, generally in an extremely elongated orbit, and consisting of exceedingly attenuated matter. The characteristic features of a comet are—a definite point or nucleus, a nebulous light or coma around the nucleus, and usually a luminous train or tail following or preceding the nucleus. Sometimes several tails are observed on one comet. Formerly, when the train preceded the nucleus—as is the case when a comet has passed its perihelion—it was called the beard. Neither the tail nor the nucleus is now considered absolutely essential to a comet, but all bodies are classed as comets which have the peculiar motion of comets and an extremely ec-

centric orbit. Among the differences between comets and planets are the following: planets move in the same direction from west to east, which is called "direct motion," but the movements of comets are sometimes from east to west, or retrograde; the orbits of all the planets are limited to a comparatively narrow zone on either side of the ecliptic, but the paths of comets cut the ecliptic in nearly every direction, some being even perpendicular to it; the orbits of all the planets are nearly circular—the orbits of comets present every degree of eccentricity. Of 200 comets whose orbits have been ascertained with more or less accuracy, forty or more appear to describe ellipses, seven or eight hyperbolas, and the rest parabolas. In general, it is held that comets with parabolic or hyperbolic orbits are only occasional visitors to the solar system, whose return is not to be looked for. The discovery that comets are extraneous to our atmosphere was made by Tycho Brahe, who ascertained the fact by observations of the comet of 1557. Newton demonstrated that they are guided in their movements by the principle which controls the planets; and Halley was the first, by determining the elements of a number of comets from recorded observations, to identify the comet of 1682 with one observed in 1607 and in 1531, and thus confidently to predict its return at the end of 1758 or beginning of 1759. The comet passed the perihelion on the 12th of Mar., 1759, exactly a month before the date fixed upon by astronomers. There are other comets whose periodicity is established and whose paths are accurately known; for example, those of ENCKE, PETERS, and FARE (which see).

In 1770, Messier discovered a comet, known as Lexell's, which remained visible a long time, and observations showed the orbit to be an ellipse whose major axis was only three times the diameter of the earth's orbit, and indicated a period of five and a half years. It was impossible to identify this comet with any before observed, and yet it was very difficult to conceive that a bright comet with so short a period should have previously escaped observation. What was still more remarkable, it was never seen again, though carefully looked for in the places where according to previous observations its orbit should have been. It gave occasion to many sarcasms by the wits of the day at the expense of astronomers. At present the explanation is easy. The comet was never seen before 1770, because of its nearest point to the sun having been as distant as the orbit of Jupiter. In 1767 it was in such close proximity to Jupiter, moving in the same direction, and nearly in the same plane, that the attraction of this great planet entirely changed its orbit. Its passage to the perihelion in 1776 took place by day, and in 1779, before another return, it again encountered the vast body of Jupiter, the attraction of the planet deflecting it into more distant regions, and so changing the form of the orbit that if it had been again visible it would not have been recognized. The great comet of 1680—which gave Newton the means of proving that comets revolve around the sun in conic sections, and that they are retained in their orbits by the same force as that which regulates the movements of the planets—was the most remarkable for brilliancy among all those of which we have any authentic account. This comet is supposed to be the one that appeared about the time of Caesar's death (44 B. C.), and that seen in the reign of Justinian (531 A. D.), and in 1106. There is, however, some doubt among astronomers as to these points. This comet came nearer to the sun than any known, except perhaps the comet of 1843. It approached the sun within less than 600,000 miles, about two-thirds of the sun's diameter. The tail or train of comets is nearly always turned away from the sun, frequently assuming a curved form. It increases in length with its proximity to the sun, but in most cases does not acquire its greatest length till after its perihelion. It is believed to consist of finely-divided matter, which is driven off from the comet by some unknown force residing in the sun.

The comets most remarkable for brilliancy in the present century have been the comets of 1811, of 1843, and of 1858 (Donati's), the latter having a period of about 1950 years, and an aphelion distance of some 15,000,000,000 miles. It has been a question among astronomers whether comets are self-luminous, or merely reflect the light of the sun. The fact of their becoming invisible in receding from the sun, though still of considerable apparent size, strongly leads to the adoption of the latter hypothesis. Experiments were made by Arago which showed that the light from comets is partially polarized in the same way that the sun's light is reflected by our own atmosphere, which strongly corroborates the same belief. The substance of the nebulousity and the tail is of almost inconceivable tenuity. Stars seen through them suffer no diminution of brightness, though the light traverses millions of miles of the cometary atmosphere; comets have never been observed to

cause any sensible disturbance of the planetary motions, though themselves much affected by the neighborhood of a planet. The curvature of the tail and the acceleration of the periodic time in the case of Encke's comet indicate their being affected by a resisting medium which has never been observed to have the slightest influence on the planetary periods. Even the nuclei of comets appear to be of extremely small density. There are accounts of stars of a very low order of magnitude being seen through the nuclei.

Comets were formerly regarded with dread, as presaging pestilence, war, or some other great calamity, not merely by the ignorant, but by a large portion of the people. Milton alludes to this notion when he says that a comet

"from his horrid hair  
Shakes pestilence and war!"

*Paradise Lost*, book ii., l. 710.

Halley's comet in 1456, being observed soon after the Turks had taken Constantinople, was regarded by all Europe with a superstitious terror, and to the Ave Maria was added the prayer, "Lord, save us from the devil, the Turk, and the comet!" The occurrence of a lunar eclipse at Constantinople at the same time increased the portentousness of the event. The discoveries of the magnitude of the space filled by cometary bodies, and their prodigious velocity, together with the confessed impossibility of always predicting their approach, have produced fears of another kind in the public mind. The groundlessness of such alarms from the extreme improbability of collision with the nucleus, and the probable harmlessness of a contact with the extremely attenuated surrounding matter, seems sufficiently evident. Already on many occasions some of the matter in the tail of comets must have come within the earth's atmosphere. Whether the effect is deleterious or salubrious, or whether it has any influence at all, is a matter of question.

Observations with the spectroscope have failed to give satisfactory evidence of the chemical constitution of comets, though some of them seem to consist in part of vaporized carbon or hydro-carbon gases. In Mar., 1872, Schiaparelli received the gold medal of the London Astronomical Society for his discovery that comets are sometimes connected with those remarkable displays of meteoric phenomena known as "meteoric showers." The importance of this discovery has been recognized by Donati, Peters, Prof. Newton, Oppolzer, Le Verrier, Chladni, Schellen, and other eminent savants. (See METEORITES.)

**Comet-Finder**, a telescope of low magnifying power and large field of view, used in searching for comets.

**Com'fort** (GEORGE FISK), A. M., an able Methodist educator, born Sept. 30, 1833, in Berkshire, N. Y., graduated at Wesleyan University, Middletown, Conn., in 1857. He taught in America Seminary, N. Y., in 1857-58, in Fort Plain Seminary, N. Y., in 1858-59, in Van Norman's Female College in 1860, travelled and studied in Europe and the East (1860 till 1866), was professor of modern languages and æsthetics in Alleghany College, Meadville, Pa., 1866-68; was chief originator and organizer of the American Philological Association (1869), and its secretary from 1869 to 1873; was one of the principal movers in founding the Metropolitan Museum of Art, New York (1869-72); was appointed professor of modern languages and æsthetics and dean of the College of Fine Arts in Syracuse University, N. Y., 1873; author of various essays upon linguistics, æsthetics, and pedagogics; is a corresponding member of the Archæological Institutes of Rome, Berlin, and Paris, and author of an excellent series of text-books for the study of the German language (1868-72).

**Comfrey**, *kum'fre* (*Symphytum*), a genus of perennial plants of the natural order Boraginaceæ, distinguished by a 5-cleft calyx and a corolla enlarged upward, its throat closed by awl-shaped scales. The species are natives of Europe and Asia. *Symphytum officinale* was formerly much esteemed as a vulnerary. It is often seen in the U. S. in gardens, and is also naturalized in our fields.

**Comines**, or **Commines**, a town on the S. W. frontier of Belgium, is divided by the river Lys into two nearly equal parts, one of which is in France. It is 9 miles N. of Lille. Here are important manufactures of ribbons, threads, etc. Pop. of the French town, 6246; of the Belgian, 3480.

**Comines, de** (PHILIPPE), lord of Argenton, an historian and statesman, born near Menin, in Flanders, in 1445. The son of an ancient race, his education was conducted with the greatest care, notwithstanding he had early lost his parents. He entered the service of Charles the Bold, who employed him in important diplomatic business. About 1472 he proved untrue to the duke, forming a secret compact with Louis XI. while he was held a prisoner by Charles, who took him captive at Peronne, and became a minister of the French king, his enemy. After the death of Louis XI., Comines was an adherent of the duke of Orleans, aiding that



prince in his ambitious plans against the French government. This cost Comines his ministerial office; whereupon he aided the Bourbon prince the more zealously. He wrote memoirs of historical events from 1464 to 1498 (1523), Langley-Dufresnoy, London, 1747, more complete; and Dupont, Paris, 1840-47. Died at Argenton, Oct. 17, 1509. (See FELIX VAN HULST, "P. de Comines.")

**Comi'so**, a town of Sicily, in the province of Noto, about 41 miles W. S. W. of Syracuse. It has manufactures of paper. Pop. 15,803.

**Comitia**, ko-mish'e-ā [from the Lat. *com* (for *con*), "together," and *eo, itum*, to "go"], in ancient history, were certain political assemblies of the Roman people. The comitia were of three kinds, distinguished by the epithets *curiata*, *centuriata*, and *tributa*. The comitia *curiata* were the assemblies of the patrician houses or *populus*, and in these, before the plebeians attained political importance, was vested the supreme power of the state. The name *curiata* was given because the people voted in *curiæ*, each curia giving a single vote, representing the sentiments of the majority of the members composing it, which was the manner in which the tribes and centuries also gave their suffrages in their respective comitia. After the institution of the comitia *centuriata*, the functions of the *curiata* were nearly confined to the election of certain priests and passing a law to confirm the dignities imposed by the people. The comitia *centuriata* were the assemblies of the whole Roman people, including patricians, clients, and plebeians, in which they voted by centuries. By the constitution of the centuries these comitia were chiefly in the hands of the plebeians, and so served originally as a counterpoise to the powers of the comitia *curiata*, for which purpose they were first instituted, it is said, by the king Servius Tullius. These comitia quickly attained the chief importance, and public matters of the greatest moment were transacted in them, as the election of consuls, prætors, etc. The comitia *tributa* were the assemblies of the plebeian tribes. According to tradition, they were first instituted after the expulsion of the kings, and in them were transacted matters pertaining to the plebeians alone, as the election of their tribunes, etc.

**Comity of Nations.** See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

**Comman'der**, in the British navy, is an officer next under a captain in rank, but independent of him. He is, in effect, the captain of a ship of war under eighteen guns, or of a sloop of war or a bomb-vessel. In matters of etiquette he ranks with a major of the army. The duties of a commander on shipboard are almost exactly the same as those of a captain.

In the U. S. navy a commander is of the grade next below that of captain, and next above that of lieutenant-commander. He takes rank with a lieutenant-colonel of the army.

**Commander-in-Chief**, a title given to the officer in whom is vested the supreme command of all the land or naval forces of any nation. In Great Britain he is appointed by the sovereign and holds office for life. His duties have never been clearly defined as distinguished from those of the cabinet minister who presides over the war office. He is responsible to the Crown for the discipline and efficiency of the army. The office of the commander-in-chief, technically called "Horse Guards," comprises the departments of the military secretary, the adjutant-general, and quartermaster-general. Great changes have recently been effected in the status of the commander-in-chief, who has lost his separate official abode, and is now more completely subordinate to the secretary of war and responsible to Parliament. The office is usually vacant, and its duties performed by a "field-marshal commanding in chief." In the U. S. the President is the commander-in-chief.

**Commandite** [from the Late Lat. *commenda*, a "trust"], **Société en**, in France, a word used to express a partnership in which a person advances capital without taking charge of the business. In this country a person thus connected with a firm is termed a special partner. (See PARTNERSHIP, by PROF. T. W. DWIGHT, LL.D.)

**Commandments.** See DECALOGUE.

**Commandments of the Church** are rules imposed upon the laity of the Roman Catholic Church, which are regarded as just as binding as the Decalogue. They are frequently called the five commandments, and are variously given; those most commonly taught are as follows:

"1. The Catholic Church commands her children on Sundays and holy days of obligation to be present at the holy sacrifice of mass, to rest from servile works on those days, and to keep them holy.

"2. She commands them to abstain from flesh on all days of fasting and abstinence, and on fast days to eat but one meal.

"3. She commands them to confess their sins to their pastor at least once a year.

"4. She commands them to receive the blessed sacrament at least once a year, and that at Easter or during the paschal time.

"5. To contribute to the support of their pastor.

"6. Not to marry within the fourth degree of kindred, nor privately without witnesses, nor to solemnize marriage at certain prohibited times."

**Commen'da** [Late Lat. *commenda*, a "trust," from *commendo*, to "entrust"] was originally the conferring of a vacant benefice for temporary administration on a clergyman already provided with one; afterwards it came to be the bestowal of such a benefice for a long period or for a lifetime. As, however, after the eleventh century abuses crept in, and influential ecclesiastics especially availed themselves of the *commenda* to increase their incomes, it was found necessary to oppose it. This was done by Gregory VII. and Innocent X., and also at the Councils of Constance and Trent. Formerly in the Church of England, when a clergyman was promoted to a bishopric, all his other preferments became void, but the interest in the living was retained by its being *commended* to the care of a bishop (called the *commendatory*) by the Crown till there should be provided for it a proper pastor. Such a living was called an *ecclesia commendata*, and it was said to be held in *commendam*. The holding of benefices and livings in *commendam* in England has been abolished by law. Among the ecclesiastical orders of knights the name *commenda* (commandery) was given to the domain over which the members (*commendatores*) exercised jurisdiction.

**Commen'sal** [from the Lat. *com* (for *con*), "together," and *mensa*, a "table"], a term recently (1870) introduced into natural history to denote those small animals, sometimes mistaken for parasites, which accompany or attach themselves to others, not to prey upon them, but to share their prey. The word means a "table-companion." Thus, a Siluridan fish of Brazil, of the genus *Platyostoma*, accommodates in the cavities of his mouth quite a family of small commensal fishes, of a species to which the name *Stegophilus invidiosus* has been given, which take toll of his food as it passes to his throat.

The term commensal was originally applied to certain court-officers of France who were furnished with food at the king's table.

**Commen'surable** [Lat. *com* (for *con*), "with," and *mensura*, "measure"], applied to magnitudes measurable by a common unit. It is one of the inscrutable things in geometry that there are magnitudes of which the relations to each other are determinate, yet incapable of numerical expression. Such magnitudes are said to be incommensurable. Magnitudes, on the other hand, of which the relations to each other can be numerically expressed with exactness, are called commensurable. By this is meant that, in the case of such magnitudes, there exists some smaller magnitude capable of being contained in each an exact number of times, without, in either case, a fractional excess. But no linear dimension, however small, is small enough to be a common measure of the diagonal and the side of a square, or of the diameter and the circumference of a circle. These pairs of magnitudes are therefore examples of relative incommensurability. In reasoning upon cases of incommensurability, the method of proceeding is to show that what we mean to prove of a magnitude incommensurable with another is very nearly true of either of two magnitudes commensurable with that other, the one greater and the other less than the incommensurable; and that the approximation to the truth is closer and closer as these commensurables are taken more and more nearly to the incommensurable. This approach can be carried so far that the commensurables shall differ from each other by less than any assignable quantity; while yet the incommensurable will always lie between them; and as the proposition to be proved is not true of the larger of the two commensurables, because that is too large, nor of the smaller, because that is too small, we infer that it must be true of the incommensurable, which is always smaller than the larger commensurable, and larger than the smaller. Very many of the quantities symbolized in mathematical investigations—*e. g.* sines, cosines, logarithms, and (generally) roots, are incommensurable with each other, with the quantities from which they are derived, and with any common unit.

F. A. P. BARNARD.

**Commentry**, a town of France, department of Allier, on the Oeil, 8 miles S. E. of Montluçon, in the centre of important coal-fields. It derives its prosperity from coal-mines and iron-works, and has increased rapidly in recent times. Its manufactures of looking-glasses are very celebrated and remunerative. Pop. 9978.

**Com'merce** [from the Lat. *commercium*, *merx*, "traffic, merchandise"], the exchange of commodities with foreign nations. Common usage distinguishes between trade and commerce by assigning the former to the land and the latter to the ocean, whence the contrast of *domestic* and *foreign*. Trade includes every kind of exchange or sale of property, by barter or otherwise, between individuals or communities, while commerce refers more appropriately to trade carried on by ships. Water-transport on the great lakes of North America is called inland commerce. Commercial treaties are treaties between different nations regulating their mutual tariffs on merchandise exchanged, or sold by one to the other. In this article commerce is considered as trade and intercourse between nations by sea; briefly, the trade in imports and exports, or international trade. "Commerce," says Galiani, "owes its rise to the necessity of exchanging the surplus of our commodities for those we stand in need of, and may be defined the interchange of the produce of general labor to provide for the wants of all."

The desire of wealth has always been the most constant and most influential motive and spur to human exertion; and the possession of it, both with nations and individuals, has proved to be the synonym of power in all achievements, whether of peace or war. Gold and silver being the most palpable evidences of wealth and its most convenient forms, to possess them in abundance has been an object of universal ambition in all ages. Hence the various methods by which their acquisition might be assured have been subjects of attentive investigation by economists and statesmen. Before the rise of commerce the only kind of intercourse that nations held with each other was aggressive. There were but two sources of national wealth: one was the cultivation of the land; the other, mutual invasion and pillage. Military expeditions were organized on a vast scale for no other purpose than that of despoiling opulent states which were not prepared for self-defence. Cyrus (B.C. 537) led the Persians to the conquest of the rich provinces of Asia for the express purpose of plunder. He distributed the treasures of conquered kings among his generals, grandees, and most daring soldiers. The Romans did likewise. "Masters of the world, they arrogated to themselves all its treasures. Having heard of the immense wealth of Ptolemy, king of Egypt, they passed a law by which they constituted themselves the heirs of a living monarch, and confiscated the dominions of an ally." (*Montesquieu*.) The Romans had no commerce and few arts. They were constantly at war to procure citizens, women, and lands; and every successive war enabled them to undertake a new one. Such was the state of the world to which commerce put an end. It converted jealous and hostile nations into amicable communities, and displaced the atrocities of war by the industries and the arts of peace. It rid the ocean of pirates, established a police of the seas, and gave birth to navigation. (See HANSEATIC LEAGUE.)

The earliest authentic date assigned to the rise of commerce is about 1000 B. C. The Phœnicians occupied a narrow strip of land between Lebanon and the Mediterranean Sea. They were an ingenious race, remarkable for intellectual activity and industry in the arts, whereby they acquired great wealth. Their proximity to the sea disposed them to maritime adventure, and they became skilful sailors. Their commercial expeditions extended to India (Ophir), and they are said to have doubled the Cape of Good Hope in a voyage of three years, returning home by the Pillars of Hercules (Straits of Gibraltar). They carried on commerce with the British Isles and the shores of the Baltic. They established colonies on Crete and Cyprus, in Sicily, Sardinia, the south of Spain, and on the coast of Africa, of which Carthage was the most celebrated, surpassing in splendor and the power of its arms even the famous cities of Tyre and Sidon. In that age of the world there was no safety for accumulated wealth and treasure but in the power to defend them. Universal rapacity was the law, and superior strength the justification of invasion and pillage. But the Phœnicians maintained themselves for near 800 years against the surrounding barbarians, and ruled the sea by their merchant-fleets. When at last they fell under the repeated attacks of their enemies, they carried their wealth, their arts, and their industries to the nations that inherited their commerce. But these nations themselves soon became the prey of Rome, and shared a common fate with all the colonies of Phœnician industry and enterprise. With the fall of Carthage may be said to have terminated the career of ancient commerce. "When the genius of Rome," says Ganilh, "grounded on the ruins of Carthage the conquest of the world, the sources of wealth were dried up in Europe, in Asia, and in Africa, because those countries had no longer any commercial communication. The treasures which Rome had gathered by the plunder of all nations did not prove a source of wealth to

any country; they fertilized no lands, improved no kind of industry, and did not extend the bounds of civilization in any one respect. They were consumed in appeasing the sedition of the cohorts and saving the empire from the successive depredations of its barbarian invaders. From the destruction of Carthage to an advanced period in the Middle Ages, an interval of more than thirteen centuries, the sources of wealth were dead throughout the Roman empire, which at that time embraced the known world. It was not till the twelfth century, when Venice, Genoa, and Pisa were greatly enriched by the Crusades, that those sources revived, and Europe was again indebted to foreign commerce for prosperity and wealth. Those cities, and Florence, acquired great wealth by their commerce with the produce of the East and North. They dictated laws to the Greek empire, commanded the respect of the greatest monarchs, and held the fate of Europe in their hands for more than three centuries. But they became involved in ambitious rivalries and expensive wars, and were finally reduced to their territorial limits and local industries. They had, however, established numerous factories in the north of Europe at Lübeck, Bruges, Bremen, Hamburg, and Antwerp, from which sprang the Hanseatic League."

The introduction of the mariner's compass by Flavio Gioia, an Italian, in the year 1302, gave a new and powerful impulse to maritime adventure. The Portuguese were the first to avail themselves of this great aid to navigation, and to push out from the shores on the broad and unknown ocean. They discovered the islands of Porto Santo and Madeira, and soon after took possession of the Azores. Their voyages extended to the coast of Upper Guinea and Congo, from which Bartholomew Diaz reached the "Cape of Storms," which King John II. renamed the Cape of Good Hope. Eleven years later, in 1497, Vasco de Gama made the sea-passage to the East Indies, and established on the coast of Malabar the first European commercial colony; and three years later Cabral discovered and took possession of Brazil in the name of the king of Portugal. In the following ten years the Portuguese established colonies and factories on the island of Ceylon and the coast of Coromandel, at the same time subjecting the spice-bearing Molucca and Sunda Islands. Lisbon then became the chief seat of commerce in the world. But the most important maritime enterprise that had ever yet been conceived, and which was destined to exert a greater influence over the world than any other of ancient or modern times, was that of Christopher Columbus, a native of Genoa, who set sail from the Andalusian harbor of Palos on the 3d of August, 1492, in three small vessels, to accomplish a passage to the Indies by a due western course round the globe. His patron, Queen Isabella of Spain, invested him with the title of Great Admiral and Viceroy of all the lands and islands that he might discover, and the tenth part of the revenue that might be derived from them. The result of this memorable expedition was the discovery of the western continent of America. Numerous adventurers followed in the track of Columbus; among others, Balboa, who crossed the Isthmus of Panama and was rewarded by a sight of the Pacific Ocean. Magelhaens, a Portuguese, passed through the straits which bear his name at the southern extremity of South America, and accomplished the first circumnavigation of the globe by reaching the East India Islands (1514). These discoveries were followed by the conquest of Mexico by Cortez (1520), that of Peru by Pizarro (1529), and of Chili by Almagro (1535). All these expeditions were characterized by frightful atrocities on the part of the Spaniards, and a fearful destruction of the native populations. A cruel though well-deserved fate befell the chief actors in these bloody scenes. Cortez was recalled to Spain, and died neglected in 1547; Francis Pizarro and his brother quarrelled with Almagro and beheaded him; the son of Almagro, in revenge, killed Francis Pizarro; and his brother, the last Pizarro, was hung by a priest who was sent out as governor of Peru by Charles V. One of the consequences of the conquest of Mexico and Peru was an immense addition to the amount of gold and silver, resulting from the working of the rich mines of those countries, whereby the values of commerce underwent a material change. The trade of the world was led into new currents. Portugal, Spain, the Netherlands, and Great Britain became centres of wealth and commerce (for particulars of which see, severally, the countries named). Of modern commercial nations, England occupies the first place. Her proud title of "mistress of the seas" has been well earned by the energy with which she has carried her arms and arts into all regions of the globe. But her policy has not always been free from the reproach of violence. She has not hesitated to extort commercial treaties at the cannon's mouth when she has failed to obtain them by amicable means.

The commerce of the U. S. originated with the separa-

tion of the colonies from the mother-country. While they were subject to British domination the people were prohibited by act of Parliament from engaging in any kind of manufactures. In 1719-32 the British merchants complained in memorials to the government that the people of Massachusetts, New York, Connecticut, Rhode Island, and Maryland were setting up manufactures of woollen and linen clothing for the use of their own families, and of flax and hemp for coarse bags and halters. Parliament prohibited the exportation of hats from the colonies, and trading in them from one colony to another by ships, carts, or horses. Iron-mills for slitting and rolling and plating forges were prohibited under a penalty of \$2500. Among the grievances recited in the Declaration of Independence was that "the king had cut off our trade with all parts of the world." Such were the difficulties with which the infant commerce of the country had to struggle. In 1789 the whole tonnage of the country did not exceed 201,562, but the wars of the French Revolution breaking out about this time, and England soon becoming involved as one of the belligerents, the American came to be the only neutral flag on the ocean, and the tonnage increased rapidly, reaching near 1,000,000 in 1800. For a succession of years following this date the harvest-fields of Europe were trodden under the feet of hostile armies, which created an active demand for American breadstuffs. In the first decade after 1789 the united exports and imports of the U. S. aggregated near \$1,000,000,000. The nation was almost without manufactures, and it was regarded by a large party as a significant indication of its true policy that it was able in the short space of ten years to pay for near \$500,000,000 of foreign manufactures exclusively with the products of agriculture. The following statement shows the progressive development of the commercial capacity of the country in tonnage by decades, coincidentally with the aggregate of its foreign trade:

	Tonnage.	Foreign trade.
1789.....	201,562	\$43,205,156
1800.....	972,492	162,224,548
1810.....	1,424,748	152,057,970
1820.....	1,280,167	144,141,669
1830.....	1,191,776	144,726,428
1840.....	2,180,764	239,227,455
1850.....	3,535,454	330,037,038
1860.....	5,353,868	762,288,550
1870.....	4,246,507	931,042,571*
1880.....	4,068,034	1,583,003,113

The ocean-carrying trade of the U. S. is divided between American and foreign vessels in the proportion of about one-sixth to the former and five-sixths to the latter. The official statistics of 1883 exhibit the following figures, illustrating the relative proportion of our foreign commerce shipped in American and foreign bottoms respectively: Imports, 1883, carried in American vessels, values, \$149,959,320; in foreign vessels, \$572,905,961. Exports, 1883, carried in American vessels, \$111,758,883; carried in foreign vessels, \$717,224,456. During the late civil war the commercial flag of the U. S. was driven from the ocean by the hostile policy of the British government in allowing its colonial ports to be used as a base of operations by a class of armed pirates which had no lawful home or status in any land. In consequence of this fact, a large proportion of the tonnage of the U. S. was transferred to foreign flags, and at the close of the war there were found to be legal difficulties in the way of its restoration. A singularly rapid development of the commerce of the U. S. began about the year 1850. Up to that time the yearly foreign trade had scarcely exceeded an average, except in a few instances, of \$230,000,000 a year. In 1851 it rose to \$400,000,000; in 1860, to \$762,000,000; and in 1880 to over \$1,500,000,000. This rapid increase, if not developed under circumstances positively inauspicious, received no encouragement whatever from any general causes or principles connected with political or civil administration. It is foreign commerce, and foreign commerce only, that maintains in any country that healthy state of exchange with the common markets of the world which alone is compatible with the preservation of a prosperous state of industry, labor, manufactures, and trade at home. A continuous adverse balance, involving a constant drain of the precious metals to other markets, is the precursor of inevitable derangement and disorder in the finances, which cannot possibly have any other effect than to drag down the best devised system of domestic trade and labor, and plunge it into hopeless ruin. Since the year 1875 the commercial statistics of the U. S. exhibit a continuous excess of exported commodities over imports, varying from \$26,000,000 to \$260,000,000 per annum. There is no instance in history, from the most ancient times, in which the policy

of robbing commerce of its precious earnings has not resulted in paralyzing its energies, destroying its hopes, and prostrating the labor, the manufactures, the industries, the arts, and the trade of the nation. It is a self-evident proposition that the circulation of the medium, and the circulation of the commodities which are their object, must be coincident. The one cannot be obstructed or stagnated without involving paralysis of the other.

In political economy, commerce is the coefficient of both production and consumption. It gives life and value to both. While treating of commerce in the restricted sense of foreign trade, we cannot lose sight entirely of its elementary idea of distribution as the simple agent of exchange. But for it production would be limited to the extent required for the mere subsistence of the people. All beyond that would be dead and valueless. Consumption likewise would be limited, since each country would have nothing to consume beyond a supply for immediate wants. It is man himself who is the primary object of development. In proportion as his nature expands he experiences new desires, and employs himself in new devices and arts for their gratification. History furnishes a sad picture of those nations and races of men which have restricted themselves to a single occupation, as of hunting or fishing, or even of agriculture. "Whatever be the kind of labor they are employed in," says Ganiilb, "wealth cannot be acquired, increased, and preserved among any people but when commerce, bringing foreign in exchange for the national produce, affords greater means of subsistence, more comforts and enjoyments, and particularly when it directs their labor to new objects, with the utility of which they were unacquainted, and in which they find new instruments of exchange and wealth. Such has everywhere been the progress of labor, civilization, and wealth."

In our own time commerce has set in motion those immense tides of emigration which have transplanted the excess of population in the older countries of Europe to the boundless fields of production in America and Australia, brightening the destiny of millions of our race, and essentially banishing the spectre of famine from the face of the earth. With one hand it has joined the navigation of European waters with that of the Indian Ocean by the canal of Suez, while with the other it has brought the countless populations of Eastern Asia into contact with the influences of modern thought and the improvements of modern science. It has changed not only the physical relations, but the social and moral destiny, of more than half the inhabitants of our globe.† There are, in reality, few great achievements of modern enterprise that do not owe their conception to the incitements of commerce. The canal of Suez and the transport of the Isthmus of Darien are directly designed to facilitate commerce by avoiding the desolate and dangerous navigation of the great Southern Ocean; and their success to this end is attested by the fact that the sailing-distance saved by them supersedes a navigation equal to the entire circuit of the globe. The government of the U. S. once pushed forward scientific surveys of the Isthmus of Darien with a view to the construction of a ship-canal to unite the two great oceans. A French company, organized by M. de Lesseps, who built the Suez canal, has now begun the work of construction. Another very important measure, or series of measures, has been recommended to the Senate of the U. S. in aid of the extension of the national commerce. A commission was appointed in Mar., 1872, in pursuance of the recommendation of the President, to examine minutely and to take testimony on the subject of improving the transportation-routes from the interior of the country to the seaboard. The result of the inquiry is given in two large volumes published by order of Congress. The committee report, "That after a most careful consideration of the merits of the various proposed improvements, they have come to the unanimous conclusion that the following are the most feasible and advantageous channels of commerce to be created or improved by the national government in case Congress shall act upon this subject—viz. (1) The improvement of the Mississippi River; (2) a continuous water-line of adequate capacity from the Mississippi River to the city of New York *via* the northern lakes; (3) a route adequate to the wants of commerce, through the central tier of States, from the Mississippi River, *via* the Ohio and Kanawha rivers, to tide-water in Virginia; (4) a route from the Mississippi River, *via* the Ohio and Tennessee rivers, through Alabama or Tennessee, to the ocean." The total cost of these improvements is estimated by the committee at from \$120,000,000 to \$155,000,000. The committee rec-

\*Of this sum, the imports (\$431,950,428) are valued in gold, while the exports are valued in currency. Specie payments were suspended from 1862 to 1879, after which gold values again applied to exports.

† It is computed that of the 1,440,000,000 of the existing human race on the earth, more than 700,000,000 occupy the southern and eastern parts of Asia and the islands of the Pacific Ocean. The population of China and British India alone is computed at 630,000,000. (*Behm and Wagner.*)

commend that these "four great channels of commerce shall be improved, created, and owned by the government, and stand as permanent and effective competitors with each other, and with all the railways which may be within the range of their influence." No legislation in pursuance of these projects has ever been adopted by Congress. The commerce of the U. S. has never, like that of England, enjoyed the subsidies of the government. It has been developed by private enterprise alone. The official yearly volumes published by the government on "Commerce and Navigation" and "Commercial Relations" contain statements of the foreign trade of the U. S. and of other nations. A very learned and important work is LINDSAY'S "History of Merchant Shipping and Ancient Commerce" (4 vols., 1874-76).

REVISED BY A. R. SPOFFORD.

**Commerce**, a game played with cards and counters; of the latter, each player puts an equal stake into the pool. The dealer is called the banker, gives each player three cards, and then inquires, *Who will trade?* The eldest hand can either *barter* or *trade for money*. *Barter* means the exchange of a card with the right-hand player, and cannot be refused unless the right-hand player declines the exchange. To *trade for money* is to forfeit a counter to the pool for the privilege of exchanging a card for one in the stock or pack. When the trading and bartering is completed, three like cards are reckoned as a *tricon*, and the best tricon wins the pool. If there is no tricon, the best sequence of three cards in the same suit will win; and if there is no sequence, the best *point* takes the pool; that is, the three cards having the smallest number of pips—aces reckoned as 11, and court-cards as 10—but the rules vary in different sets of players.

**Commercy**, a town of France, in the department of Meuse, stands on the left bank of the Meuse, and has foundries, lime-kilns, cotton-factories, and some trade in cattle, grain, wood, etc. It has a castle built in 1708, now used as cavalry barracks. Pop. 5262.

**Commerson** (PHILIBERT), a French botanist, born at Châtillon-les-Dombes Nov. 18, 1727. He accompanied as naturalist the expedition of Bougainville, which sailed in 1767, and he visited South America and explored Madagascar, etc. He died in the Isle of France in 1773, leaving some works in manuscript. Commerson was a man of profound science. An exceptional honor was conferred on Commerson by the French Academy of Natural Sciences in electing him a member notwithstanding he had never sent them a memoir. Unfortunately, when this distinction was conferred he had been already eight days dead. Forster gave the name *Commersonia* to a genus belonging to the order Byttneriaceae, several other botanists having previously established genera bearing this name, but Forster's genus alone has stood the test of critical study, and still bears the name.

**Communion** [from the Lat. *comminor*, to "threaten," because in it God's threatenings against sin are repeated] is the name of a penitential service in the Liturgy of the Church of England. In that of the Protestant Episcopal Church of the U. S. it is nearly all omitted. The communion in the English Book of Common Prayer comes with little change from the old missals of Sarum and York. The Greek and Latin churches retain the communion, but only for Ash-Wednesday. The communion is in substance a repetition of the curses found in Deut. xxvii., and at the reading of each sentence the congregation responds *Amen*. It is read in the English Church upon Ash-Wednesday, and upon such other days as the ordinary shall direct. Its use is traced back to about 700 A. D.

**Communes**. See **COMINES**.

**Comminges, Counts of**, in French history, a noble family whose descent can be traced from the sixth century.—BERNARD, the fourth count of Comminges, was an Albigensian, and fought on the side of Raymond of Toulouse, his relative, against Simon de Montfort, but after the battle of Muret (1213) was compelled to recant at Narbonne, and become a Catholic. In 1218 he took arms and recovered a part of his ancestral domain, and in 1219 commanded the victorious Toulousans at Baziège. We also find him waging a long war with the count de Foix. D. in 1226. After his time the family never attained much importance in French history.

**Commire** (JEAN), born at Amboise, in France, Mar. 25, 1625, became a Jesuit, and was for many years a teacher of theology, remarkable for his frank and upright character and for spirituality. Died in 1702 in Paris. He is now remembered only for his Latin poems (*Poemata*, 1678), which are mostly upon religious and moral themes, and are remarkable for elegance of diction rather than for power or originality. He produced some fine Latin fables in verse.

**Commissariat** [Fr., from *commissaire*, a "commis-

sioner"], a term originally meaning a "commissionership," has come to be applied to that department of the military administration which has in charge the furnishing of food for the men. The other supplies of the troops, including forage for horses, etc. (with the exception of ordnance stores), are furnished by the quartermaster's department. In ancient Rome the *quæstors* attended to the victualling of the troops. The first English commissary-generals were called *provant-masters*. The British commissariat is now under the charge of a commissary-general-in-chief. That of the U. S., at present, is under an officer who has the rank of a brigadier-general and the title of commissary-general of subsistence. The accounts of the U. S. commissary officers are referred for settlement to the third auditor of the treasury department. (See **SUBSISTENCE OF ARMIES**.)

**Com'missary** [Fr. *commissaire*], a term nearly synonymous with deputy, signifies one to whom the power and authority of another is committed. It is sometimes used in a sense nearly equivalent to that of commissioner. In the army the officers of the commissariat department are styled *commissaries of subsistence*. The officers having charge of musters in and out are *commissaries of musters*. In ecclesiastical law, a commissary is appointed by a bishop to exercise jurisdiction in remote parts of the diocese. A papal commissary is a bishop or other high functionary deputed to perform duties properly belonging to the pope. There are *temporary* commissaries appointed for the performance of a single act or a few particular acts; and *perpetual* commissaries, who regularly represent the pope or some superior prelate in a specified place or district. Often the duty of a commissary is performed by a board of officers, who together constitute a *commission*.

In Scotland the sheriff of each county is called also *commissary* of that county. When the Reformation drove the papal commissaries from Scotland, there was established a supreme commissary court in 1563 for administering the law in such cases as had been formerly decided by the ecclesiastical courts of the papal representatives. The commissary court gradually lost its powers, its duties being performed by the civil courts. In 1836 it was abolished; but there are still commissary courts for the counties, presided over by the sheriff. They transact some of the business which in the U. S. comes before the probate courts.

**Commis'sion** [Lat. *commissio*, from *committo*, *commisum*, to "commit"], the act of committing or performing; also a writing, generally in the form of a warrant or letters-patent. Instruments bearing this title are issued by the executive to officers in the army and navy, judges, and others. The term is sometimes applied to a number of persons joined in an office or trust. All the officers of armies above the grade of sergeant hold their authority by warrants called commissions, and hence they are called *commissioned officers*. The practice of buying and selling all commissions under the rank of colonel formerly prevailed in the British army, but it was abolished by royal warrant, against the will of the House of Lords, in 1871.

**COMMISSION**, in law. See **TRUSTEES**, by PROF. T. W. DWIGHT, LL.D.

**Commis'sion Mer'chant, Agent, or Factor**, a person who sells goods which belong to another party or person, by whom they have been consigned to him for that purpose. The owner of the goods is called the consignor, and the commission merchant the consignee. The latter receives for his services a percentage on the sum for which the goods are sold.

**Commissionnaire** [Fr.], an attendant at European hotels, employed to attend at the arrival of railway trains and steamboats to secure customers, to take charge of baggage, see it passed through the hands of the custom-house officers, and send it on to the hotel; for which services the commissionnaires charge a fee. They likewise procure visés to passports, and act as valets-de-place.

**Com'missure** [Lat. *commissura*, a "joining together," from *com*, "together," and *mitto*, *missum*, to "send"], in anatomy, the union of any two parts or the structure which unites any two parts. Thus, at the outer and inner angles of the eye there are *commissures* between the lids; and in fact the angles of the eye, the mouth, etc. are often spoken of as the commissures of the lids, the lips, etc. Among the parts named commissures are the following: the *commissura simplex*, a little lobe of the cerebellum situated near the posterior incisure, and forming a part of the superior vermiform process; the *commissura brevis*, a lobule arising from the inferior vermiform process of the cerebellum, within the posterior incisure; the *great commissure* of the brain, called often *corpus callosum*, which unites the hemispheres of the cerebrum; the *anterior, middle* or *soft*, and *posterior commissures* of the brain, bands which cross the cavity of the third ventricle; the *optic commissure*, or *chiasma*, the point of the decussation of the optic nerves.

**Committee.** See *INSANITY*, by PROF. T. W. DWIGHT.

**Com'modore**, in the British navy, is a title given to the senior captain of a squadron when there is no admiral present. It is not a permanent rank, but is bestowed for a time on a captain. A commodore usually commands more ships than one, detached from a fleet on some special service; and he then hoists a pennant. In the U. S. navy the title of commodore was formerly given by courtesy to a captain commanding a squadron. The office was recognized by law in 1862, commodores taking rank next below rear-admirals, and next above captains. Their rank corresponds to that of brigadier-general in the army. (See *ADMIRAL*.)

**Com'modus** (LUCIUS ÆLIUS AURELIUS), Roman emperor, born in 161 A. D., the son of Marcus Aurelius; succeeded his father in 180, and soon manifested the excessive cruelty and sensuality of his disposition. His officers Eclectus and Lætus conspired against him, and caused him to be strangled in 192.

**Common.** See *HEREDITAMENTS INCORPOREAL*, by PROF. T. W. DWIGHT, LL.D.

**Common Carriers.** See *CARRIERS, COMMON*, by PROF. T. W. DWIGHT, LL.D.

**Com'mon Coun'cil**, a name given in some cities of the U. S. to one of the governing bodies which control the municipal and local affairs. The other is sometimes called select council.

**Com'moner**, one of the common people, applied in general to all persons except the hereditary nobility; also a student of the second rank in the University of Oxford (England), who pays for his board or *commons* and other charges. The term "great commoner" has been applied to the English patriot Hampden, and to the elder William Pitt before he entered the House of Peers.

**Common Law.** See *LAW*, by J. N. POMEROY.

**Common Pleas, Court of.** See *COURTS*, by GEORGE CHASE, LL.B.

**Common Prayer, Book of**, a collection of all the forms of worship used in the Church of England. The King's Primer, published by Henry VIII. in 1546, was the first form of this book, but it contained only the Creed, Lord's Prayer, Commandments, and Litany. Edward VI. had this primer twice revised and republished (in 1549 and 1552), and his second Liturgy is very similar to that which now exists. He caused the Sentences, Exhortation, and the Confession and Absolution to be prefixed to the Daily Service, and introduced the Decalogue into the Communion Service (1548). In the reign of Elizabeth the Liturgy was again revised (1559), but with few alterations. After the conference with the Presbyterians at Hampton Court, James I. instituted another revision, and added the explanation of the sacraments in the Catechism (1604). It was again revised under Charles I. (1633). After the restoration of Charles II., when a conference had been held with the dissenters at the Savoy, the Common Prayer-Book was further revised in 1662. Certain forms were added, and slight changes were made in the services; and a very few have been made since that time.

**Com'mon Schools**, the name given in the U. S. to public schools for elementary instruction. A rural common school for a certain district in a town is called a *district school*. In some cities the common schools are called district schools, and in some others *ward schools*. Common schools in villages and cities, composed of pupils in the upper classes of the course of elementary instruction, are called *grammar schools*, and the schools composed of pupils belonging to the lower classes of the course are denominated *primary schools*. The common schools in other countries are designated by different names: in England they are called *public elementary schools*; in Scotland, *parish schools*; in Ireland, *national schools*; in France and Belgium they are called *écoles primaires* ("primary schools"), and the names given to them in the other Latin nations have the same signification; in the principal German states they are named *volkschulen* ("people's schools"). The common school dates from the Reformation, and Germany, the country of Luther, is its cradle. It is true indeed that the Christian Church from the earliest times recognized the duty and asserted the right of organizing and controlling public education, and professed the obligation to provide not only episcopal schools for the clergy, but also schools of a humbler order for the poor laity. But the church schools for popular instruction bore little fruit. They were mostly confined to the populous towns, and served chiefly to train boys for the service of the choir. Nothing was attempted in them of the nature of school-learning beyond a little oral instruction in the Catechism and the rudiments of religion. To fulfil their

religious duties the people had no need to know how to read and write. Hence the attempts made here and there by public authorities to establish schools for teaching these branches were discontinued by the Catholic Church. The Reformation, on the contrary, demanded popular instruction. The main principle of Protestantism involves the necessity of general education. In rendering man responsible for his faith, and in placing the source of that faith in the Scriptures, Protestantism contracted the obligation to put each person in condition to read and understand the Bible. Moreover, Protestantism involves the principle that every man has the right to moral and intellectual as well as religious education, and consequently that it is the duty of the state to provide for the instruction of all youth. Hence the Protestant Reformer maintained that it is the right and duty of the State rather than of the Church to establish and support schools for the children of the people. This may fairly be regarded as the origin of the common school. The Reformation demanded it, and it was rendered possible by the simultaneous discovery of printing, which placed books in the hands of the poor. Through the influence of Luther public elementary schools were established in Saxony as early as 1627. Wherever the Reformation was carried the popular school followed. The Reformers were everywhere zealous advocates of common schools. In Scotland the result was particularly striking. John Knox urged the founding of schools in every parish, with no little success. In the beginning of the seventeenth century James VI. ordered a school to be set up in every parish, and near the end of the century the Scottish Parliament passed an act "for the settling of the schools," "of which," says Macaulay, "the effect could not be immediately felt. But before one generation had passed away it began to be evident that the common people of Scotland were superior in intelligence to the common people of any other country in Europe." No less remarkable was the early success of the common school in Puritan New England. The first public school was established in Boston in 1635, the second in New Haven in 1639, and the third in Hartford in 1642. The first school law was enacted by the legislature of Massachusetts in 1647, requiring every town of fifty families to maintain a school for teaching reading and writing, and every town of one hundred families to maintain a "grammar school" to fit youth for the university. At the close of the colonial period Connecticut had a common school in every district, and Massachusetts and New Hampshire had an elementary school wherever there were children enough to constitute one. Elementary instruction was practically universal in these colonies, few adult persons being unable to read and write. Nor was their reading confined to the Bible, but, said Burke, in 1775, "all who read—and most do read—endeavor to obtain some smattering in that science [the law]." For a long period little was done to elevate the character and enlarge the scope of popular instruction. During the sixteenth, seventeenth, and two-thirds of the eighteenth centuries the instruction was confined to one or two studies, and those were taught in the most imperfect and mechanical way. The schools were essentially reading schools, reading the mother-tongue being the first and principal study; next came the singing of psalm-tunes and the memorizing of texts, hymns, and the Catechism. The teachers were for the greater part choristers and sextons, and nobody made pretension to much educational skill. Each child read by himself; the simultaneous method was not known. Years usually passed before any facility had been acquired in reading. To understand what was read was little thought of. There were no school-books, distinctively so called; the pupils learned their lessons and read either in the Old or the New Testament or in the Psalter. The discipline was severe; the rod, the cane, and the rawhide were necessary apparatus in the school. The school-rooms were mostly cold, dark, small, and shabby. But, imperfect as the primitive common school confessedly was, it may be doubted whether modern civilization has given the people a more precious boon.

The reform of the national system of education in Prussia after the disaster of Jena in 1806 may fairly be regarded as the commencement of the modern epoch of the common school—the epoch of improvement and propagation. King William III. sounded the keynote of this movement, so far-reaching in its results, in saying, "The state must regain in intellectual force what it has lost in physical force." The preceding third of a century had been a period of preparation and transition, opened by the remarkable ordinance decreed by Frederick the Great at the close of the Seven Years' war, which created the first systematic organization of common-school instruction. Maria Theresa, the first Catholic sovereign to adopt the common school, magnanimously followed the example of her great antago-



nist. In 1771 she established in Vienna a normal school which still survives, and three years later decreed a school law of the most advanced type of the time. The unprecedented political events in France and the United States near the close of the century turned the attention of statesmen to the necessity of popular education as a guaranty of free institutions. Rousseau's "Emile" and Pestalozzi's experiments had developed the principles and methods of a new education for the people. It would require much space to describe all the elements that went to make up that improved Prussian system. The two chief instrumentalities of progress employed were the normal school and the Pestalozzian methods, and these are now the essential instrumentalities of the improved modern common school wherever it exists.

The area of the common school has now become coextensive with the civilized world. England adopted it only in 1870, but compulsory education is now as rigidly enforced in London as in Berlin. In 1872 a complete system of popular instruction was adopted by the government of Japan, and it is now in successful operation with 25,000 schools, attended by 2,000,000 pupils, taught by 60,000 teachers. As the German nation was the first to establish common schools, so it has kept the lead in improving them. Pestalozzi became the schoolmaster of the world, and opened the normal school of the world at Yverdon, to which during his life teachers from far and near, and especially from Germany, made pilgrimages. And thus the Pestalozzian common schools were set in operation throughout all Germany, and ever since whoever has desired to study the best common schools has resorted to Germany, and especially to Prussia. What is the perfected common school of to-day? The school-house combines the requirements of taste, convenience, and health; the cabinets of the school-rooms are filled with books, apparatus, and collections of natural history; its walls are hung with maps, charts, and pictures; the blackboard has the first place. The teacher is no longer a menial, but an officer of the state; he is an educated man trained in a seminary established and maintained for the purpose by the state; he knows the science and art of teaching, loves his profession, and is devoted to it for life. The course of study comprises what is most useful for knowledge and training. Every child has the best of school-books for each branch. There are no absences except for sickness. The intuitive method awakes the intelligence and secures the attention of all the pupils. The moral and religious sentiments as well as the intellects of the pupils are developed and cultivated, and their bodies are strengthened by gymnastics. Order, activity, and cheerfulness reign. Each pupil has his individual chair and desk, but all learn together everything that is taught. The simultaneous method in the modern common school is what the railroad is in transportation. Hence the time for studying so many branches, including singing and drawing. The discipline is a process of teaching self-government, but it exacts implicit obedience with firmness and love. The ideal of this school is the ennobling of mankind by education and culture. Such was the model Prusso-Pestalozzian common school of fifty years ago, and such is now the model common school in all countries; and to this ideal the schools of the people are everywhere tending. There is no longer any occasion to prove the necessity of having schools, of having them everywhere, and of having good ones; this necessity is accepted by every enlightened friend of human progress. The people which has the best schools is the first people; if it is not so to-day, it will be to-morrow. There is no country which has expected so much from the common school, or that is so much indebted to it, as the United States. Nor is there any other country where the people are so liberal in affording the means, by voluntary taxation, for the establishment and support of common schools. At the close of the Revolution there were few common schools out of New England. Within fifty years the area of our common schools has been increased twenty-fold, and it now extends from ocean to ocean and from the lakes to the Gulf. In every State there is a system of *free* common schools. Although the Federal government has no control over popular education, it has granted in aid of common schools about 70,000,000 acres of public lands. The expenditures for public schools, elementary and high, for 1879, were \$78,294,155; the permanent school funds, \$113,030,027; pupils enrolled, 9,424,086, daily attendance, 5,282,337; number of teachers, 272,686.

The schools are not only all free, but unsectarian. A number of States have enacted laws to compel attendance. The revenues for the support of the schools are chiefly derived from local taxation, these being supplemented by State taxes and the income of State school funds. In the rural districts and in most cities, especially the newer ones, the schools are mixed.

JOHN D. PHILBRICK.

**Commons, House of.** See PARLIAMENT.

**Commonwealth',** a state, a body politic; properly a free state, a republic. The official title of Commonwealth is used by the States of Massachusetts, Kentucky, Pennsylvania, and Virginia.

**Commonwealth of England,** in history, the form of government established in England on the death of Charles I. in 1649, and which existed during the protectorate of Oliver Cromwell and his son Richard, until the restoration of Charles II. in 1660. The substitution of a democratic for a monarchical form of government was provided for and enjoined by two successive charters. The first charter of the Commonwealth was drawn up in Dec., 1653; it was styled the "Instrument of Government." The second charter, called the "Petition and Advice," was framed in May, 1657. Under the first charter the English government may be classed among republics, with a chief magistrate at its head; under the second it became substantially a monarchy, and Oliver Cromwell from 1657 to the period of his death was virtually king of England.

**Commune,** a French word signifying "common," is the name of a small territorial division in France.

**Commune of Paris,** an organized band of socialists, outlaws, and proletaires connected with the International Association who revolted against the new régime or Versailles government on the 18th of Mar., 1871. Paris had a few days before this date been evacuated by the Germans, who had taken it after a long siege. The National Guard of Paris had been permitted to retain their arms, and a large part of that guard supported the Commune, whose head-quarters were in the suburbs of Belleville and Montmartre. Among the prominent leaders of the Commune were Flourens, Félix Pyat, Assi, Delescluze, Pashal, Grousset, General Cluseret, Dombrowski, Arnould, Jules Vallès, Blanqui, and Rochefort. Their principles and aims are thus defined by one who was a member of the Commune: "Their philosophy is atheism, materialism, the negation of all religion; their political programme is absolute individual liberty by means of the suppression of government, and the division of nationalities into communes more or less federated; their political economy consists essentially in the dispossession, with compensation, of the present holders of capital, and in assignment of the coin, land, etc. to associations of workmen." The same writer affirms that "the central committee of the National Guard, exclusively composed of workmen, members of the *Internationale*, has taken the initiative, and alone has the merit of the movement."

As those members of the National Guard who favored the cause of order were irresolute and not inclined to fight, the Communists quickly became absolute masters of Paris. Their ranks were reinforced by many convicts, whom they released from the prisons, and by many foreign refugees. The leaders who had some intelligence, some definite purpose, and some lingering scruples were soon discarded one after another and imprisoned, and the control of the Commune was obtained by desperadoes and outlaws, who initiated a reign of terror. On the 26th of March an election was held in Paris to choose members of the Commune, but as the party of order declined to vote, only 180,000 votes were cast, and the election resulted in the triumph of the insurgents. On the 29th they issued a proclamation in these terms: "The central committee has remitted its powers to the Commune. Citizens: your Commune is constituted. The vote of the 26th of March has sanctioned the victorious revolution," etc. The government organized at Versailles sent an army to suppress the insurrection. On the 2d of April a large body of insurgents marched against Versailles, but they were repulsed at Meudon, and much injured by the fire of Fort Mont Valérien. Gustave Flourens, one of the commanders of the Commune, was killed soon after. The army of the republic began to besiege Paris under the command of Marshal MacMahon. The chief command of the besieged forces was held successively by Dombrowski, Cluseret, Rossel, and Delescluze. Violent dissensions disturbed the counsels and hindered the success of the Commune. On the 5th of April they arrested Darboy, archbishop of Paris, and other persons, whom they kept in prison as hostages. The insurgents, who occupied several forts in the environs, made an obstinate resistance to the besiegers. The official journal of the Commune announced on May 1st that a committee of public safety had been appointed. This committee was composed of five members—viz. Antoine Arnaud, Félix Pyat, Charles Gérardin, Ravier, and Léon Moillet. Rossel, who bore the title of delegate of war, resigned the command on the 9th of May, and was succeeded by Delescluze. Having captured several of the forts, the besieging army, about 90,000 strong, entered Paris on the 22d of May by several gates, enclosing the insurgents in a great semicircle. The latter continued

for five days fighting behind barricades in the streets, and revenged their defeat by atrocious acts of cruelty and vandalism. They set fire to the public buildings, and endeavored to destroy the ancient monuments and treasures of art. Among the finest edifices that were burned were the Tuileries, the Palais de Justice, the Palais Royal, and the Hôtel de Ville. The Louvre was partly consumed. During the last days of the power of the Commune they shot Archbishop Darboy, Bonjean, president of the court of cassation, and other persons whom they held as hostages. In order to execute their incendiary designs on a grand scale, they ignited petroleum, gunpowder, and other explosive materials in many parts of the city. Delescluze was killed while fighting in the street on the 26th of May. The civil war ended on the 27th, when M. Thiers issued a bulletin stating that 25,000 Communists had been taken prisoners. Large numbers of these were put to death, and several thousand were punished with deportation. The ringleaders of the Commune who survived the battles were mostly arrested and executed. "The Commune," says the "Edinburgh Review" for July, 1871, "has been supremely arbitrary and supremely stupid. In the name of liberty it destroyed every condition of freedom; in the name of the common interests of the city, it reduced that city to the depth of ruin, drove away the wealthier classes, and pauperized the lower. . . . As a means of government the secret committee of the Commune was odious and contemptible, but as an engine of social war it was terrific, for in the frenzy of despair it let loose all the powers of destruction. We shall not attempt to describe in detail the appalling spectacle of Paris as it appeared in the month of May in this year, an awful prelude to the most tremendous catastrophe in the history of man."

The Commune of Paris took a prominent part in the revolution of 1790. After it was constituted by the law of May 21, 1790, it was a political power in the capital which proved itself superior to the lawful authority of the Assembly and the nation. It was in the Commune and the Cordeliers' Club that the real authors of the excesses of the revolution had established their stronghold. From this arsenal of crime came forth the conspiracies and seditious movements which overturned the throne and stained the revolution with the bloody outrage of the 10th of Aug., 1792, and the massacre of September. (See SEMPRONIUS, "Histoire de la Commune de Paris," 5th ed. 1871; BEAUMONT-VASSEY, "Histoire Authentique de la Commune de Paris," 1871; "Guerre de Communeux de Paris, 18 Mars-18 Mai, 1871," 1871; MORIAC, "Paris sous la Commune," 2d ed. 1871.)

WILLIAM JACOBS.

**Communicatio Idiomatum** ("conjoint possession of attributes"), the name marking the doctrine that the One person of Christ has conjoint possession of the attributes of the two natures—that the attributes of the two natures are so held together in the One person as *in it* to have fellowship with each other; the person which conjoins the nature conjoins their attributes in itself. The two natures are inseparable, both actively and passively. What is proper to either nature in the abstract belongs to Christ in the concrete; and what the divine, which is the assuming nature, has in itself, the human, which is the assumed nature, has in and through its personal conjunction with the divine. (See KRAUTH's "Conservative Reformation," 476-481.)

C. P. KRAUTH.

**Communion Service.** See EUCHARIST, by F. A. P. BARNARD.

**Communism**, the theory which teaches that property should be held in common—a theory which Plato advocates in his "Republic," and which was probably practised before his time by the followers of Pythagoras. In later times the Neo-Platonist Plotinus attempted to establish community of goods upon the plan which had been proposed by Plato. Among the Jews the Essenes and Therapeutæ practised a sort of communism. The so-called communism of the apostolic church in Jerusalem lacked the essential features of communism. It was only partial and voluntary, was not patterned after by other Christians, and was a failure. Buddhism and other Oriental religious systems have for ages had followers who have practised a rude communism. In Europe there were numerous mediæval sects of heretics (Catharists, Brethren of the Free Spirit, etc.) who advocated some practice of the kind. Later came the Anabaptists of Münster, the Libertines of Switzerland, the Familists of England. Still later we find the Herrnhuters, the Shakers, the Harmonists, the Buchanites, and numerous other religious communists—some practically successful, and others not. Bacon, More, and other English theorists long ago wrote treatises which looked towards the ultimate establishment of communism, but Robert Owen was the first great advocate of the doctrine in that country. The first

French Revolution brought forward a number of communistic theories, but none survived long. In later times, Saint-Simon, Fourier, Louis Blanc, Proudhon, Cabet, and Considérant have been representative French communists. Karl Marx is the best-known German representative of these ideas. It is remarkable that the most successful communistic experiments of modern times have been organized and conducted by those who are inspired by strong religious notions, like the Shakers, Oneida Communists, and Harmonists. The teachings of the great communists of the present century have, however, not been without value, since the highly successful co-operative movements of Europe have been in part guided by the best thought and truest philanthropy of the better class of communistic writers. The service of communistic authors is as yet chiefly critical, exposing the dangers to true liberty which seem to rise inevitably from the principles of unlimited freedom of competition. (See CO-OPERATION.)

**Commute** [from the Lat. *com* (for *con*), "with," and *mutō*, to "change," literally to "exchange one thing for another"], in law, to exchange one penalty for another, usually less severe. A sentence of death is often commuted into a long imprisonment. Also, to receive one thing for another; thus officers in the army are allowed so many rations each; these they commute for cash.

**Comnenus** [Gr. Κομνηνός], the name of a Byzantine family of Italian origin, from which descended six emperors of the East and all the emperors of Trebizond. (See ALEXIS I., ANDRONICUS I., ISAAC I., MANUEL I., and ANNA COMNENA.)

**Como**, a province of Italy, bounded on the N. by Switzerland and Sondrio. on the W. by Novaro, on the S. by Milan, on the E. by Bérgamo and Sondrio. Area, 1049 square miles. It consists of the territory about Lake Como and the eastern part of Lake Lugano, and reaches westward to Lago Maggiore. This province contains several magnificent regions; the finest of them is the tract called Brianza, lying between Monza and the two southern branches of Lake Como, which is as much as 25 miles long and from 1 to 3 miles broad, and watered by the Adda. The province produces much silk and wine. The principal industry is the rearing of silk-worms. Pop. in 1880, 518,372.

**Como** (anc. *Comun*), a city of Italy, in Lombardy, capital of a province of the same name, is at the south-western extremity of the Lake of Como, 24 miles N. of Milan, with which it is connected by a railway. It is beautifully situated in a valley enclosed by verdant hills, covered with gardens and groves of orange and olive trees. On a hill overlooking the town are the ruins of the Castle Baradello, which was destroyed by Frederick Barbarossa. It has a fine cathedral founded in 1396, by the side of which is a clock-tower built in 1463. Here are also an ancient town-hall, a public library, a museum, theatre, and botanic garden. Here are manufactures of cotton yarn, silk and woollen fabrics, and soap. It has a trade by the lake with Ticino and Germany. Pop. in 1880, 25,560. *Comum* was an important town under the Romans. Pliny the Younger and Volta were natives of this place.

**Como, Lake** [It. *Lago di Como*; anc. *Larius Iacus*], a lake of Italy, in Lombardy, is an expansion of the river Adda, which enters it at the foot of the Lepontine and Rhetian Alps, and issues from the south-eastern extremity of the lake. It is divided into two branches, one of which, extending south-westward, is called the Lake of Lecco. It is 698 feet above the sea, and about 35 miles from Como to the northern end, and is nearly 3 miles wide. Its greatest depth is 1925 feet, the superficial extent 62 square miles. It is celebrated for the beautiful scenery of its shores, covered with elegant villas. Numerous steamboats ply on this water.

**Comonfort** (IGNACIO), a Mexican general and president, born at Puebla Mar. 12, 1812. He was chosen a member of Congress in 1842, and senator nearly six years later. He co-operated with Alvarez against Santa Anna in 1854, and became provisional president on the resignation of Alvarez Dec., 1855. The clergy and conservatives raised an unsuccessful revolt against Comonfort, who in 1856 issued a decree to confiscate the property of the Church. He was proclaimed constitutional president Dec., 1857, but his power was rendered only nominal by the enmity of the clergy and the disaffection of the army. He was driven into exile Jan., 1858. In 1863 he commanded a republican army against the French invaders. He was killed by bandits Nov. 13, 1863.

**Comorn**, a county of Hungary, is bounded on the N. by the counties of Presburg and Bars, on the E. by Gran, on the S. by Stuhlweissenburg, and on the W. by Raab. Area, 1146 square miles. It is divided into nearly equal

parts by the Danube, besides which it is also traversed by the Waag River. In the N. it is level, but in the S. mountainous. The country at the entrance of the Waag into the Danube consists of large swamps. The soil is generally fertile and well cultivated; sheep-raising is extensively pursued. Chief town, Comorn. Pop. in 1880, 151,729.

**Co'morn**, a fortified town of Hungary, capital of the above county, is on the left bank of the Danube, at the mouth of the river Waag, 46 miles W. N. W. of Pesth, on the Great Schütt Island at its eastern extremity. The streets are narrow and irregular. The Danube is here crossed by a bridge of boats. The fortress of Comorn, originally built by Matthew Corvinus, is considered one of the strongest in Europe, and requires for its defence 15,000 men. Comorn has eight churches and two theatres; also manufactures of woollen cloth and leather, a trade in wine, grain, wood, and fish, and coal-mines in the vicinity. It was besieged and bombarded by the Austrians in 1848 and 1849 without success, but finally capitulated of its own choice, Sept. 27, 1849. Pop. in 1880, 13,108.

**Com'oro Isles**, a group of four volcanic islands in the Mozambique Channel, between Africa and Madagascar. They are mountainous, and the highest peaks rise about 6000 feet above the sea. The inhabitants are upright and well-mannered. They are of mixed Arab and negro blood. Area, 1030 square miles. The soil is fertile. The prolific tropical vegetation includes the cocoa and areca palms, excellent rice and maize, yams, bananas, mangos, pineapples, oranges, lemons, cotton, wild indigo, and sugar-cane. Excellent wood for shipbuilding is found. The principal exports are palm oil and tortoise-shells. The greater part of the people are Mohammedans, but fetishism is practised among them. They support themselves mostly by tillage; there are among them skilful cutlers, weavers, and jewellers. Three of the islands have each their own sultan. The rule of the rest is exercised by numerous elective chiefs. Mayotte, one of these islands, is a French colony. The island of Johanna is celebrated for its beauty. Pop., with Mayotte, 62,600.

**Compans** (JEAN DOMINIQUE), COUNT, a French general, born at Salîes, in Haute Garonne, June 26, 1759. He served in the armies of the Alps and of Italy; and in 1799 at the head of a division of the Army of the Alps, then commanded by Grenier, he raised the siege of Coni, took Fossano and Savigliano, and reopened communications between the right and left divisions of the French army; he thus relieved a portion which was hemmed up by the Austrians and was suffering fearful hardships, shoeless and half naked among the Alpine snows, and depending upon wild herbs for nourishment. He served afterwards in Italy, which had been reopened to the French arms by the battle of Marengo; and the assaults of Mincio, Montebello, and Villafranca witnessed his bravery. After the peace of Lunéville, Compans was made commandant of the province of Cuneo. Falling at one time into the hands of brigands, who then swarmed in the country, he thought himself lost, until one of the band approached and addressed him: "Have no fear, general; we have not forgotten how in war-times you protected our wives and children and preserved our dwellings." In the Prussian campaign Compans was raised to the rank of general of division. He was created a count of the empire in 1808. He served with distinction through the Russian campaign, fought with the greatest bravery in the campaign in Saxony, at Bautzen, Dresden, and Leipzig, evinced a remarkable presence of mind in rescuing the pupils of l'École Polytechnique, shut up at Chaumont and fighting with despair, and took up arms again in the Hundred Days, and was taken prisoner at Waterloo. Died Nov. 10, 1845.

**Company.** See JOINT-STOCK COMPANY and PARTNERSHIP, by PROF. T. W. DWIGHT, LL.D.

**Com'pany** [Fr. *compagnie*], in an army, is a body of men commanded by a captain, and forming an aliquot part of a regiment or battalion of infantry. A full company consists of about one hundred men. In the British service a regiment of infantry generally comprises ten or twelve companies. The captain of each company is assisted by two subaltern officers, the lieutenant and ensign. A regiment of cavalry is divided into troops instead of companies. In the U. S. army each of the three arms of the service is divided into companies. Each battalion of infantry is divided into ten companies, and each company has a captain and two lieutenants. The cavalry companies are often known as troops, while the artillery company is more properly a battery. The U. S. marine corps also has its companies.

**Comparative Anatomy**, the science of the structural constitution of animals; so called because it is based upon the comparison of the anatomy of different animals.

## I. PRIMARY ELEMENTS.

Animal bodies either consist of homogeneous substance, or of that substance disposed in tissues. Tissues, in the vast majority of cases, are made up into organs, the simplest forms of which are the sac, the tube, and the segment. By multiplication and modification of these elements, organs become complex. The simplest expression of tissue is, on the other hand, the nucleated cell, and all tissues are made of multiplied and modified cells, with the addition of unorganized or homogeneous substance.

This substance, whether homogeneous or exhibiting structure, is chemically identical throughout the animal kingdom, and constitutes the living part of plants. It belongs to the class of protein compounds, and is called gelatin, albumen, fibrin, etc., or, regarded structurally, protoplasm. Its composition is  $C_{24}H_{37}NaO_8$ , with very small amounts of sulphur and phosphorus added under some circumstances. It is therefore a nitryl of cellulose—i. e.,  $C_{24}H_{20}O_{20} + 3NH_3$ .

According to the latest investigations, the cell is not usually a hollow body, but consists of a superficial layer, which represents the wall (but which may be of considerable thickness), and a central body which fills it, which is called the nucleus. This nucleus may contain another visibly distinct body, or nucleolus. The essential difference between the nucleus and the wall consists in the fact that the former alone is capable of direct nutrition from the blood, while the wall is derived from it by additions on its inner surface. All growth originates in the nucleus; that is, all cell-division or discharge of homogeneous protoplasm has its origin there. Hence it has been called the germinal matter, while the wall is termed formed matter. Formed matter exhibits the active functions of life other than growth. Thus it contracts, as in muscular tissue, or is irritable and conductive of force, as in nerves. It constitutes the primary substance of secretions, by its breaking down and mingling with special compounds brought by the blood. It may then be concluded that the formed protoplasm or wall converts heat, etc. into motion, chemism, etc., while the germinal matter converts heat into growth-force.

## II. TISSUES.

Tissues are naturally arranged, according to their structure, into four groups—viz., connective tissue, tissue of independent cells, nerve-tissue, and muscular tissue. The connective tissue consists of cells, frequently presenting narrow prolongations, which are separated by formed substance of various character, but always either gelatinous or solid. It includes the supporting and connecting tissues of the body, as the osseous, cartilaginous, connective, etc., as well as those of less consistence, as the vitreous humor of the eye, adipose tissue, etc. The tissues of independent cells include those floating in fluids, as blood- and lymph-corpuscles, with those which are stationary, but not bound together by connective substance, as the epithelium. The muscular tissue consists of elongate cells, which are massed together in longitudinal bundles or fibrillæ, without the intervention of non-cellular substance. The nervous tissue consists of isolated cells surrounded by formed matter, which terminate in tubular prolongations or nervous fibres which extend throughout the body. These cells are of delicate texture, and are separated by the equally soft altered cell-contents.

The connective tissue (figs. 1 and 2) is composed in the lower

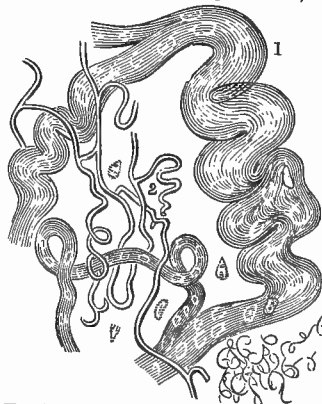


FIG. 1. Connective tissue: 1, white fibrous element; 2, yellow fibrous element. In the upper skin the cells assume a radiate form, and contain the coloring pigment (fig. 3) which is generally characteristic of the animal. These cells may contract under nervous influence, so as to obliterate the color, as in many fishes. In

animals more exclusively of cells than in the higher. The formed matter exterior to the nucleus of the cells assumes various forms. In the gelatinous tissues (which are most abundant in young animals) this substance is relatively large in quantity and thin in consistence. In the more numerous forms the latter assumes a fibrous character, and consists of bands of fibres, with the cells scattered at intervals.

many of these they are expanded only at certain seasons of the year; in the squids (*Loligo*) they pulsate during life, and produce great changes in the appearance of the skin. In many batrachians and reptiles one color may be rapidly substituted for another, as in the tree-frog, *chamæleon*, etc. Here there is more than one stratum of pigment-cells, each containing a peculiar color. Under nerve influence the inferior cells may expand while the superficial contract, and, penetrating between the latter, give color to the whole surface of the skin. Cartilage (fig. 4) differs from other forms in the large quantity of formed matter which is discharged from the germinal centres or nuclei, and which separates the latter widely. It is but slightly fibrous in typical cartilage, but in fibro-cartilage highly so. In elastic tissue certain bands of fibres agglomerate and harden, and become elastic through the addition of toughness to the original qualities. By hardening in extended layers, connective

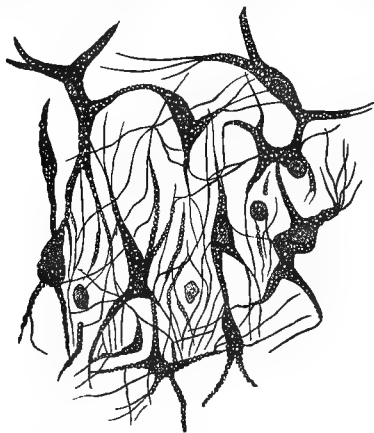


FIG. 2. Connective tissue, partially developed.

tissues form basement membranes, or those supporting glandular structures. Osseous tissue (fig. 5) is developed either in typical connective tissue, skin, or cartilage, but usually in the latter. It consists of a deposit of phosphate of lime in the formed intercellular substance by the minute capillaries which traverse it. It is generally concentric to the cells.

The connective tissue is the medium for transmission of the blood-vessels in most regions of the body.

The tissues of independent cells are various in situation and function. As epithelium it covers the surfaces of the cavities of the body, as well as its exterior. Its cells are packed together, forming a stratum which may be depressed and hardened, as the epidermis or outer skin, or soft and of little consistency, as inside of the mouth. The cells are flat or cylindrical, and in some situations furnished with movable cilia. The columnar epithelium (fig. 6) is only found in the mucous membrane; the spheroidal exists as the lining of the urinary and perspiratory vessels and ducts; the ciliated (fig. 7) belongs to the air-passages, the conjunctiva of the eye, and the lining of the ventricles of the brain. The crystalline lens of the eye is one of its most modified forms. The lymph-corpuscles are white nucleated cells thrown off from the lymphatic glands into the blood, in which they float. They are highly important in nutrition. The red blood-corpuscles (fig. 8) give color to the circulatory fluid; in the invertebrates, where the blood is frequently white, it contains only the white corpuscles, while the latter are much more numerous in the lower than in the higher Vertebrata. In this class the red corpuscles are nucleated below the Mammalia; in the latter, their contents appear to be homogeneous. They are disk-like, with slightly concave surfaces, sometimes with a median convexity. They are largest in Batrachia, especially in the *Proteus*.

The muscular cell is of a peculiarly elongate or rod-like form, and possesses a well-defined wall or sheath. It is composed originally either of a single cell, which elongates with growth, chiefly in its formed substance (but in some measure with its nucleus also), or of several confluent cells. In the fresh water *Hydra* the contractile cells of its body-walls and arms preserve their original form. Muscular cells are divided into the unstripped and the striped—the former having homogeneous formed matter; the latter exhibiting transverse divisions (figs. 9 and 10), which produce the appearance of a series of disks. Muscles terminate in tendons, which present a form of connective tissue, the nuclei being few and the formed substance fibrous, and very dense and hard.

The nerve-cells (fig. 11) are found in nervous centres—i. e., brain and spinal cord—and in ganglia. They form, with the intervening substance, the gray nerve-matter. The white matter and the nerves proper are composed of nervous fibres or tubes. The nerve-cell has to various observers presented a greater complexity of structure than other cells. In some, fibrous layers in the wall and covering the nucleus have been observed, the external layer being continuous with the external walls of the nerves. Others describe tubular vacuities in the nucleus. Nerves consist of more or less granular formed protoplasm, surrounded by a sheath or neurilemma, and containing nuclei. Many nerves exhibit thick walls, while in others, especially the sympathetic, the nerve-walls are extremely thin.

### III. ORGANS AND SYSTEMS.

Tissues arranged and united in forms, so as to be usable for vital processes, form organs. All organs not constructed of cells alone are composed of elementary parts, which may be regarded as repetitions of the sac, the tube, or the segment, no matter how complex they may be. The organs are classified into systems by their structural connection with one another, which of course signifies functional association for some common vital process. The systems are as follows:

1. *Cellular Systems*—The nervous, the muscular, the mucodermal.

2. *Sac and Tube Systems*—The digestive, the circulatory, the respiratory, the urogenital.

3. *Segment System*—The skeletal.

The nervous system consists of central bodies or ganglia, and nerves which extend from them to the periphery of the body. The structure presents much variation among the several groups of animals. The muscular is composed of muscles and the tendons by which they are attached to the part of the skeleton to be moved by them. The muscles are composed of innumerable fibrillæ enclosed in a common sheath. The bundles in invertebrate animals are smaller, till in some of the lowest they are composed of but few fibrillæ. Unstripped fibres prevail in invertebrate animals, excepting the Arthropoda, where the muscles are striped. The fibres in vertebrates are striped, excepting in involuntary muscles, where they are unstripped, save only in the heart. In invertebrates they may have thick sheaths, and the contents are frequently granular. In most Arthropoda the central part of the striped fibrillæ retains the original cell-nuclei in one or more columns. The mucodermal system covers the body externally, and as mucous membrane enters and lines all the cavities that communicate with the open air; as serous membrane it lines the closed cavities. In animals no system presents greater varieties of exterior structure. In invertebrates it is sometimes hardened by segments produced by a deposit of lime, which resemble bone (sea-urchin), or form a more elastic substance, chitin (Arthropoda). In vertebrates it may support osseous pieces of various forms (scales), or hairs, or feathers, which are simply enlarged hairs finely branched. Finally, as horn it appears as nails, claws, and horn-sheaths; these are simply thickened epidermis.

The digestive system is a tube usually open at both extremities. Portions of its course are enlarged into stomach, large intestine, etc., while glandular bodies are distributed along it from one end to the other, and pour their contents into it. These glands are formed of sacs, in a few cases simple (fig. 12) (gastric glands of stomach), in others simply forked, but usually many times divided and subdivided, forming masses of lobules. Some of these bodies are almost universal in the animal kingdom. Thus, it is usual to find

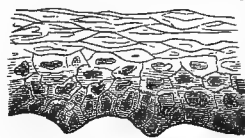


FIG. 3. Epidermis of the negro.

one or more situated near the cavity of the mouth (fig. 13), which secretes a fluid to aid in deglutition; another, most frequently met with, discharges its secretion into the alimentary canal just beyond the stomach. This is the liver and its representatives. The walls of the canal are supplied with several layers of muscular tissue in the vertebrates, and in a less complex form in lower animals.

The circulatory system consists of tubes for the conduct of the results of digestion throughout the body; it originates from branches of the digestive canal in the lowest types (Meduse), but becomes highly specialized, so that communication with that system is had by endosmosis only. It early acquires a specially muscular enlargement, which pulsates. This organ becomes more specialized, isolated, and divided, and is known as the heart. The arteries (which take blood from it) are muscular throughout their length. The veins are not so, but are distinguished by the presence of valves in the higher animals.

The respiratory system consists of a series of tubes which carry air through the body; in some animals (snails, spiders) these are blind, forming pulmonary sacs, on which capillary arteries are distributed. In animals inhabiting the water this system is little or not at all developed, it being replaced by branchiæ or gills. In vertebrates it does not exist, but large sacs, connected by tubes with the digestive system, answer the same functional purpose, except among fishes, where it is used as a float. Gills aerate the blood in this class.

The urogenital system consists of tubes, sacs, and glandular and cellular bodies, which are connected with the outer air at the posterior end of most animals, and are usually blind at their termini. Their exit is usually common to the alimentary canal, and is called cloaca. These organs exhibit usually bilateral symmetry, the opposite sides having distinct exits, except among females of some of the higher animals, where the discharge tubes unite and form a chamber called the uterus. The tubes are termed oviducts (or tubæ Fallopii), and terminate in a fibrous and cellular body, the ovary. In its circumference appear cells, which grow, and after discharge are modified into the embryo. Originally, the embryo-cells of low animals grow into adults by a simple vegetative process, but in higher forms a stimulus to such growth is required from the other or male sex. In this sex the ovaries produce, by a form of secretion, independent cells, each of which bears a long cilium or lash (*spermatozooids*), and being modified in structure are properly termed testes. The efferent tube is called the vas deferens. These only unite near their point of exit. The urinary system is present in the vertebrates only. Tubes connect it with the reproductive canals near their termini. These are derived from paired glandular bodies, the kidneys, and usually unite into a common reservoir before exit—i. e., the urinary bladder. The object is the removal of uric acid, etc. from the blood.

The skeletal system exists only in vertebrates. It constitutes the solid framework of the body, and is axial or internal. It is composed of cartilaginous and osseous tissue. It is composed of segments, which possess a solid centre-piece and two opposite arches attached to it—one superior, the other inferior. It thus forms two tubes connected by a solid axis. The upper protects the nervous—the lower, the nutritive organs. Each segment is divisible into sub-segments, which are originally separate. These are much modified in form at the anterior extremity of the body—above, to contain the brain; below, to aid the sense of hearing, to prepare food for digestion, etc. Appendages to inferior segments are seen in limbs, which are the supports of the body and resistant elements in motion. They are also composed of segments arranged in lines or radii.

#### IV. CLASSIFICATION OF ANIMALS.

All known animals are referable to seven "branches" or primary types. Four plans of structure cover these, without expressing their intimate or essential structure. The four are the *radiated* (Cœlenterata and Echinodermata); the *longitudinally-jointed*, with external and ring-shaped skeleton (Vermes and Arthropoda); the *bag-shaped* (Mollusca and some Protozoa); and the *vertebrate*, whose essential character is mentioned above under the skeleton of the Vertebrata. The characters may now be given in more detail.

**Branch I., Protozoa.**—Low animals, composed of single or aggregated solid cells or protoplasmic masses, without blood or nerves. When symmetrical, bilateral or radiate.

**Branch II., Cœlenterata.**—Hollow animals, without special digestive organs, or with a sac-like stomach opening into the common cavity. Circulatory system wanting or represented by branches from the digestive cavity. No nervous system. The form is radial and bilateral, or radial only.

**Branch III., Echinodermata.**—Digestive system independent of the body-walls, not filling the cavity; the circulatory system present, largely isolated; a water-circulatory system; nervous system an œsophageal ring, with radii; skin with hard protective bodies. Form bilateral and radial.

**Branch IV., Vermes.**—Digestive system isolated, not occupying the body cavity; circulatory system incomplete or wanting; nervous system an œsophageal ring, with ganglia, or consisting of the chief ganglia only. No jointed limbs; body elongate. In development the alimentary canal is excavated in the embryo.

**Branch V., Mollusca.**—Alimentary canal complete, iso-

lated; circulatory system incomplete at the distal extremities; nervous system with ring round œsophagus, which bears a ganglion above and one below; a third ganglion inferiorly placed, connected by a ring with the former. Form sac-like. Intestines excavated from yolk of egg, not formed by a fold.

**Branch VI., Arthropoda.**—Digestive system complete; circulatory with complete central organ, but open ex-

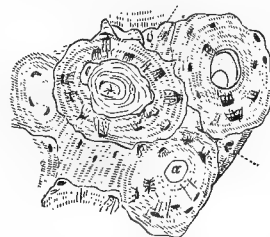


FIG. 5. Osseous cells.

**Branch VII., Vertebrata.**—Alimentary system complete; respiratory, a branch from it; circulatory, with complete circuit; nervous, of a longitudinal ganglionic axis on the upper side (spinal cord), with usually ganglionic bodies at one end (brain). An internal bony or cartilaginous skeleton, consisting of solid axis; superior tube for nervous and inferior for other systems. Form bilateral. Digestive tubes formed by the infolding of a membrane formed on the yolk.

A few years ago the number of species of animals known was stated to be 500,000, of which 400,000 were Arthropoda; of the remainder, 25,000 were Vertebrata.

The classes of animals number thirty-six, distributed and defined as follows:

**PROTOZOA—Rhizopoda.**—Bodies of homogeneous protoplasm, which throws out threads or arms of the same substance, which are elastically retractile. No internal organization; often a silicious covering, which is perforated. (Fig. 14.)

**Spongia.**—Unicellular animals (fig. 15), in which the cells are frequently associated in large numbers on axes of a horny, calcareous, or silicious nature, forming branched masses. These are penetrated by canals.

**Infusoria.**—Body with wall distinguished from contents, with mouth and often anus; often a contractile vesicle and ovarian nucleus. Surface frequently ciliated. (Fig. 16.)

**CœLENTERATA—Hydrozoa.**—The cavity of the body the only digestive system; skin distinct; form radiate only. (Fig. 17.)

**Medusa** (jelly-fish).—Digestive system an open sac communicating with the body cavity, from which canals radiate as isolated grooves. Eight series of swimming-lobes on the surface. Form bilateral. (Fig. 18.)

**Anthozoa** (corals, etc.).—Digestive system the body-cavity and an appended open sac, the former divided round the walls by vertical septa into grooves, which continue into tubular tentacles. Septa and skin often filled with deposit of carbonate of lime. (Fig. 19.)

**ECHINODERMATA—Crinoidea.**—Body cup-shaped, the surface covered with mineralized plates, which are solidly united, but wanting on a part next the stomach; arms present, formed of articulating segments. (Fig. 22.)

**Asterida.**—Body depressed, star-shaped, covered with calcareous plates, which are wanting on a part of the dorsal surface, and which articulate with each other in clusters (star-fishes). (Fig. 20.)

**Echinida.**—Body discoidal or globular, surface covered with calcareous plates, which are immovably united together; no arms (sea-urchins). (Fig. 21.)

**Holothurida.**—Body elongated, cylindric, covered with soft skin; a calcareous ring round œsophagus; mouth surrounded by tentacles (trepangs). (Fig. 23.)

**VERMES—Gephyrea.**—Body cylindric, not jointed, alimentary canal complete in the hollow body; a nervous system, an œsophageal ring and abdominal axis.

**Rotatoria.**—Alimentary canal developed in the hollow body; ciliated disks or wheel-organs for movement; a water-circulatory system.

**Cestoda.**—Body jointed, nearly solid, without digestive system; head with suckers and hooks; a water-circulatory system (tape-worm).

**Trematoda.**—Body not jointed, solid except in the developed digestive tubes, and water-circulatory system; head with suckers and hooks (flukes).

**Acanthocephala.**—Body hollow, not jointed, cylindric, without digestive canal; head with a hook-bearing proboscis.

**Nematoda.**—Body hollow, unjointed; digestive canal well developed.

**Turbellaria.**—Body unjointed, flat, solid, except in the

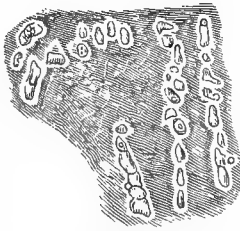


FIG. 4. Cartilage cells.



developed digestive canals; nervous system of two supra-oesophageal ganglia; surface covered with cilia.

*Annelida*.—Body hollow, segmented, with well-developed digestive canal and nervous system; the latter an oesophageal ring and abdominal ganglion chain; a system of respiratory tubes (earth-worms, etc.). (Fig. 23.)

*Mollusca*.—*Bryozoa*.—Head, tongue, and foot wanting; a shell-producing mantle enclosing the hinder portion of the body; mouth surrounded by a crest of tentacles as respiratory organs. Nervous system rudimental. (Fig. 24.)

*Tunicata*.—Head, tongue, and foot wanting; a large bag-like mantle, which bears a shell of connective tissue, enclosing sac-like gills. Nervous system rudimental. (Fig. 25.)

*Brachiopoda*.—Head, foot, and tongue absent; mantle large, bearing large shells, which are dorsal and ventral; branchiæ supported on two spiral arms, which are attached to the shell. (Fig. 26.)

*Acephala*.—Head and tongue wanting, foot anterior; mantle covering the body on each side, and enclosing lamiform branchiæ; two shells, right and left (mussel, clam). (Fig. 27.)

*Gasteropoda*.—Head, tongue, and foot present, the latter extending posteriorly; mantle small, posterior; gills comb-like on the back. Shell, when present, single, spiral (conch, snail). (Fig. 28.)

*Pteropoda*.—Head, tongue, and foot, the latter developed into two lateral fins; mantle covering the hinder part of body; gills comb-like on the back. (Fig. 29.)

*Cephalopoda*.—Head and tongue present; foot divided into arms, which radiate from the mouth as a centre; posterior part of body enclosed in a mantle; gills on back; cartilages behind eyes, and ganglia in head (cuttle-fish). (Fig. 30.)

*ARTHROPODA*.—*Crustacea*.—Two pairs of antennæ; post-abdomen developed; limbs on all segments of the body, those of the thorax converted into mouth-organs; respiratory organs, gills or wanting (shrimp, crab). (Fig. 31.)

*Arachnida*.—No antennæ nor anterior cephalic segments; the last pair of cephalic limbs of the form of legs; three

heart with three or four chambers; metatarsal bones distinct; limbs with few radii; a humerus and pelvis.

*Aves*.—Skeleton osseous, with coracoid bone and mandible, which includes malleus, and is supported by single incus; a basi-occipital, no parasphenoid; metatarsal and tarsal bones united; humerus and pelvis present; optic lobes lateral, small; four chambers to the heart; one aorta-root and bow, turning to the right (birds).

*Mammalia*.—Skeleton osseous, without coracoid bone; with the stapes, incus, and malleus withdrawn into the ear, and simple, mandible sessile on the squamosal bone; cranial axis behind the basi-occipital; limbs ambulatory, with distinct tarsal and usually metatarsal bones; optic lobes inferior; cerebral hemispheres very large; one aorta-root and bow, turning to the left; heart with four chambers.

The preceding descriptions express a few of the structural peculiarities of the animals included in the respective divisions—i. e., such as are common to those of each, and by which they may be distinguished from each other. But the innumerable characters found in the subordinate or contained divisions and species of each remain to be considered.

## V. THE NERVOUS SYSTEM.

1. *In Invertebrates*.—In Protozoa, and perhaps Cœlenterata, where the nervous system has not been certainly discovered, spontaneous movements in the taking of food and moving from place to place are readily observed. It is therefore evident that the contractibility of their protoplasmic walls is under the direction of stimuli which do not require nerves for their conduction or direction. The nervous system of higher animals must therefore be looked upon as designed for the specialization or location of movements—a capacity entirely necessary to the activity of special mental powers. These demand particular movements for special objects; hence the necessity of concentrating the directors of movements in particular parts—i. e., nerves, muscles, etc.

In the Bryozoa, the lowest mollusks, there is not certainly known to be an oesophageal ring, but there is a considerable ganglion above the gullet, which sends nervous threads around the horse-shoe respiratory crest. One of these extends on each side at the base of the processes, but, though they approach, they are not known to unite on the inside of the arc. In Tunicata in like manner a single ganglion exists above the oesophagus, between it and the vent, and sends out nerves in a radiating manner. These are distributed to the orifices of the body and to the muscles. In Brachiopoda the system is more highly developed, there being a complete oesophageal ring, with a broad band-shaped ganglion on the inferior side. The latter represents two united ganglia, and gives off on each side a strong nervous trunk. These trunks turn forward and outward, and soon divide, the weaker branch going to the spiral respiratory arms, representing that above described in the Bryozoa. The stronger branch goes to the muscles that close the shells, to the mantle, etc. Each one forms a ring in the former locality, which gives off small threads. In Acephala (called also Lamellibranchs or bivalves) the ganglia are transparent, yellowish, orange, or rosy, containing fat cells, as well as the nervous. There are three well-separated pairs of ganglia, the ganglia of each pair connected by a commissure. The anterior pair is near the mouth; they are rarely close together (*Venus*, *Macra*) or united (*Mesodema*, *Teredo*); they give off on each side a nervous thread which extends to the foot, and is connected with the foot-ganglion pair. These are wanting in the oyster and other genera which want the foot. This forms an open oesophageal ring. The nerves of the foot are derived from the ganglion, but none of the intestinal nerves. These are derived from the third pair of ganglia, which are the most posterior, and which are connected with the front pair by a nervous stem on each side, forming a second ring round the digestive axis. It sends nerves to the mantle, gills, etc., meeting those from the anterior ganglia. In *Ostrea*, *Pinna*, *Mytilus*, etc. its nerves contribute to form a circuit which extends round the edge of the mantle, connecting with the anterior pair.

In Gasteropoda the ganglia and commissures are homologous with those of the Acephala, but the former are concentrated near the mouth, forming much more contracted rings. The two supra-oesophageal ganglia (or "brain-ganglia") are connected by short commissures. They send down commissures to the foot-ganglia, which are close to the oesophagus; the visceral ganglia or third pair are behind these, and connected with the superior ganglia by special commissures; sometimes they are on the upper side of the oesophagus, and connected by commissure below it. The superior sends nerves to the lips, mouth, tentacles, and eyes; the foot-ganglia to the under side of the oesophagus, to the ear, and the foot; the visceral ganglia to the mantle, gills, heart, intestines, and certain muscles. In the naked

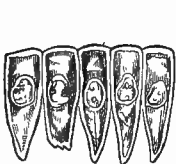


FIG. 6. Columnar epithelium from the intestine of the rabbit.

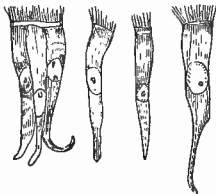


FIG. 7. Ciliated epithelium from the membranes of the human nose.

additional pairs on the thorax; head and thorax united into a cephalothorax, abdomen and developed post-abdomen without legs; respiration by tracheæ or sacs (spider, scorpion).

*Myriopoda*.—One pair of antennæ; a part of the thoracic limbs used as mouth-organs; abdomen not distinguished, many-jointed, furnished with limbs throughout; post-abdomen rudimentary; respiration by means of tracheæ (centipedes).

*Insecta*.—One pair of antennæ; abdomen without limbs, post-abdomen rudimentary; three pairs of limbs on the thorax; respiration by means of tracheæ; usually two pairs of wings (insects). (Fig. 32.)

*VERTEBRATA*.—*Leptocardi*.—Cranium membranous, without mandibular arch, no brain; heart with one chamber; five aorta-roots (lancelet).

*Dermopteri*.—Cranium and skeleton cartilaginous; no mandibular arch; heart with two chambers; five aorta-roots (lamprey).

*Pisces*.—Cranium and skeleton osseous or cartilaginous, or both, with under jaw composed in part of malleus, and supported by incus and stapes, as hyo-mandibular bone, etc. Limbs with many segments in contact with scapula without intervening humerus; pelvis mostly wanting. Brain well developed; optic lobes generally larger; cerebellum distinct; two chambers of the heart; five aorta-roots on each side. A parasphenoid bone (shark, sturgeon, sucker, perch).

*Batrachia*.—Skeleton osseous; cranium with parasphenoid, no basi-occipitals; under jaw embracing malleus, and supported by a single "quadrate" bone, "the incus;" limbs with humerus and few radii; pelvis present; brain with cerebral hemispheres largest, and small cerebellum. Three chambers to the heart; four or three aorta-roots; a coracoid bone (salamander, frog).

*Reptilia*.—Skeleton osseous, with coracoid bone and mandible, latter with malleus, and supported by incus; no parasphenoid, but a basi-occipital; brain with large cerebral hemispheres; two or one aorta-roots; two aorta-bows;

division (Opisthobranchia) the upper ganglia give a special ganglion to the tentacles; the foot-ganglia in like manner are adjoined by a pair for the gills. In *Chiton* all three pairs of ganglia are found on the inferior side of the oesophagus. In *Turbo*, *Littorina*, *Janthina*, *Phasianella*, and *Patella* the superior pair occupies the opposite sides of the gullet. In *Natica* all three are closely massed together. As in other higher Mollusca, a sympathetic nervous system exists which supplies the involuntary organs of the body.

The Pteropoda exhibit the three pairs of ganglia connected by commissure. In the Gymnosomata they are all separate, but in the Thecosomata they are concentrated on the lower side of the oesophagus, so as not to be readily distinguished.

In Cephalopoda this system displays the most concentrated type known among mollusks.

In *Nautilus* the ganglia are almost confluent, and form thick bands, one above and two below the oesophagus. The cerebral pair give off each an enormous optic nerve, appropriate to the size of the eyes in this class. The pedal pair supply the tentacles and organ of hearing, and the visceral pair the other organs. The inferior arches rest on the cephalic cartilage which characterizes the Cephalopoda.

The nervous system is in many of the Vermes very imperfectly developed, including the oesophageal ganglia with a few divergent nerves. In the Annelida the most highly developed condition is observed, where each body-segment possesses a ganglion connected by a longitudinal double commissure, which originates from the ring. In the Arthropoda this type is also the basis of the various arrangements observed, and is constantly discoverable in the larvæ of the various forms. As a general rule, it may be understood that where a special organ exists the ganglion of the segment in or on which it is placed is enlarged for its supply, as in the thoracic ganglia of insects. Here several segments are confluent; correspondingly, nervous ganglia unite, forming larger masses, thus supplying the legs and wings. The transition from the simple type found in the larvæ to the modified and concentrated types of the adults has often been observed in tracing the history of the growth and metamorphosis of insects. In the Crustacea and Arachnida the concentration is carried still farther than in insects. Thus in some lower Crustacea there are numerous ganglia, and the lateral commissures of the abdominal axis are only united in front; in the highest division, the Decapoda (crabs, lobsters, etc.), the axis is largely undivided, is short, and the ganglia are massed together. In the scorpions (Pedipalpi) there are but few distinct ganglia, but in the spiders (Aranea) there are no ganglia in the abdomen, and the nervous axis is short, massed together, and undivided. On the other hand, in the lowest Arachnida, the Acaridæ, there is no abdominal axis by defect, and the oesophageal ring is incomplete above, reminding one of the condition of the lowest Mollusca.

2. In Vertebrates.—In this branch the nervous system reaches its highest development, though in the lowest form, the Leptocephali, it can hardly be considered to be more perfect functionally than in many Mollusca. Here there is a spinal cord or medulla, but no brain, but in its place a slight enlargement of the diameter of the medulla.

The spinal cord of vertebrates, like the brain, is composed of gray and white nerve-tissue, the gray being the ganglionic or cellular tissue, and the white the fibrous or conducting. Unlike the brain, the spinal medulla possesses the white substance externally, and the gray internally. The cord is divided longitudinally by an anterior and a posterior fissure of some depth, and by two less profound lateral ones. The gray substance exhibits in section a crescentic outline, the horns of the crescent being turned externally and reaching the lateral grooves. Here each horn gives origin to a nervous stem, and the two soon unite and pass out through a foramen between the vertebrae. The posterior bears a ganglion, and is devoted to the function of sensibility or feeling; hence it is termed *sensory*. The anterior is the smaller, and is termed *motor*, as its office is to convey the stimulus which gives origin to muscular movements or contractions. After leaving the spinal column the single stem divides again, each branch containing fibres from both roots. The extremity of the cord is divided into a number of radiating threads, together constituting the cauda equina. In all the Vertebrata, from the Dermopteri to (and including) the Aves, there is an axial

tube of small diameter; in Mammalia this is wanting, except a short anterior trace of it. Birds add the peculiarity of a sinus rhomboidalis, which is a long rhomboidal expansion of the tube in the sacral region (rump), which is open superiorly. The spinal nerves in many of the branches form networks by unions and separations opposite the fore and hind legs, which are called the brachial and sacral plexus. The ganglia of the sensory root are in the Batrachia accompanied each by a deposit of white phosphate of lime, forming a rounded mass. In some fishes with a short spinal cord the division of the cauda equina takes place far anteriorly, as in *Diodon* and most other Plectognathi, thus leaving a very short axis.

The anterior part of the column enlarges, and is called the medulla oblongata; as this is within the cranium, it is reckoned as part of the brain. The six columns are here better defined, and there are added two well-defined oval prominences termed the corpora oliviformia between the lateral columns of Mammalia. This contains a corpus dentatum of gray matter. The fibres of the posterior columns cross or decussate; they are, however, only those of the anterior or motor root of the spinal nerves that do so, having passed upward through the column; the fibres of the posterior roots decussate in the gray matter of the cord near their exit, and pass thence into the brain without further exchange. The divergence of the posterior columns leaves a rhomboidal cavity or basin in the superior face of the medulla, which is the fourth ventricle. The roots of the auditory (seventh) nerve originate below its fundus. This chamber is variously exposed in different vertebrates. The postero-lateral columns (corpora testiformia) diverge upward and backward, and support the first great brain ganglion, the cerebellum. In the Elasmobranchi (sharks, etc.) the fourth ventricle is greatly extended laterally, having a lobate outline, with sinuous walls; in other Vertebrata this peculiarity does not exist. In Dermopteri, one division (Hyperotreti) exhibits prominent lateral lobes, which do not open externally; they are wanting in the remainder of the class (Hyperoarti). In many bony fishes there are ganglionic enlargements of the medulla, corresponding to the origin of the nervus vagus; hence vagal lobes. There are numerous lobes on the medulla of the pike. The medulla is straight in most vertebrates, but in Reptilia and birds it is bent rather abruptly downward and forward after entering the cranium.

The cerebellum is a simple oval or flat body in the fishes, Batrachia, and reptiles, excepting in the crocodiles. In these it develops two small lateral lobes, while the middle portion, now called the *vermis*, becomes transversely grooved. In the birds the lateral lobes are a little larger and the plicæ deeper, and on section it yields a digitate and serrate outline of gray matter with a white centre, called the *arbor vitæ*. In Mammalia the size is increased, especially as regards the lateral lobes. In Dermopteri it is small—in the division Hyperoarti apparently composed of two lateral ganglia. In sharks it is much enlarged longitudinally, and on section displays a weak arbor vitæ; in *Pristis* (saw-fish) it even reaches the cerebrum, covering the optic lobes. In other fishes it is smaller, in the usual osseous orders a flat transverse commissure bridging the fourth

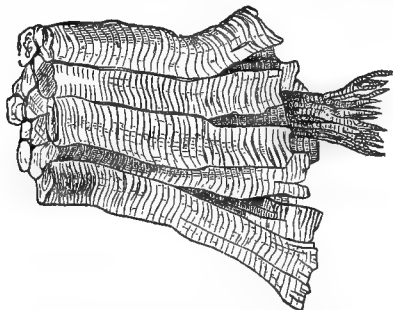


Fig. 9. Striated muscle magnified.

ventricle, in *Polypterus* it is similar, but in *Lepidosteus* and *Amia* it is larger and oval. In Batrachia and in Dipnoi it is more insignificant than in any other division, being a very small transverse commissure, not nearly covering the fourth ventricle. In Batrachia this cavity contains a triangular network of blood-vessels, which fits it, called the plexus chorioideus; this is only seen elsewhere in the tortoises (Testudinata). In reptiles the cerebellum is still small and transverse, but exceeds that of the Batrachia; it is convex and scutiform; the fourth ventricle is nearly closed. In the crocodiles it is first approximately closed.

Anterior to the cerebellum, the brain is best understood

as a double body, bilaterally symmetrical, and composed of a series of ganglia on each half of the divided axis or prolongation of the medulla oblongata. These ganglia are, primarily, the optic lobe, the cerebral lobe or hemisphere, and the olfactory lobe. The middle columns of the medulla support the optic lobes, while the cerebral lobes are supported by the middle and anterior columns. The optic lobes are the largest of the ganglia from the Dermopteri to the Batrachia (fig. 33), with the following exceptions: the cerebral hemispheres are larger in elasmobranchs and *Polypterus*. The lobes are sub-globular, and exhibit no marked external peculiarity till we reach the Batrachia, where they are smaller than the hemispheres, as in all the succeeding classes. In the tailless Batrachia (Anura) they are divided transversely, forming four sub-round bodies; it is possible that the anterior one should be considered the lobus ventriculi tertii, or optic thalamus, of the next ganglion or cerebrum; but as it is united with the posterior in the tailed Batrachia (salamanders) and Proteida (*Necturus*) (fig. 34), they are more probably the anterior bodies of the corpora quadrigemina of mammals. The posterior, and half or all of the anterior, are covered by a fold or lamina, which rises from the posterior part of the posterior bodies in the Anura. In the Urodela the posterior is reduced, like the cerebellum, to a narrow transverse commissure, while in *Necturus* both it and the cerebellum are wanting.

In Reptilia the optic lobes are more simple, but they are partially divided into superior and inferior bodies. In lizards the superior is laminar, and separated by a vacuity from the inferior; but in serpents the latter is a mere fissure. In harmless snakes (fig. 36) the lateral bodies are connected by a commissure, but in the venomous *Trigonocephalus* and *Bungarus* they are united behind; in *Vipera* the superior and inferior bodies appear to be quite separated from each other. In birds the optic lobes are simple, and situated infero-laterally, since the cerebellum and hemispheres are in contact. In Mammalia they are superior, and continuous with each other, and consist of four protuberances, the corpora quadrigemina. They are much reduced in size, and cover a narrow vacuity or tube, the

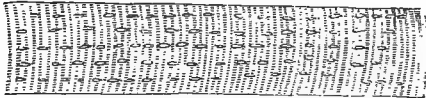


FIG. 10. Muscular fibre, greatly magnified.

aquæductus Sylvii. In front of the anterior pair is situated a sac-like body, the pineal gland, which is the rudiment of an important organ of the brain of lower orders, the epiphysis. This is a highly vascular membranous body, which rises to the inner surface of the cranium in Dermopteri, fishes, Batrachia, and Reptilia. It is very variable in structure in fishes; in reptiles (lizards) it often communicates with the outer surface by the foramen parietale of the table of the skull. Directly opposite to it another sac descends from the cavity below the optic lobes (the aquæductus Sylvii), which is termed the hypophysis. It exists in the classes which possess the epiphysis, and is represented among Mammalia by the pituitary body and infundibulum.

The cerebral hemispheres are small in the classes below the Batrachia, except in sharks and a few fishes, as the Dipnoi, Polypterus, and Ginglymodi (gar). In Dipnoi, Crassopterygia, Chondrostei (sturgeons), Ginglymodi and Halecomorphi (*Amia*) the hemispheres are at a distance from the optic lobes, being supported by the elongate crura of the medulla oblongata; in other classes and orders the hemispheres are sessile. In the mammals alone we find the pons varolii, a body of transverse fibres which cross and bind together these crura cerebri on the inferior side. The hemispheres in the mammals present many peculiarities: their size is increased, and in many the surface is thrown into vermiform ridges or "convolutions." In the fishes and higher types they are hollow, enclosing the "lateral ventricles." The floor of these is occupied by various bodies in the different types. Thus in Batrachia there is a body on the inner side of each. In reptiles this is represented by a narrow body, while another mass occupies the outer part of the floor of the ventricle. In Mammalia two bodies, little separated, occupy this position—viz., the "lobus ventriculi tertii" (or thalamus opticus) and the corpus striatum. The cerebral hemispheres are not united till in certain birds we find a narrow bridge connecting them, the fornix. In the lowest Mammalia (Marsupialia, etc.) we observe another connecting body in a rudimental state above the fornix. This is the corpus callosum, which in higher mammals is a massive bridge, and much larger than the fornix. There is another bond of connection called the anterior commissure, which is short and sub-cylindric: its size in

mammals is nearly in inverse ratio to the development of the corpus callosum. The ventricles are separated by the septum lucidum in this class only, but is much reduced in the monotremes (duck-bill). The characters of the brain in the orders of Mammalia may be best expressed in tabular form, thus:

I. No calcarine sulcus nor hippocampus minor; corpus callosum rudimental; hemispheres smooth, leaving cerebellum and olfactory lobe exposed: Monotremata, Marsupialia.

II. Corpus callosum well developed, short, without rostrum; no calcarine sulcus nor hippocampus minor; hemispheres smooth, short; olfactory lobes and cerebellum not covered: Edentata, Rodentia, Insectivora, Chiroptera.

III. Corpus callosum longer, with a recurved rostrum in front; no calcarine sulcus nor hippocampus minor; the hemispheres convoluted, and partially covering the olfactory lobes and cerebellum: Proboscidea, Hyracoidea, Ungulata, Carnivora (hoofed and carnivorous animals).

IV. Corpus callosum long, with rostrum; a calcarine sulcus and hippocampus minor; hemispheres mostly convoluted, partly or wholly covering the olfactory lobes and cerebellum: Primates (monkeys, man).

Exceptions to the definition of the Primates are seen in some of the Lemuroidea, in which the hemispheres are smooth. In man they have nearly twice the size seen in the allied forms of apes (chimpanzee, etc.). The calcarine sulcus is on the lower side of the posterior part of the hemisphere, and the hippocampus minor is the convex body within the ventricle, which its presence causes; it forms the inner wall of the posterior horn of that chamber.

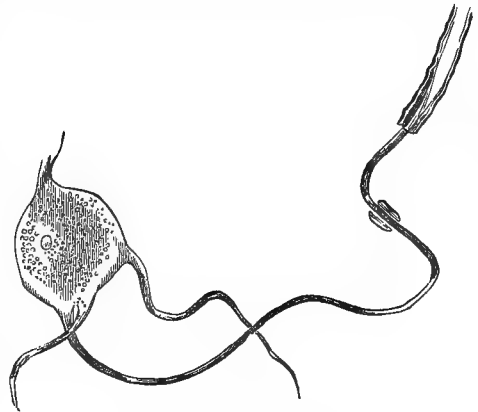


FIG. 11. Nerve-cell and filaments.

The olfactory lobes are very large in elasmobranchs, and are connected with the hemispheres by a narrow commissure. In fishes they are less developed, and in batrachians are sub-cylindric and separated by a groove. In reptiles they are continuous with the hemispheres, obpyriform in shape, and often slender; they are frequently hollow. In birds and mammals they bear a smaller proportion to the whole brain, and are entirely concealed in Primates.

The optic nerve originates by fibres derived from the optic lobes. Its fibres decussate or cross from the right side to the left, and vice versa, shortly after leaving the brain in all Vertebrata, excepting the lower Actinopteri (Halecomorphi, Ginglymodi, and Chondrostei), the Elasmobranchii, and the Dermopteri. In all of these the nerves are connected by a commissure, which is in part (*Amia*) composed of fibres which leave the brain and return again, forming a short circuit. In the Dermopteri this "chiasma" takes place near the roots of the nerves; in the others, at a greater distance from the brain.

The remaining cranial nerves are in fishes only four pairs, the vagus, glossopharyngeus, trigeminus, and facialis. The first two and the last two are each approximated. The vagus exhibits in the fishes above the Dermopteri two distinct roots. The first is the nervus (ramus) lateralis, which extends posteriorly beneath the scapular arch, and runs along the middle of the side of the body to the tail; it is abortive in Dermopteri. The second or larger nerve supplies the gills and viscera. The nervi trigeminus et facialis have four distinct origins, which sometimes unite and form one or two plexuses outside the cranium. The branches are distributed to different parts of the head; but one, which especially characterizes many bony fishes, but is wanting in Clupeidae, Plectospondyli, *Amia* (gar), Chondrostei, and elasmobranchs, the ramus lateralis, runs upward within the cranium, issues above, and extends along the back to the caudal fin, supplying the dorsal fin. In Der-

mopteri and Dipnoi the glossopharyngeal is a branch of the vagus; in other vertebrates it is distinct.

In Batrachia the rami laterales of the vagus are present; and the glossopharyngeus unites with the vagus, forming a ganglion, from which nerves issue. The origins of the nervi trigeminus and facialis are wholly or in part common, and they support a ganglion Gasserii. The hyoid and scapular muscles are supplied from the first pair of spinal nerves, and the vagus supplies branches to the scapula. These characters are in part those of reptiles, but more prominently those of fishes. In the Reptilia there are nervi accessorii, as well as hypoglossi. The latter supplies the hyoid and scapular regions, and the former certain muscles inserted in the scapula in front. The rami laterales of both vagus and trigeminus are not present, and the facialis has a distinct origin. In mammals all these nerves are present, except laterales, but the facialis frequently is identical with the trigeminus in origin.

#### VI. THE MUSCULAR SYSTEM.

Muscles are entirely wanting to the Protozoa and to the Coelenterata, excepting the Medusæ. In the latter, delicate bundles of unstriped fibres exist, extending vertically from both the inner and outer surfaces of the umbrella, while between them concentrically curved bundles run between the eight circulatory canals. Among echinoderms the innumerable segments of which they are composed give origin and insertion to many muscles. In addition there are muscles devoted to the masticatory apparatus. This consists in Echinoidea of five tooth-like bodies, which form a pyramidal mass when closed. For the opening and shutting of these, twice ten paired and twice five single muscles are arranged, as well as several others. In Holothurida five longitudinal muscles extend from the hard cesophageal ring to the vent. A sphincter closes the mouth, and the superior part of the gullet is thickened with muscular walls. The tentacles possess muscles.

In Mollusca muscles are universally present, though fewer in number than in the groups just described. In Bryozoa (or Polyzoa) a system of muscles is arranged for the withdrawal of the crown into the sheath-like body; these are median, longitudinal, slender muscles. Those designed for projecting it again are horizontal, curved, and situated on the inner wall of the body; the successive contractions of these from below upward will produce the result. Avicularia are peculiar bird-head-like bodies, situated near the mouth in the marine Bryozoa; they are furnished with a bird-like beak, with an under jaw which frequently closes with a snap, and slowly opens. These movements are conducted by muscles whose movements are automatic. The large mantle enclosing the body of the Tunicata is composed of two muscular layers—the one of transverse (hence annular) fibres, the other of longitudinal or oblique. Muscles for producing progressive movement or swimming are found in many genera. These are annular, and at intervals around the body. *Appendicularia* possesses a long and deep rudder-like tail, which contains muscular layers. The Brachiopoda are attached to a fixed body by a muscular arm or anchor, which enters the shell through a foramen. This is connected with the dorsal and ventral valves of the shell by corresponding opposite muscles, which determine the direction of its open borders. There are two pairs of adductor muscles arranged longitudinally, and two pairs of abductors (divaricators), one of the pairs smaller, and sometimes wanting. There are muscles also in the mantle and branchial arms. In lamellibranchs or Acephala there are powerful musculi adductores. There is but one in the Ostreidæ, Aviculidæ, and Muelleriidæ. They are of very unequal size in the Mytilidæ, but sub-equal in the remaining Acephala. In *Anomia* there are three.

There are also retractor muscles of the siphons, and a band round the edge of the mantle. The muscles of the foot are often large. The principal one divides next the body, and each half is inserted near the hinge of the shell between the adductor muscles. In Gasteropoda the muscular structures have a different arrangement. The foot is largely muscular, and its upper and posterior region gives insertion to the columellar muscle, which attaches the animal to the shell. It arises from the columella at the beginning of the last whorl. Its size depends on the size of the whorl and length of foot. Other muscles are devoted to the elongation or retraction of the proboscis and the penis. In Cephalopoda the columellar muscle is represented by a large symmetrically divided mass, which arises from the cephalic cartilages, and is inserted into opposite sides of the shell. An annular muscle surrounds the neck, and another the funnel. From the latter diverge the longitudinal muscles of the tentacles, which are perforated by radial muscular fibres. The mantle is occupied by a flat muscle. The usually muscular foot is here represented by a flat body, which projects forward from beneath the mantle. It is

rolled up, forming a tube. By the energetic expulsion of water from the mantle-chamber through this tube the animal is driven through the water, the mantle end first.

The interior surface of the outer chitinous skeleton of the Arthropoda is lined with a muscular layer. Longitudinal and oblique muscles connect the annuli, which repeat each other in those forms (Myriopoda and larvæ) in which the segments are similar. Where (as in all the higher types) the segments are much specialized, the muscles are modified accordingly, either by increase of size or number. Muscles of the dorsal and ventral regions are usually more

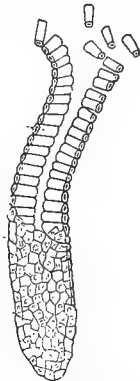


FIG. 12. Tubular follicle of the pig's stomach.

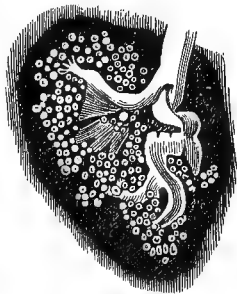


FIG. 13. Lobule of parotid gland, magnified.

enlarged than those of the lateral, while in the types where the sides are soft, to allow of the movements of the back and belly plates, the latter are connected by straight muscles which pass through the viscera. All the limb-muscles are within them, or are inserted into internal processes of the chitinous walls. Sometimes they are inserted into fibrous bodies which have been hardened by calcareous or chitinous deposit, which also subserve the purpose of levers.

Arthropoda possess muscles which perform the functions well known among vertebrates as rotators, elevators, depressors, retractors, protrusors, etc. But the flexors and extensors exceed the others greatly in importance and size. Their relative size is the reverse of what is seen in vertebrates; in the latter the extensors are the more important; in the Arthropoda the flexors exceed the extensors several fold.

2. In Vertebrates.—The muscles of the animals of this type are divided into two classes by their position and the relation they bear to the skeleton, and are termed episkeletal and hyposkeletal. The former are situated on the upper surface of the vertebræ—i. e., of the body and arches, including ribs—and are developed in the fœtus coincidentally with the vertebræ. Hence they are in segments which correspond to these, and are separated by intervals termed inter-muscular septa. The hyposkeletal are developed later, and below the vertebræ; they are in part attached to the latter, or to the abdominal walls or the limbs.

In vertebrates below the Batrachia the hyposkeletal muscles are developed to a very slight degree. The segments of the episkeletal series (or myocommata) cover the sides of the body posterior to the head, and meet on the median line below. They present an angle forward, near their middles, having thus an open chevron shape. In Batrachia the tails and sides retain the largely developed myocommata, while the abdominal muscles have the character of those of the Reptilia. In these and higher Vertebrata the hyposkeletal muscles are well developed. In the latter numerous muscles (spinalis, semispinalis, longissimus dorsi, sacrolumbalis, inter transversales, levatores costarum, complexus, splenius, recti postici, and recti laterales) are derived, by subdivision, from the upper portion of the myocommata. In the same way the inferior half gives rise to the recti abdominis, which extend from the pelvis to the sternum; the sterno-hyoidei from the sternum to the hyoid apparatus; the genio-hyoidei from the latter to the lower jaw. On the sides the derivative muscles are obliquely directed—viz., the external intercostales; the obliqui externi of the abdomen; the subclavius from the first rib to the clavicle, and the scaleni from the anterior dorsal ribs to the cervical ribs and processes; lastly, the sterno-cleido mastoid extends from the sternum and clavicle to the skull. The fasciculi of these muscles are all directed, as is the lower part of the myocomma of the fish, from above, or dorsally, downward and posteriorly. The hyposkeletal muscles occupy the inner side of the body-walls, and include, besides many others, the diaphragm of Mammalia

and birds. This septary muscle is wanting or rudimental in vertebrates below the Aves.

The muscles of the limbs are of two kinds: (1) those that originate from the body, and (2) those that take origin on some bone of the limb. The former move the whole limb, the latter, its parts. They are extensors, flexors, and rotators; among the most notable of the last is that which, in the Mammalia, rotates the radius of the fore arm on the ulna. Of flexors, the pectorales major and minor pertain to the fore limb; they are enormously developed in birds, subserving the function of flight. The extensor of the hind limb, the *gluteus maximus*, is greatly developed in man, as essential to the erect attitude. The longitudinal dorsal muscular tendons are generally ossified in birds.

A remarkable modification of the muscular system is seen in the electrical organs of certain fishes, the torpedo, electric eel (*Gymnotus*), and catfish (*Malapterurus*). Here a system of enormous cells, packed in parallel columns, discharges electricity instead of developing movement or contraction. The contents are gelatinous, and are divided by connective tissue into transverse disks, imitating striped muscular fibre. The columns are vertical in the torpedo and longitudinal in the other genera. They are richly supplied with nerves, which are distributed on one face only. The rays possess rudimental organs of the same kind at the base of the tail.

#### VII. THE MUCO-DERMAL SYSTEM.

1. In *Cœlenterata*, *Echinodermata*, and *Mollusca*.—The superficial or cellular layer of the skin, or epidermis, is universally present in animals. The inferior layer in vertebrates is fibrous, and belongs strictly to the system of areolar or connective tissues; it is not found in the *Cœlenterata*, but is represented by a non-cellular, granular, and sometimes slightly striate "true skin." In these animals and in polyps (*Anthozoa*) there are two or three layers of cellular skin, of which the lower contains the "nettle-cells." These are minute bladders .02 to .07 millimètres long, and one-third to two-thirds as thick, which contain a hair-like body coiled within them. These are suddenly projected upon external irritation, and act as irritants or offensive weapons upon the object they strike, producing sometimes severe smarting and paralysis. These cells occur also as an external lining of the mesenterial threads of polyps. The true skin is the layer in which is deposited the carbonate of lime, which, penetrating or not the folds of the internal cavity of the body, produces the radiating and tubular solid structures characteristic of corals. In the *Gorgoniidae* the deposit of the basis of the first simple, and therefore of the axis of the compound, animal, is horny; this is afterwards covered with a thin calcareous layer.

In the *Echinodermata* the dermal system fulfils an important function, as the basis of deposit of mineral matter in the form of innumerable symmetrical segments. In the *Holothurida* these deposits are frequently isolated and internal, and sometimes entirely wanting; the tentacles always contain them. Among *Mollusca* the superficial layer consists of ciliated epithelium (except on the eye-peduncles). The true skin is fibrous, and contains many cells; it is in the form of a sac, and often reaches considerable thickness. An extensive fold derived from the posterior part of the body in *Cephalopoda* and *Gasteropoda*, or the superior in *Acephala*, envelops the body more or less completely. In mollusks which possess a shell the latter is produced by the margin of the mantle. This margin is

lateral oval laminae, thus producing the well-known form of the shells. The periodical deposits of lime by the mantle are seen in the lines of growth of all shells. The form of the mantle border is faithfully repeated in the shell; thus the projections caused by the protrusion of the proboscis in *Murex*, *Strombus*, etc., is seen in the convexities and canals of their margin. In *Acephala* the mantle extends beyond the body, enclosing a space known as the mantle-chamber. The margins of the mantle in a large number of families are extensively united, thus forming a nearly closed chamber. They are entirely separated in the oyster, the *Arca*, *Myophoria*, etc. They are sometimes only united by a bridge; when more extensively, there usually remains an opening through which the foot is protruded. Of these some leave a single opening at the posterior end of the body (*Mytilidae*, *Unionidae*), or the latter is divided into two (*Tridacna*, *Isocardia*, *Cyprina*). Of these the upper is the point of exit for excrement and water, while the lower admits water to the gills and food to the mouth. The lips of these openings are in many families prolonged into tubes, sometimes very extensively. These may be united or separate. They are either fixed or retractile; when the latter, the space they occupy in the shell requires that the line of attachment of the mantle to the shell should be indented, sometimes to a great degree. The opening for the foot also admits water. It is much reduced in size in genera with a rudimental foot (as *Gastrochæna*, *Aspergillum*, etc.), and is finally closed in *Pholadidea*.

Besides the mineral substance, the colors of the shell are secreted by special pigment-glands on the margins of the mantle.

The shell is not always composed of carbonate of lime; in *Lingula*, *Pinna*, etc., the material is phosphate of lime, and resembles bone. The pearl layers of many shells are aragonite. The shell may be composed of laminae or prisms, or both. *Anomia* exhibits the first, *Inoceramus* the second, and *Strombus* the third type. In *Brachiopoda* the shell-valves are dorsal and ventral; in *Acephala*, right and left; in *Gasteropoda* and *Cephalopoda* the shell is central and single. In *Acephala* tightly-closed valves indicate retractile siphons; posteriorly gaping shells, projected ones.

The valves are united by a marginal hinge, composed of teeth, pits, and cartilage ligament, in most families.

In *Gasteropoda* the coil may be flat (*Planorbis*) or much prolonged (*Mitra*). The "body-whorl" is that last made; it may be either contracted (certain snails), or greatly enlarged, as in *Cypræa*, where it almost or quite conceals all the other turns, in its fold.

In the fossil *Endocardines* (or *Rudistes*) the valves are fastened by hinge-processes on the inner face of the free and smaller valve.

The shell of *Cephalopoda* is distinguished by its septa. These enclose chambers, the animal only occupying the last one constructed. This structure is not without parallel among *Gasteropoda* (where the unused portion is generally broken off), but the *Cephalopoda* are peculiar in that the body is not entirely withdrawn from the first chamber, but leaves a long tube, which passes through all the chambers, and secretes a pearly sheath, which is known as the siphon of the shell. In life this contains nothing but air, which is wanting in carbonic acid. The margins of the septa are simple in *Nautilus*, *Orthoceras*, etc., but fold in a most complicated and symmetrical manner in *Ammonites*, *Baculites*, etc. In *Goniatites*, *Aturia*, etc., the folds are fewer and more simple.

The *Argonauta* (paper nautilus) is peculiar in the character of its shell, which only belongs to the female. It possesses indeed no true shell secreted by the mantle, in common with other octopod genera, but that which bears the name is secreted by the margin of the large expansions of the two posterior arms. These enclose the shell, which is thus evidently a product of their inner face.

The byssus is a fibrous rope or thread-like body which is secreted by a gland in the foot of certain *Acephala*. By means of it the animal is attached to fixed bodies. It is well developed in *Mytilus*, rudimental in some *Uniones*.

2. In *Arthropoda*.—The external covering of the body and limbs of animals of this class has been already stated to be chitin. This substance is composed chemically of  $C_{17}H_{14}NO_{11}$ —that is, a protein body,  $C_6H_5NO_3$ , plus a hydrated carbon,  $C_9H_8O_8$ . In higher Crustacea and in various *Myriopoda* (*Iulus*, *Polydesmus*, etc.) it is accompanied by an equal or even greater amount of carbonate and phosphate of lime; of these the former exceeds the latter in quantity. The chitin layer proper is a secretion from a layer of cells, which in turn lies above a stratum of connective tissue. The cells resemble the epithelial, and have distinct nuclei. The chitin originates from these as a transparent layer, but frequently becomes streaked or fibrous.

The pattern on which each segment of the arthropod

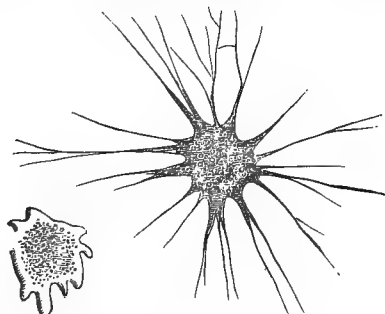


FIG. 14. Amoeba, Rhizopods.

supplied with glands which secrete or separate carbonate of lime, which they deposit on the general border. Thus the shell takes the form of the body, which the mantle closely enfolds. In *Gasteropoda* it is sub-cylindric; the shell has the same character, being sometimes partially or wholly straight (*Vermetus*, *Teredo*), or generally spirally twisted. In the bivalves the mantle has the form of two



body is constructed is that of an annulus composed of several pieces. These are a median dorsal and ventral, and a pair of lateral shields on each side. The number of these rings in the different orders averages twenty and less, but in some Myriopoda it rises as high as 140 (*Geophilus*). They are greatly modified in forming the head, to which five segments are reckoned by some (seven by others). In Myriopoda those remaining are very similar to each other, while in the other orders they are much modified, and generally arranged in groups. These are distinguished in insects as head, thorax, and abdomen; in Crustacea the first two and part of the third series are united into a cephalothorax, while the numerous remaining segments are the post-abdomen. In Arachnida only, however, we have the true cephalothorax, including head and thorax only, the abdomen remaining entirely distinct. The number of segments in the Crustacea Decapoda Amphipoda and Isopoda, is 20; in the Copepoda and insects, 12; in Arachnida it varies from 12 to 19.

The limbs of Arthropoda are composed of hollow, variously altered cylinders, articulated together where com-

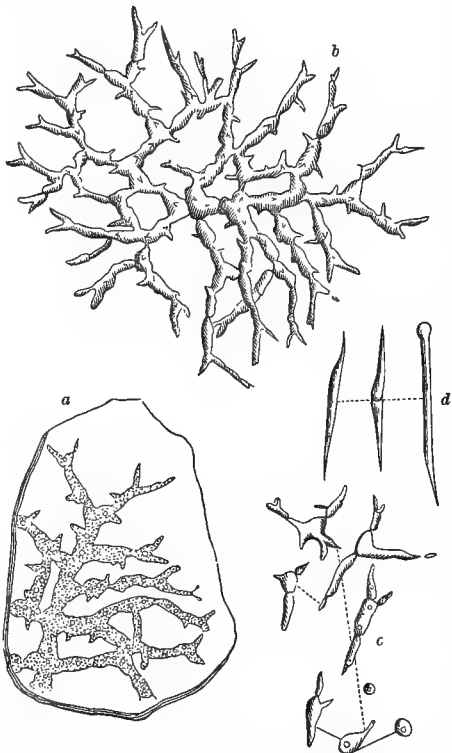


FIG. 15. *Vicia Freyeri*, Hanc.: a, entire animal on a shell of *Placuna placenta*; b, c, the sponge removed, the branches in different stages of growth; d, spicules.

posed of more than one segment. In Crustacea and Myriopoda they are present on all the segments of the body; in Arachnida and Insecta on head and thorax only. In the last-named class only those of the head are modified to aid in seizing and devouring food; in the Crustacea, those of the thorax are partly (*Gammarus*) or wholly (*Astacus*) devoted to this service. As organs of progression only those of the thorax are employed in Insecta; in Arachnida the last head-limb is included; they thus possess four pairs of limbs, while the Insecta have but three. The larvæ of lepidopterous and some (tenthredenid) hymenopterous insects possess false feet or pro-legs on the abdominal segments. In the former they are beset by an arched series of minute claws, which are absent in the latter. The abdominal legs of Myriopoda are, like the thoracic, simple. In Crustacea they are in part swimming organs, and many of them bear plates and fringes in which the blood is exposed and oxygenized.

The organs of the head, or altered feet, are in jawed insects as follows: 1st, wanting; 2d, antenna; 3d, mandible; 4th, maxilla; 5th, labium. In insects with a tubular mouth it is similar, except that the third pair are bristles for puncturing, the fourth similar, and the fifth a tubular body or rostrum, enclosing them. The hemipterous rostrum is of this type. In Lepidoptera, where there is a tubular or suctorial tongue-like rostrum, the third segment is rudimentary,

the fourth is the rostrum, and the fifth is the labium. Of the jawed type of the Coleoptera are the orders Orthoptera and Neuroptera. In the Hymenoptera (bees, etc.) the mandibles are developed as jaws, but the maxillæ are elongate, and form the opposed halves of a tube which encloses a projectile tongue. The suctorial orders, Hemiptera and Lepidoptera, have been mentioned; the structure in the Diptera (flies) is similar to that of Hemiptera.

The antennæ of insects are organs of special sense, but whether of hearing, smell, or taste is not well known. In the basal segment of certain Crustacea (*Sergestæ*, etc.) a chamber containing grains of sand has been suspected to be an organ of hearing; while a microscopical nervous structure in the posterior wings of Coleoptera has been regarded as of similar significance. The antennæ are set with bristles, which evidently subserve the ordinary but here highly delicate sense of touch. The Crustacea are distinguished by the presence of two pairs of antennæ; the second pair only of these is present in other Arthropoda, excepting the larvæ of insects, where the first pair exists in a rudimentary state, the second being absent. In Myriopoda they are as in Insecta, but in Arachnida both appear to be wanting; the second pair is, however, present as jaw-antennæ, taking the place of the absent mandibles.

In Insecta the forms of the antennæ are very numerous. The typical structure is that of a succession of (nine to twelve) sub-similar cylindric segments. Thus they appear in carnivorous and other Coleoptera, in phryganoid Neuroptera, acridiid Orthoptera, nematocerous Diptera, etc. In most Diptera they are excessively shortened and of few joints; the last is enlarged, and supports at its base a large bristle, which is frequently plumed. In Lepidoptera Diurna they are club-shaped; in Sphingidæ, triangular in section, and in Lepidoptera Nocturna, fusiform and often plumed. In many Orthoptera they are very short; in Hymenoptera short (bees), elbowed (ants), or much prolonged (Ichneumonidæ). The Coleoptera exhibit the greatest varieties. In some (*Elatæ*, *Dictyopteræ*) they are serrated; in Silphidæ, short and clubbed; in Longicornia their length is often excessive; in Curculionidæ some of the basal segments are elongate, forming an elbow with the remainder. In Lamellicornia the terminal segments are expanded, leaf-like, one on each side of the axis, and open and shut like the leaves of a book.

In Myriopoda the maxilla and labium of insects are represented by a large labium. In the Strongylia there are a second and third labia; but in Chilopoda the last is represented by a pair of powerful foot-jaws, which are perforated for the conduct of poison. The first leg corresponds to the third of the insect. In Arachnida the insect maxilla is represented by jaws, which are simple in spiders, acute, and perforated by a poison duct, but in Phalangia, scorpions, etc. (Pedipalpi) are furnished with an opposable joint, or are chelæ.

In Crustacea the second pair of maxillæ are not united into a labium, as in Insecta. The cephalothorax in some of the higher order of Decapoda (crabs, lobsters, etc.) is distinguished from the abdomen by a groove, as in the crayfish (*Astacus*): in all of them the ambulatory limbs arise from the abdomen. One or more of these are chelate (furnished with nippers) in the Decapoda and other orders, but in the Stomatopoda the first pair has instead the last joint opposed to the whole length of the penultimate, forming a reversed scissor-like organ. The limbs of the post-abdomen usually bear branchial organs, while those of the last segment are in the form of plates, which, when extended, form a swimming shield (lobster), or are hook-like bodies for maintaining the hold in the shell (*Pagurus*).

The limbs in Insecta are always similar in construction, though the hinder may be much elongated (grasshopper), and never chelate. They consist of four regions—the coxa, femur, tibia, and tarsus. The coxa attaches the limb to the body by a ball-and-socket or hinge-like joint, and may be from globular to laminar in form. The femur is the stoutest joint, containing the muscles which flex and extend the rest of the leg. The tibia is slender and often long; the tarsus usually consists of several joints. In some Hemiptera it consists of but one or two; in most Coleoptera it embraces at least five. In the latter order the number is an important index of relationship. The lower groups (Phytophaga, etc.) possess but three; the curculios, longicorns, etc. possess four, and the Tenebrionidæ and others five in front and four on the hind limbs only; lastly, the sericorns, clavicorns, monilicorns, and other types with five joints, all round. The last joint usually consists of a pair of chitinous hooks; others may be modified by expansion, etc. for adhesion to vertical surfaces, etc.

3. In Vertebrates.—The skin in the Vertebrata is primarily smooth and soft. Its epithelial glands may secrete mucus, as in many fishes, or glands seated in the true skin may separate sweat. The latter are simple, convoluted, and

with a long efferent duct. The epithelial layer produces the bony sheaths of claws and horns, feathers and hairs. Mammalia are generally covered with hairs, but in the manis it is thrown into extensive folds, which are ossified, and become the scales of those remarkable animals. In the shell of the armadillos and on the head of various batrachians it is penetrated by ossification, which is confluent with that of bony structures below them. Hairs are an epithelial growth in the form of a hollow cylinder. The epidermis is sunk into a pit of the true skin, and then returns outward as the hair. It increases in length by addition of cells and pigment from below. A modification of the same structure is seen in feathers, where the axis is split laterally, and thus develops the barbs and fibrillæ on each side. Birds are covered with feathers. The first growth appears as down, in which the fibrillæ are softer and in much smaller number, so as not to be coherent; the bases of the true or mature feathers are furnished with the same. Those of the body are generally soft; in aquatic birds excessively dense on the lower surfaces. They arise from certain patches only. There is one on each scapular region, and one along the middle line of the neck above. Another is on the rump, and one on each side of the breast. The abdomen presents a large median patch. In ostriches, penguins, and a few others the feathers are evenly distributed over the whole body. Besides the main shaft of the feather, a second one is developed behind it in many birds. It is generally much smaller than the first, but it is equal to it in the Casuariidæ. The largest feathers are developed on the caudal vertebrae and on the fore limb. In the latter they subserve the function of flight. Those attached to the carpus and manus are the longest and most important, their length bearing a direct relation to the powers of flight of the bird. These are the *primary* quills; they are enormously developed in the swallows and swifts, in the humming-birds and frigate-pelicans (*Tachypetes*), etc. They consist of naked shafts only in many of the ostriches. The quills attached to the fore arm are the *secondaries*; they are proportionately large in gallinaceous birds. Those inserted into the skin of the humerus are the *tertiaries*, and are most highly developed in the wading families (Grallæ) and certain song-birds—e. g., the Motacillidæ. The caudal quills or rectrices are from twelve to eighteen in average number; they are greatly elongated in the tropic-bird (*Phaeton*), *Milvulus*, etc., and are almost wanting in some gallinaceous birds, in some tinamous, etc. The rump-feathers or tail-coverts are sometimes so developed as to conceal them, as in the peacock, *Pharomacrus*, *Ægretta*, etc.

The scales of reptiles are areæ of true derm, bounded by simple folds, which are covered exactly by epidermis. These areæ may be filled with an osseous deposit, as in *Heloderma*; in snakes they are soft. In tortoises the intervening folds are very shallow, and remotely correspond to the skeleton below. The epithelial layer is horny (tortoise-shell), while the derm is ossified and united with the osseous skeleton below. In Crocodilia the distinct ossifications occupy the dermal areæ of the back, or on both surfaces of the body in the caimans, etc. The areæ are symmetrically distributed on the head in serpents, most Lacertilia and some tortoises. In the first they are fewest and most regular, numbering usually nine on the upper surface. They correspond remotely with the cranial bones, and hence are called parietal, frontal, superciliary, prefrontal, internasal, rostral, etc. In venomous snakes and boas the vertex is frequently covered with scales.

Fishes frequently display ossifications of the epidermis as well as of the true skin, as on the cranium of sturgeons, their dorsal and lateral shields, etc. The scales which cover the bodies of most fishes are developed in pouches of the true skin by deposit of mineral matter. Their exposed surfaces are covered by epidermis, which enters between them, and reaches there the true skin. In eels they are small and separated. In fishes with closed swim-bladder (Physoclysti) the scales develop spinous projections which produce the effect of a comb on the margin, and are hence called *ctenoid*. Most of those in fishes, with the duct of the swim-bladder (Physostomi), have smooth surfaces and edges, and are termed *cycloid*. In many fishes of early periods, and some now living (*Lepidosteus*, *Polypterus*), the scales are pavement-like and glossy, with a layer of *ganoin*. These are crossopterygians or Physostomi. Sharks have separated mineralized bodies, with flat bases and produced points, granules, etc., whence they have been termed *placoids*. In Dermopteri and Leptocardii the skin is smooth.

The internal parts of the muco-dermal system are the mucous and serous membranes. The former are continuous with the epidermis, and line the cavities of the digestive, respiratory, and reproductive systems. The latter line the closed chambers, being continuous with the mucous membrane only at the fontanelles of the oviducts (tubæ Fallopii). In the thoracic cavity they form a sac, with one side thrust

in upon the other, the thoracic viscera being on the outside of the entering portion. The abdominal viscera occupy in the same way the outside of the membrane lining the cavity, which is termed the peritonæum. In the thorax it is the pleura.

4. *The Teeth*.—These bodies are generally developed in an internal or external epithelial layer, like some of the dermal, bony, or mineral plates or pieces. In Protozoa and Coelenterata they are wanting. In Echinodermata they are present as five hard sub-triangular plates, which close the mouth by their close contact, like radii from its centre. In Mollusca they are described under the digestive system, so that it only remains to consider them in Vermes and Vertebrata. In the former they consist exclusively of hooks, mostly arranged round the mouth. In the Trematodes they occur, weakly developed, in a few genera, in one of which they are attached to an organ at the posterior extremity of the body. In Nematoda, *Chiracanthus* has hooks on the head and body, and *Strongylus* horny teeth round the pharynx. In Acanthocephala all the genera possess a retractile proboscis, which is studded with recurved hooks in various circles. In Cestoda, the tape-worms have hooks as well as suckers on the head, which are especially well developed in the cysticercus larval stage. The Tetrarhynchidæ possess four projectile proboscides, each of which is set with several rows of recurved hooks.

The teeth of vertebrates are developed on papillæ of the mucous membrane, which is usually sunk into successive cavities or alveolæ of the jaw and palate bones. In Leptocardii there are none, and in Dermopteri they are horny processes in concentric series round the inside of the funnel-shaped mouth. The two largest are situated at the

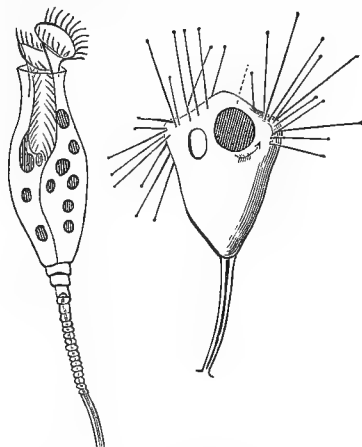


FIG. 16. *Epistylis nutans*.

mouth of the esophagus. In fishes generally bony teeth are present, but are not usually developed in alveolar cavities, but on the surface of the bones. True teeth are usually composed of a very dense substance allied to bone, called dentine. Exterior to this they have a deposit of a still denser and harder substance, the enamel, which covers the crown. The root is sheathed in a layer of true bone, the cement. Dentine is distinguished from bone (*ostéine*) by the presence of great numbers of parallel tubuli, which radiate from the central cavity to the circumference of the tooth. Enamel is, on the other hand, of the nature of a secretion, filling vertical hexagonal cells which stand upon the dentine. Hence it is composed of prisms. It contains, like dentine, a trace of fluoride of calcium, besides the phosphate of lime of which both are composed.

In fishes the teeth are usually covered with dentine instead of enamel, and may be composed internally of true dentine or of its variety, vasodentine. This substance retains the numerous blood-vessels which characterize the early stage of deposit of dentine, which are easily seen in a section of the teeth. Of such character are the teeth of Elasmobranchii, which are moreover of very various form. Thus, they are pavement-like, with vertical lamellar roots, in skates and rays, or they are rootless and with swollen crowns of differing sizes, etc., arranged in symmetrical band-like pavements, as in cestracions. The crowns may be more elevated, as in hybodonts, or finally isolated and with sharp apices and cutting edges in the existing squalodonts. In Holoccephali the teeth are most rudimental, consisting only of the calcified walls of the vessels arranged in alveolar cavities of the jaws. In Dipnoi the teeth form a single serrate cap for each jaw. In Actinopteri the teeth are generally composed of a larger proportion of dentine.

In sturgeons they are only present during immature age. In the *Lepidosteidae* the external or dentinal surface is inflected in deep folds, which are closed so as to resemble grooves externally. Physostomi generally have large teeth on the jaws, but in some *Characinidae* and all other *Plectrospondyli*, *Coregonus* (grayling), some *Mormyri*, etc., there are none. In some of these fishes there are numerous teeth on the lower segment of the fifth pair of hyoid arches, or the "inferior pharyngeal bones." In *Characinidae* these are of very varied type; in *Catostomidae* the bones are much prolonged, and the teeth are comb-like in one row, and work against a projecting inferior table of the basi-occipital bone. In *Cyprinidae* they are stout, in one or more short rows, and may be hooked, sharp-edged, conic, or grinding in type, according to the food of the fish. This structure does not exist in other fishes. In *Esox* the teeth are raptorial and very numerous; in *Clupeidae*, rudimental and wanting. Only in the order to which the latter pertains, the *Isopondyli*, do we find fishes with fangs sunk in deep alveoli, the extinct *Saurodontidae* from the cretaceous formations. In *Nematognathi* they are more or less bristle-like, and packed together like a brush. In eels they are often dagger-like. In physoclostous (or the higher) fishes they are generally brush-like, frequently with canines intermixed; but in *Pediculari* they are large, incurved, on flexible ligamentous bases. In some *Plectognathi* they are incisor-like, and in *Pharyngognathi* those on the hyoid apparatus are greatly developed. The latter are sub-quadrate, oval, or narrow (*Scarus*), and arranged pavement-fashion for the crushing of hard substances, as shells, etc. In *Scarus* the teeth of the jaws are confluent into a shining, parrot-like beak, useful in scraping out shells and cutting off sea-weed.

FIG. 17. *Hydra viridis*.

In *Batrachia* the teeth are usually small, often wanting (bufoniform *Anura*), or in the extinct *Labyrinthodontia* with deep complicated inflections of the dentine and superficial cementum. In reptiles we find teeth with fangs and with crowns, generally covered with enamel. These may be sunk in deep alveoli (*Rhynchocephalia*, *Acrodonta*, *Crocodylia*, *Ichthyopterygia*, *Sauropterygia*, *Ornithosauria*, *Dinosauria-Goniopoda*), or may be attached to the inner side of the outer alveolar wall (*Lacertilia* in general, and *Dinosauria-Orthopoda*); may stand immediately on the jaw-bones, without fangs (*Ophidia*), or on a thick column of ossified pulp (*osteo-dentine*) in an alveolus (*Pythonomorpha*). The crowns are generally compressed conic; in some (*Lalrops*) knife-shaped. In herbivorous lizards they present an oblique face inward. In *Crocodylia* the young teeth rise within the pulp-cavity of the old, and throw them off; in most other orders the successional teeth appear at the side of the fang, and provoke absorption, which cuts off the crown of the old. Tortoises and birds are toothless; *Anomodontia* are so likewise, except a strong maxillary tusk.

In *Mammalia* the dental armature is distinguished into series—viz., the incisors, canines, pre-molars, and molars. Their normal number on each side of each jaw is I. 3; C. 1; Pm. 4; M. 3; total, 44. The incisors are normally flat and transverse-edged; the canines longer and conic; the pre-molars compressed, with one to three cusps; and the molars oval in section, with a double series of cusps. In *Ornithorhynchus* there is but one, a horny tooth. In marsupials the number of incisors is excessive (as 8 or 10), or, as in kangaroos, less numerous and the median much enlarged. In these and their gigantic extinct allies two in the lower jaw are much enlarged as tusks. In *Rodentia* there are but two incisors above and below, which have enamel on the external face only, hence the inner wears more rapidly, and the opposed pairs act as efficient cutters in gnawing. The other teeth are molars only, and these of the complicated type to be mentioned later. In *Insectivora* the incisors are enlarged, but in *Edentata* they are always wanting. In *Cheiroptera* and *Carnivora* they are similar to each other, and much reduced. In *Quadrupedia* they are well developed, broad, opposed cutters, and are generally 4-4 in number. The proboscidiens, on the other hand, have but one (the outer) pair of incisors in each jaw, which are developed into huge tusks above (*Elephantidae*) or below (*Dinotheridae*). In these cases the opposing pair

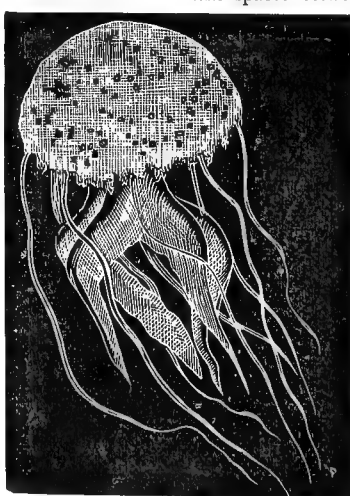
is reduced or wanting. The *Artiodactyla-Ruminantia* are remarkable for the entire absence of superior incisors, and the close resemblance of the inferior canine to the lower incisors, producing the appearance of eight of the latter.

The canine is largely developed in the *Carnivora*, hogs, *Hippopotamus*, and certain extinct proboscidiens, as *Eobasiliscus*, etc. The pre-molars are wanting in rodents and many proboscidiens, but numerous in marsupials, insectivores, etc. In *Carnivora* they are numerous, and the last is peculiarly formed, being the sectorial or flesh-tooth characteristic of the order. The two outer tubercles and connecting ridge are developed into a longitudinal notched blade, while the inner remains a small tubercle at the front of the inner side. In dogs there are two tubercular molars behind it; in weasels and cats, one; in the extinct *Hyæodontidae*, several, but all of the sectorial form.

Molar teeth are composed of one, two, or three rows of tubercles. In the first case they may be one- or two-rooted. Thus, in cetaceans generally they are simple cones, covered with cement instead of enamel. In some extinct groups (*Zeuglodon*, etc.), the crowns are compressed and the roots two. In *Edentata* they are simple throughout, and covered with cement. This forms a thick layer, and encloses a thin one of dentine, which by its superior hardness forms the ring-like grinding surface of the crown; it is filled within by osteo-dentine. In insectivorous animals the tubercles are in two, sometimes three rows, and acute and elevated; thus they appear in *Cheiroptera*, many marsupials, *Insectivora*, etc. In kangaroos, sirenians, tapirs, and *Dinotherium* they appear as two transverse crests or keels. These crests are multiplied in *Mastodon*, reaching six or seven. In *Stegodon* they are more numerous; the intervals are a little deeper, and with some cementum in their bottoms. In *Elephas* they are deepened to the roots of the tooth, and filled to the top with cement; are narrowed by the approach of the much elevated transverse crests, which have now reached a great number. Their summits readily wear in use, and thus present bands of alternating dentine, enamel, and cementum.

The transverse crests of *Tapirus* may unite at the inner extremity, forming a V in *Bathmodontidae* among hoofed animals, or be connected by an external longitudinal crest in *Rhinocerus*, *Palæotherium*, and *Hyrax*. The outer crest may so be indented as to form two Vs, and the inner portions reduced to knobs, as in *Limnolagus* (*Perissodactyl*), or curved crests (*Anchitherium*). The latter may be cut off and curve lengthwise, so as to produce four Vs or crescents on the grinding face.

From this point the succession of forms seen in approaching the elephants is repeated in two series, ending in the ox and horse. The intervals deepen, the crescents become elevated, and the tops, being soon worn off in use, present a figure formed by the edges of enamel plates, which enclose islands of dentine. The spaces between them are filled

FIG. 18. *Pelagia*.

with cementum. In the horse and ox there are five crescent-shaped columns in the upper molars and two in the lower. In other artiodactyls there are four above and two below. In deer the crown and roots are subequal in length, but in the *Cavicornia* the crown is much the longer.

The same transition is seen in the rodents. In *Mus* the molars are only tubercular; in squirrels there are elevated crests. In *Arvicola* and beavers there are deep inflections of the enamel of the sides of the tooth, producing a zigzag section when the crown is worn, while in *Caviidae* the tooth is entirely divided into several columns by the deep descent of the enamel coating from above. In porcupines figures are produced by both lateral and coronal folds. Simpler teeth are seen in men and apes, where the molars present four obtuse tubercles (in the last sometimes five); and in the hogs, where the tubercles are more numerous, and sometimes irregular. In *Hippopotamus* each of the four tubercles is trifoliate in section.

## VIII. THE DIGESTIVE SYSTEM.

1. In *Invertebrates*.—The prominent features of the digestive system in *Cœlenterata* have been pointed out. There is none in the *Hydra*, the inner surface of the urn-shaped body-cavity performing that function; an excretory pore exists in the foot-like support. In polyps a small sac is sometimes formed at the summit of this cavity by the reflexion of the inner skin; it opens into the cavity, and is entered above by the mouth. The body-cavity is ridged on the sides by prominent folds, whose margins bear reproductive organs and nettle-cells. In the *Medusæ* the body is turned the other side up at maturity, though its position is that of the polyps in the larval state. Hence the stomach is below the body-cavity. The latter is sometimes wanting, and is ridged occasionally, as in polyps. It is produced downward in some genera by its walls becoming a peduncle for the stomach. The latter is bell-like, and often widely open; it is generally closable by the contraction of its margin. The latter bears bunches of tentacles, etc., which in the *Rhizostomæ* are greatly enlarged and prolonged into four leaf-like bodies, which bear the four mouths at their extremities, and the tubular œsophagi throughout their length. From the body-chamber rise the four radiating tubular canals, which extend through the umbrella to a tube which passes round its margin.

In *Crinoidea* there is a central column to the body-cavity; round this the alimentary canal winds, and, returning, issues near the mouth. In *Asterioidea* the stomach is a sac, connected with the mouth by a short gullet, which is closable at the mouth. The stomach is divaricated into five pairs of bunches of cæca, which send out radial tubes, two into each arm of the animal. The vent is wanting in the *Ophiuridæ*, but present in most *Asteriidæ*; in the latter case there is an enlarged rectum, which gives rise to five horny radial cæca (often bifurcate), which alternate with those of the stomach. In the *Holothuridæ* the vent is present, and the alimentary canal elongate, and divisible into œsophagus (closed behind by a sphincter), intestine, and rectum. The last receives the mouths of the respiratory organs.

In the *Vermes* this system does not branch radially; otherwise its character is very various. That it is a blind sac in many orders has been already shown. In those without arms it is either a simple blind tube (*Turbellaria-Rhabdocœla*, *Nephele*, *Aspidogaster*, *Branchiobdella*, etc.), or is early divided into two parallel tubes, as in *Trematodes*. In tape-worm and *Monostomum* these tubes unite at the posterior end of the body. In the *Nemertina*, in which the canal is simple, there are two constrictions at the end of the œsophagus, to the anterior of which is attached a projectile stylet furnished with venom-glands. In *Polia* the alimentary canal becomes a solid ligament, which is turned forward and attached to the wall of the cavity. In *Pontobdella* the blind canal is furnished with a few branches or cæca. In the *Turbellaria-Dendrocœla* it forms a large number of branching cæca.

In the families with vent, it is wound or knotted (*Capitibranchiata* and some *Dorsibranchiata*), simple (*Abranchiata*, *Gordiacea*, *Nematoda*), or furnished with cæca on the sides. There is but one on each side in *Hæmopsis*, but many in the leeches.

In *Vermes* in general there are no Cuvierian glands, and there are often liver-cells on the canal walls.

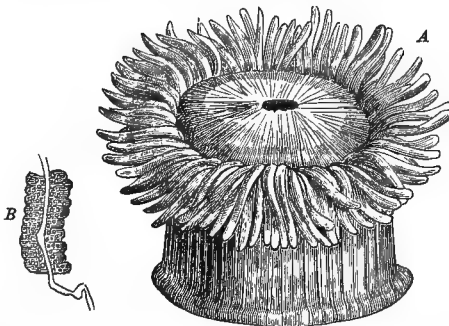


FIG. 19. *Paractis alba*: A, expanded; B, the reproductive organ of *Cercus*.

In *Mollusca* an anus and liver are always present, excepting that the former is wanting in most *Brachiopoda*. An almost universal peculiarity of mollusks is that the alimentary canal, after fewer or more numerous convolutions in the body-cavity, returns and issues not far from the mouth on the dorsal or lateral face of the body; this prevails from the *Bryozoa* to the *Cephalopoda*. The general characters of the canal can be expressed schematically as follows:

A. A more or less projectile œsophageal body or tongue,

with a movable membrane armed with reverted horny teeth, and more or less retractile into a sheath; no crystal style in the stomach (except two or three genera). Stomach large, unsymmetrical; canal short, with a large pyloric cæcum; liver very large, lobular, discharging anterior to stomach; mouth with horny beaks: *Cephalopoda*.

Course of canal with two abrupt turns: 1st, at transverse stomach; 2d, of intestine double, under œsophagus; rectum

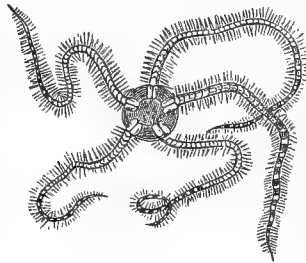


FIG. 20. *Ophiura*.

transverse, opening in mantle-hole; liver double, of many cæca, entering each end of stomach: *Gasteropoda-Scaphopoda*.

Course of canal little enlarged at stomach, and with an intestinal one; altogether a loop opening forward near heart; liver single, lobulate: *Gasteropoda-Heteropoda*.

Intestine short (straight), emptying on right side, never in breathing cavity (rarely on back), rarely issuing from anterior part of stomach; latter elongate (longitudinal), receiving straight œsophagus at either end or side, often divided in two or three, when one or more is furnished with horn-armed ridges or teeth; horny jaws: *Gasteropoda-Opisthobranchia*.

1. Liver lobulate, compact.
2. " " subdiffuse, with connecting canals.
3. " " of blind canals.
  - a. Branching from large stomach-opening in body.
  - β. " " in lateral body-wings.
  - γ. " " in gills.
- α. Two posterior body-trunks of liver.
- γ. One " " (including four families).
- z. Three " " "

Stomach (with very few exceptions) elongate into a cæcum; intestine rising from middle and turning forward to the vent; ridges armed with horny plates in stomach: *Pteropoda*.

Stomach a widening of canal, rarely with one or two constrictions; intestine not convoluted (except *Chiton*), emptying into breathing-cavity on right side; small flat jaws, sometimes horny; a pharyngeal lump, with internal cartilage supporting tongue, on lower side of end of œsophagus: *Gasteropoda-Prosobranchia*.

AA. Movable armed tongue wanting.

a. A crystalline style in caecal appendage to stomach; lips at entrance of œsophagus; canal mostly uniform, much turned; end of rectum free in cloaca; stomach oval or round: *Acephala*.

aa. No crystal style; mouth opening between more or less cartilaginous spiral appendages; canal bound by an extra mesenteric sheath; stomach little distinct; liver double with large (sometimes several) discharge canals: *Brachiopoda*.

1. Canal shorter, ending in blind enlargement.
2. " " longer, ending in lateral anus.

Mouth opening at base (or side) of a gill-sac; œsophagus short; stomach not large, simple, both with intestine, forming a v; latter directed forward, opening on same side as mouth: *Tunicata*.

Mouth surrounded with ciliated tentaculæ (in one genus with a conic lid); œsophagus well defined; stomach distinct, oftener double than single; intestine rising from end of first or single stomach, swollen in part of a straight course to anus near mouth: *Bryozoa*.

In *Gasteropoda* there is a pair of salivary glands; in most *Cephalopoda*, two pairs (in *Sepia* and *Loligo* but one pair, and in *Nautilus* none).

The *radula*, or tooth series, and their supporting band, present an enormous number of separate teeth in some of the *Gasteropoda*. In the *Cephalopoda* and *Pteropoda* they are less numerous. In some of the *Pulmonata* they number as many as 26,800. They are arranged in rows, longitudinal as well as transverse. The latter are more or less irregular in their course, but strictly bilateral. There is a series of median plates or teeth, with one or more rows of lateral ones. The following divisions are indicated by the different tooth-structures in *Gasteropoda*:

- a. *Rhachiglossa*; only median plates, which are often toothed (0—1—0): *Volutidæ*.
- b. *Toxoglossa*; no median plates; on each side a single lateral tooth of an awl-like form; no basal membrane of radula; lateral teeth moved by special muscles (1—0—1): *Conidæ*, *Pleurotomidæ*.
- c. *Hamiglossa*; a middle plate and single lateral plate (1—1—1): *Muricidæ*, *Buccinidæ*, *Olividæ*, *Lamellaridæ*, *Fasciolaridæ*, *Turbinellidæ*.

d. *Tænioglossa*; median plates, and on each side three lateral plates; fourteen families; among them Littorinidae, Cerithiidae, Turritellidae, Cassididae, Tritoniidae, etc. (3—1—3).

e. *Ptenoglossa*; no middle plates; lateral plates similar, numerous ( $\infty$ —0— $\infty$ ): *Scalaria*, *Janthina*.

f. *Rhipidoglossa*; middle plates; laterals 4—6 or more, of various forms; outside of these numerous small hook-like teeth ( $\infty$ —4—6—1—4—6— $\infty$ ): *Neritidae*, *Trochidae*, *Halitidae*, *Fissurellidae*. The *Pulmonata* (except *Testacella*) exhibit a close similarity to this division in their dentition.

The digestive canal in *Arthropoda* does not turn on itself as in mollusks, but issues at the extremity of the body opposite to that which it enters. The oesophagus is usually straight, and is expanded in the thoracic region into the usually longitudinal stomach. Anterior to this point it has saciform dilatations (Orthoptera) or diverticula in some types, as the bees, *Lepidoptera*, flies, etc. After leaving the stomach, the canal, after few or no windings, reaches the anus.

In *Crustacea* and *Insecta* there is an extensive fatty mass on each side of the posterior part of the canal, known as the corpus adiposum; in *Arachnida* it is frequently wanting. The form of the stomach in this class varies; thus in *Pedipalpi* (scorpions, etc.) it is simple or nearly so, but in *Aranea* (spiders) and *Pycnogonum* (whale-louse) it branches into radiating diverticula; in the latter these penetrate even into the femora and tibiae. The digestive system is supplied with various glandular organs. Those nearest the mouth are the "salivary glands," which are present in all the classes except the *Crustacea*. They are complex glands, and their secretion in some forms (larvæ of some *Lepidoptera*) hardens on exposure to the air into silk-like threads. The so-called liver-glands or tubes are situated either before or behind the stomach. As their function is unknown, and their position is inconstant, the above name is but provisional. In *Insecta* they are slender and tubular, sometimes very elongate and undivided. There are usually but four in *Coleoptera*, but more in *Orthoptera* and *Hymenoptera*, forming a whorl. In *Arachnida* (*Scorpio*, *Mygale*, etc.) and *Limulus* they are more complex, and present a series of more numerous openings into the intestine. In the decapod *Crustacea* the organ exhibits its highest development. It is there a complex follicular gland of large size on each side of the alimentary canal, and opening posterior to the stomach. Other simple glands are in the *Insecta* distributed over the surface of the stomach, and are enclosed by its muscular layer.

The stomach-walls are thin or muscular, in some types ridged within and furnished with horny teeth: *Orthoptera*, some *Coleoptera*.

2. In *Vertebrata*.—In most of this branch of animals the stomach is present as a distinct enlargement of the alimentary canal, and the intestine is short or long as the food is flesh or vegetable and mixed in character. The liver is present in all, and is of a highly complex glandular character, except in the *Leptocephali*, where it is a simple diverticulum of the alimentary canal.

In the *Leptocephali* the pharynx is very capacious, and is abundantly fringed with long processes. It opens into a sac-like stomach, which is continued as the slender straight intestine to the vent. There are no teeth. In the *Dermopteri* the intestine is also simple and straight. In fishes it presents a good many variations. In some, as the sharks and silurids, the stomach is large, and the pylorus is remote from the cardiac entrance. In most *Clupeidae*, *Hypodontidae*, *Characinidae*, *Amia*, and *Polypterus*, it is sac-like, with the pylorus near to the cardiac entrance. In most fishes the stomach is bent on itself, but in *Chimæra*, *Symbranchus*, *Amphiprionus*, *Fistularia*, and *Belone*, it is straight. The stomach in some sturgeons and in *Heterotis* and *Chaetodus* (clupeoids) is gizzard-like (i. e., sub-round), with muscular walls and tendinous lamina on the sides. It is closed at the pylorus in most fishes by an annular muscle. In the higher fishes (Physoclysti) there are generally found diverticula from the beginning of the intestine at the pylorus, which are termed pyloric cæca. They are also abundantly found in the lower groups, or Physostomi, but their entire absence is more common. They are wanting in *Nematognathi*, eels, *Fistularia*, *Chirocentrus*, *Hyodon*, the *Gobiidae*, and *Blenniidae*, and in *Amia*, *Polypterus*, and the *Elasmobranchii*. They exist in vast numbers in some *Salmonidae* and *Lepidosteidae*, and are numerous in electric eels and sturgeons. In *Platax* there are but four, in *Chologaster* two, and in *Amblyopsis* one.

The succeeding part of the canal is generally to be distinguished into small intestine and rectum. These are separated by a strong valve in *Elasmobranchii* (except *Chimæra*) in *Lepidosiren*, *Polypterus*, *Zoarces*, *Acipenser*, *Mastacembelus*, and it is not strong in *Orestias* and *Claroetes*.

The rectum is distinguished in the lower forms by the possession of a spiral internal valve or partition. In *Elasmobranchii*, *Polypterus*, and *Lepidosiren*, the spiral partition is continuous by its inner margin with a median membranous axis, which is suspended from the ileo-cæcal valve; in *Raja miraletus* there is no axis, and the partitions are transverse and perforated; in *Squatina*, *Polyodon*, and *Acipenser ruthenus*, it has no axis, and revolves spirally on the wall of the rectum. It is also present in *Amia* and *Trachypterus*. In *Acipenser rubicundus* there is no spiral valve, but the walls of the rectum are areolate, somewhat as in tripe. The gall-bladder is always present, and discharges beyond the pylorus.

In *Reptilia* the divisions of stomach, intestine, and rectum are well marked; in *Batrachia* rather less so. In both the canal is elongate, and held in a folded position by a mesentery, but in batrachian larvæ it is much more extended, and is horizontally coiled. The liver is large in *Batrachia*, and usually in three lobes, but in the *Brevicipitidae* and *Engystomidae* there are but two. There is a sphincter valve at the pylorus, and sometimes one at the end of the small intestine. The gall-duct discharges below the pylorus. In tortoises, whether carnivorous or not, the alimentary canal is elongate.

In some *Emydidae* and *Trionychidae* there is a cæcum or sac on each side of the rectum, the bursa analis. In many *Lacertilia* the rectum is double or divided by a muscular valve; in *Iguana* and *Basiliscus* there is a septary valve with small orifice. In serpents the oesophagus is greatly elongate, and the gall-bladder peculiar in being separated from, and sometimes far behind, the liver. The rectum presents many peculiarities. In *Crotopeltis* and *Homalopsis*

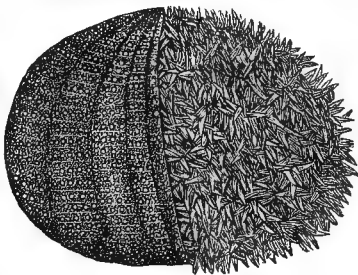


FIG. 21. *Echinus*.

the internal surface is longitudinally folded; in *Hydrophis* with short interrupted folds; in *Dryiophis*, *Dipsas*, *Vipera*, and *Caudisona*, transversely folded; in *Boodon geometricus*, *Bungarus*, *Elaps*, and *Ancistrodon*, the folds are developed into partitions, which are pierced by a single hole each. A pancreas is present in lizards and serpents.

The alimentary canal of birds is distinguished by the peculiarity of the stomach, which is a gizzard—that is, with walls composed on the convex face or borders of contractor muscles, which have a median and common tendon extended sheet-like on the plane side of the stomach. This is, however, not found in certain marine birds, as penguins, where the stomach is a simple sac; and it is little developed in *Sarcorhamphus* and *Vultur*. It is a double sac in *Apteryx*. The crop is a bag-like expansion of the oesophagus, for the temporary stowage of food; it is found in gallinaceous birds, vultures, etc.

Adjoining the stomach is frequently found another more symmetrical expansion, the proventriculus, whose walls are studded with simple glands, whose secretion softens hard food. It occurs in Gallinæ, *Crypturus*, *Insessores*, *Ibis*, ducks, condor, etc. The rectum is not strikingly distinguished from the ilium, but it sends off at its origin two huge cæca, which extend forward towards the stomach on each side of the intestine. They are excessively elongate in *Phasianus*, *Crypturus*, *Dicholophus*, *Apteryx*, etc., and very short in *Apenodytes*, *Ibis*, etc. They are apparently absent in *Sarcorhamphus*.

In *Mammalia* the stomach, intestine, and rectum are well distinguished. There is neither crop, proventriculus, pyloric nor rectal cæca, nor rectal valves. The gall-bladder is not separated from the liver, and discharges below the pylorus, as does also the excretory duct of the pancreas. There are glands in the intestines of many forms, known as Peyer's, and the salivary glands of the oesophagus or pharynx are always present. The intestine (colon) is frequently prolonged beyond the origin of the rectum, forming a cæcum; the mouth of the rectum is closed by a strong valve. The stomach is transverse, with a portion projecting beyond the cardiac—the fundus. This is excessively elongate in the bat *Desmodus*. The stomach is simple or undivided in *Primates*, *Carnivora*, *Proboscidea*, *Perissodactyla*,



Cheiroptera, and squirrels. It is lobulate and subdivided in Monotremes, marsupials (generally), many rodents, some cetaceans, and most of all in artiodactyles (ruminants, etc.). In *Ornithorhynchus* the cardiac and pylorus is from a division one-third the size of the remainder of the stomach; in kangaroos the stomach is slender, sacculated, and wound in one and two-thirds turns on itself; the fundus is large. In the hog the fundus is profoundly sacculate. In Artiodactyla-Ruminantia there are four chambers, of which the first is generally the largest, being an enormous expansion of the fundus. In the musk it is not in direct communication with the oesophagus, but is so in the ox. In the former there are five sacs, the last the best defined, with reticulating ridges on the inner wall (tripe), and entered by both cardiac and pylorus. The first stomach of the ox represents the first four of *Moschus*; it is followed by the reticulate, which receives the oesophagus; between it and the pylorus are two chambers, whose walls are thrown into elevated folds. The first division has strong papillae on the inner walls, which are very large in the deer.

In many of the Rodentia (e. g., *Fiber*) the cæcum is exceedingly large and long. In the Primates, etc., it terminates in a narrow, curved extremity, the processus vermiformis.

#### IX. THE CIRCULATORY SYSTEM.

1. In *Invertebrata*.—This system, as is well known, consists of organs for the propulsion and conveyance of the fluid results of digestion throughout the body for the maintenance of all its functions. It consists essentially of a system of tubes radiating from the central muscular organ, in which resides principally the contractile or propulsive

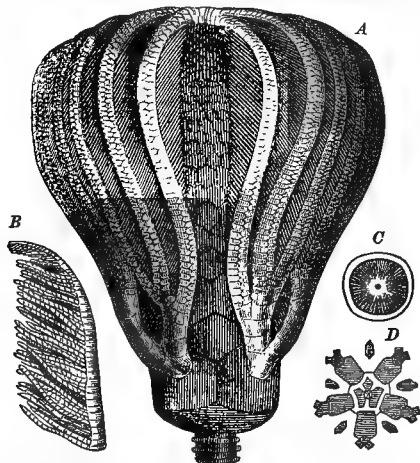


FIG. 22. *Platycrinus triacantodactylus*, McCoy: A, side view; B, terminus of arm; C, articular surface of a stem-segment; D, structure of the basin or body.

activity. This centre is in the lowest forms simply a tube, but is greatly specialized in the highest forms. We may divide the system into the systemic, the water-vascular, and the lymphatic systems. The second is found in the aquatic invertebrates, and the last in vertebrates only.

The systemic circulatory tubes first appear in Coelenterata. In Protozoa the contents of the body are in motion, and probably a small pulsating vesicle contributes to this end. In no coelenterate class excepting the Medusæ do the tubes appear as isolated; they have been already described as radiating from the stomach or the adjoining body-cavity, and continuing round the margin of the disk as a single tube. The Echinodermata possess a true circulatory system, with a well-developed water-vascular system. The vessels of the former are not derived from the stomach, but form an isolated series. The peculiarities of the classes are as follows:

a. Vessels arising from a basal sac, which connect by a short tube with stomach; vessels radiating, penetrating the pieces and arms: Crinoidea.

aa. From an oral ring.

b. Superior and inferior oral and anal rings: an asymmetrical heart, emptying into the former; no respiratory artery; stomach-arteries (five) collected into two, which enter superior ring at point of entrance of heart: Asteroidea.

Rings and heart connected by marginal intestinal artery: Echinoidea.

bb. Only oral circulatory ring: no heart; distinct respiratory artery (where lungs exist); intestinal arteries gradually disappearing posteriorly: Holothurida.

In echinoids and asterooids there is a septary column extending from the upper to the lower surface, unsymmetrically near the middle line. In a fold of it are placed the shell-canal of the water-circulatory system and the heart. The latter has a narrow opening into the oral ring, which from this fact is termed arterial. The opposite end of the heart communicates by a duct with the superior anal or venous ring. The arterial ring is the smaller and more muscular, and lies between the more superficial nervous ring and the deeper water-canal ring. In the asterooids it sends an artery along the median line of each arm below. The venous ring is larger, and sends two vessels, one on each side of each arm. In Holothurida the vessels are delicate and not largely developed. In all classes the tubes are without cilia internally, and have a wave-like pulsation in life.

The water-circulatory system is greatly developed in the Echinodermata, and forms the basis of their means of movement from place to place. Its central organ consists, first, of a ring canal, which surrounds the oesophagus within the arterial ring; secondly, of a calcareous (or shell) canal which rises from a point on the ring canal to the dorsal (or anal) side of the body, and terminates in a peculiar shield, the madreporic plate, which is perforated by numerous pores. In the Holothurida, where the body is elongate, this shell canal does not reach the posterior end of the body, but terminates freely in its cavity, sometimes in one, often in many tubes, each of which terminates in a madreporic plate. The peripheral system consists of five vessels, which arise from the ring canal, and run at equal distances along the interior face of the body-walls (on the medial line of the arms in Asteroidea), and send branches right and left. These terminate in a large hourglass-shaped sac on each side in Asteroidea, the "ampullæ," or in numerous smaller ones in Holothurida. These project through pores (ambulacra) between the plates, hollow processes which frequently are enlarged as a wart at base or end, and which are used as feet. They are regularly arranged in bands in Asteroidea and Echinida, but in some holothurians are distributed in patches (*Psolus*) or all over the body, or in two kinds—one dorsal, the other ventral (*Holothuria*). They are retractile and protrusible by erection. The interior of the water-vessel system is covered with cilia. In all the classes the oesophageal ring communicates with "Poli's vesicles," small bladders situated round its circumference.

In Mollusca and Articulata the arterial and venous vessels are not universally continuous at their extremities by capillaries, as in Vertebrata, but the circulating fluid is emptied into cavities of the connective tissues or lacunæ, whence it is taken up by the extremities of the veins by suction. In some of the highest forms of both (Cephalopoda, Pedipalpi) the capillary vessels are numerous. The prominent peculiarities of the classes in respect to circulation may be indicated as follows:

A. No distinct central organ or vascular system.

a. No lacunary canals; liquid moves in continuous inner concavity of body, without definite direction and with doubtful external orifice: Bryozoa.

aa. Vessel-like lacunary system; five large sinuses; post-abdominal and foot largest; anal (annular) throat and buccal smaller; two mantle-edging vessels: Scaphopoda.

AA. A distinct heart.

a. Neither arteries nor veins; no chambers to heart; a system of canal-like lacunæ decussating from a dorsal and ventral principal; one through the gill-sac, and with fine body ramifications, continuous with each other; two (sometimes more) from heart: Tunicata.

aa. A venous system; no branchial auricle or gill-hearts; one ventricle, and a false heart on each mantle artery: Brachiopoda.

One branchial auricle; no gill-hearts; one branchial artery; ventricle embracing the intestine: Gasteropoda.

Two branchial auricles; no gill-hearts; two branchial arteries; ventricle embracing intestine: Acephala.

Two branchial auricles, and two hearts or expansions on the two branchial arteries; a circulus cephalicus; ventricle not embracing intestine: Cephalopoda.

aaa. No venous system, or a rudiment rarely; branchial veins and arteries: Crustacea.

AAA. No distinct heart; a longitudinal dorsal sinus, more or less subdivided.

a. No pulmonary arteries or veins; no venous system: Insecta.

aa. A pulmonary artery and vein; no venous system: Arachnida-Araneæ.

A venous system: Arachnida-Pedipalpi.

In Acephala and Gasteropoda the ventricle receives the contents of certain veins direct, without aëration in the gills; hence the blood forced into the aorta is, as in most reptiles, of a mixed character. In Cephalopoda all the venous blood passes through the gill-hearts and gills, and

is oxygenized before returning through the auricles to the ventricle. In a few Gasteropoda there are two auricles, as *Haliotis*, *Fissurella*, *Chiton*. In a few Acephala (as *Ostrea*) the ventricle does not embrace the intestine.

In Gasteropoda the vessels of this system form extensive ramifications in the foot. They have moreover communication externally by pores, which enables them to absorb large quantities of water. By means of this water-vascular system the foot is inflated, as in erectile tissue, to a size which would forbid its withdrawal into the shell were it not for the power of expulsion of the water.

Among Arthropoda, the decapod Crustacea and the pedipalp Arachnida only possess a complete circuit with veins

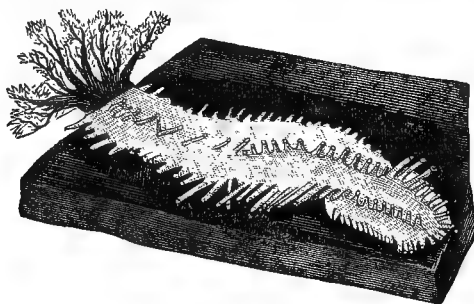


FIG. 23. *Cladodactylus dolium*.

and capillaries. In the former the heart sends two aortas forward and two backward; the larger (inferior) of the former is the aorta cephalica, and supplies the head; the two posterior are the aortae abdominales superior and inferior. A large sinus in the bottom of the anterior abdomen gives origin to the branchial arteries. In Myriopoda the dorsal trunk gives off a pair of lateral trunks to each segment of the body. From the anterior section of the dorsal trunk in Chilopoda the lateral arteries unite beneath the oesophagus and give rise to a longitudinal vessel which accompanies the abdominal nervous axis. In insects the lacunar currents of the body are four principal ones—i. e., one beneath the dorsal trunk, one along the nervous chain, and one along each side. The blood also circulates outward in the tubular ribs or nervures of the anterior part of the wings, and returns along the posterior.

2. In Vertebrata.—In the fishes generally the heart is the right or venous heart (except in Dipnoi), but always there are vessels passing directly from the gill-veins into the aorta, whether the gill-veins return arterial blood to the ventricle (making mixed blood) or not (leaving venous blood). The first case occurs among Dipnoi; the second in *Monopterus* (apodali). In *Amphioxus* the usual trunk-like divisions of the heart are blended into one chamber. The gill-artery is rhythmical, pulsating, as also the origin of the special gill-arteries; so also is the portal vein, which has the same peculiarity in *Myxine*.

The aorta often forms no distinct isolated circulatory trunk. Sometimes arterial blood passes through a cartilaginous canal, which inwardly is only isolated by perichondrium, as in *Acipenser* and *Spatularia*. In other fishes it is also not isolated, but with its dorsal face (on which an elastic longitudinal band runs) let into the vertebral column (*Esox*, *Salmo*, *Silurus*, *Alosa*, etc.). Many arteries subdivide minutely into retia mirabilia, then continue from the reunited vessels. The arterial blood of the Chorioidea of most fishes must pass through such structure twice before passing into its branches.

In the venous system, not only in the veins that pass to the liver, do the stems lose themselves in capillaries, in order to be again collected into one or more trunks to go to the heart, but in many fishes this structure prevails in most of the veins of the body. The vena caudalis and the intercostales very often subdivide minutely and mix with (or surround) the renal, suprarenal, and other arterial glanduliform bodies, before they return to the veins for the heart. Many veins of walls of the trunk, of the swim-bladder, and of the generative organs appear as roots of the portal system. These structures delay and prolong the venous circulation.

Stagnation of venous blood-currents is common, also blind closings of veins and obliteration of connecting trunks; and at certain periods the so-called "blood-corpuscle-holding" cells and membranes are met with—e. g., in the kidneys. The blood-corpuscles one often finds involved in transformation or degeneration. The formation of exudations occurs not seldom; the transformation of blood-corpuscles into pigment-cells often follows. (These arrangements appear not only as metamorphoses of the blood, but also as favoring rejuvenation of the organio

substance and new construction. The great periodical changes, repeated yearly in the increase of the contents of the generative organs, which the animal undergoes, the extraordinary circumference of body which many can reach in high old age, as also the destruction and perforation of the organic substance which parasites produce, and which demand a restitution, is not yet sufficiently estimated. Blind terminations of capillaries have been shown in the skull-cartilage of *Acipenser*. The change of blood-corpuscles to pigment-cells is seen in the kidneys of *Cottus*, *Pleuronectes*. In Leptocardii the portal heart is behind (above) the colon; it pulsates from behind forward. It bends sharply forward, and empties into the gill-artery heart, taking up the venæ cavæ during the curve. The gill-artery heart is straight, equally thick, its cavity without the pericardium longitudinal in the median line, beneath the whole length of the gill-membrane. From it emerge regularly (alternating as beginnings of the gill-arteries) small contractile bulbules in the intervals between the pointed arches of the gills. From the latter the blood through the gill-veins is transferred into a dorsal contractile aorta. Independently of what passes through the gills, a part of the blood is led directly into the aorta by two contractile arterial bows (one on each side of the posterior end of the oral cavity), which issue from the gill-artery heart. These aorta-bows exist also in *Amphipnous*, where each gill-arch that does not bear a gill contains an arterial bow. In *Monopterus* one-fourth the blood passes the gills and traverses an arterial bow in the fourth gill-less gill-arch. The portal-vein heart extends the whole length of the intestine. It is straight, and continued on the colon anteriorly between the gills, then becomes narrower and terminates. It pulsates from behind forward, with pauses (as in the gill-heart) of about a minute. The venæ-cavæ heart is on the dorsal side of the intestine, from the anterior point of the colon, increasing posteriorly to the end of the colon, where it suddenly turns over into the gill-artery heart. Its contraction alternates with that of the inferior or portal-vein heart. This colon (which is green) is equivalent to the liver, and gives blood to the venæ-cavæ or portal heart. On each side of the aorta, on the upper arches of the gills, is a vena cava descendens, which meets a posterior vein (vena cava ascendens), and together they empty themselves into the curve of the venæ-cavæ heart just before entering the gill-artery heart. The blood is colorless.

In Dermopteri, Elasmobranchii, and Actinopteri the muscles of the heart are always of striped tissue. The right or venous heart has the following divisions: an auricle receiving the united veins through a sinus venosus; a ventricle; and a bulbus arteriosus. There are valves between all these. In Dermopteri the auricle is more roomy than the ventricle, and is separated from the sinus by a membranous double valve; it has two membranous valves in the ostia venosa and ostia arterialia, each. From the latter proceeds the truncus communis branchialis, which is somewhat "bellied" at its origin, but has no evidence of muscular structure.

In Elasmobranchii and Ganoidea there is a bulbus arteriosus, similar in possessing a ring-like layer of striped muscle-tissue, which ceases abruptly at the boundaries of the gill-arteries, and in numerous valves which are affixed by threads. There are two cross-rows of these in *Chimera*, *Carcharias*, *Scyllium*, and *Galeus*; three in *Sphyrna*, *Mustelus*, *Acanthias*, *Allopias*, *Lamna*, *Rhinobatus*, and *Torpedo*; four in *Hexanchus*, *Heptanchus*, *Centrophorus*, and *Trygon*; four to five in *Raja*; five in *Scymnus*, *Myliobatis*, *Pteroplatea*, and *Squatina*. In Ganoidea there are two at the commencement and one at the end of the bulbus; there are nine in *Polypterus*, each of which contains three complete and some abortive veins; there are fifty-four to sixty in *Lepidosteus bison*. In *Amia* there are but three rows; the two inferior, in the bulbus, with two large and two small valves; the superior with only two.

In Teleostei there is no striped muscle-tissue on the outer layer of the bulbus, but an elastic material of thread-bundles, which is produced into pillars on the inner side. There is one pair of valves at the ostium bulbo-ventriculare; between these are sometimes one or two smaller adjoining valves. The only exceptions are species of *Butyrinus*, where there are four valves in two rows, with no muscular bundles round the bulbus. In Teleostei, sharks, and in Ganoidea-Holostei there is a pair of valves at the ostium sino-auriculare, often attached by strong threads. In *Acipenser* there is a ring-like valve in two parts—one with four, the other with five pockets, each one attached by a strong thread. The large, expandible, thin-walled auricle has usually on one or two sides an auricula. Within it are numerous trabeculae carneae. The ventricle is on the abdominal side of the auricle. The latter in passing over it is narrowed sometimes (e. g., in *Petromyzon*) for some length. There are usually two valves in the ostium arterio-ventricu-

lare, sometimes four in *Orthogoriscus* and *Acipenser*. The ventricle is thick, with the muscle-structure in two layers. Within are various parietal depressions, ribs, etc., between the muscles.

The heart's position is usually between the clavicle, which form in Goniodontidae a kind of transverse bony septum. In Apodes, and particularly in Symbanchii, the heart is more posterior. In Plagiostomi it lies in its sac immediately under the elongation of the copulæ of the gill-arches, which pass through the cartilago-subpharyngea impar. In *Petromyzon*, with the pericardium, it lies in a sort of incomplete capsule, which is separated from the gill-cavity by muscles forming a kind of diaphragm.

The heart-capsule (in all fishes except Leptocardii) is fibrous, is attached to the bulbus arteriosus, and often sends threadlike processes to the heart proper, which are often tendinous, sometimes accompanied by blood-vessels, as in *Anguilla*, or are blood-vessels only, as in *Acipenser*.

In Dipnoi the auricle is externally one, internally divided by an incomplete septum. Into the left auricle enters the vena pulmonalis, at whose entrance is placed a semilunar valve. There is no valve at the ostium atrio-sinuosum. From both auricles the ventricle is entered by a common ostium, which has a valve. The ostium possesses a papillar muscle, which is bound with a thread-cartilage which closes the ostium during systole. The bulbus arteriosus (without valves at its origin) forms a curve. It contains two lateral, longitudinal spiral foldings of different lengths, which fade away at their extremities.

In Actinopteri-Chondrostei, on the upper surface of the heart, are numerous bottle- or vesicle-shaped elevations, which are of different sizes in different or in the same animal, sometimes large, sometimes almost wanting. A varied number of arterial vessels from the subclaviæ and mammariae penetrate the heart-sac and distribute themselves to these elevations, which have various arrangements. These surround bladders which involve their entering arteries in rosy, spongy tissue composed of granules and meshes of fibre and cells containing granules. From the bases of these, vessels enter the heart. This cellular structure is sometimes surrounded by fluid. An elevation frequently contains these bladders, each of which is filled with either cells, nuclei, or liquid. They are connected to the cellular structure by pedicels. These structures may be for the renewal of the muscular tissue of the heart.

In general, on the trunks, except in the Leptocardii, from the anterior extremity of the bulbus arteriosus (which is external to the heart-sac), there issues an incontractile "gill-artery trunk," from which on each side issue directly or indirectly, through other communicating trunks, the branchial arteries.

In myxinoide the truncus communis branchialis is variable, running in a membranous cavity which surrounds the anterior end of the ventricle and projects into the membranous pouch that envelops the gill-sac. Each gill-sac contains an artery which forms a circle at the entrance of the gill-branches, and sends off radiating arteries. In *Petromyzon* four arterial branches on each side leave the truncus communis branchialis, which divides anteriorly into two trunks, each of which divides into three arteries, and an anterior twig is sent to the anterior row of gill-lamellæ. The special branchial arteries pass (except the first and last) between the two gill-pouches, and give their branches through diaphragms to the gill-arches.

In Plagiostomi, from the truncus branchialis communis there issue on each side one or two trunks, each of which afterwards divides into two. In *Raja* and *Pristis*, where one goes off, it divides into three, and the terminal portion into two. In *Pristis* the first of the three runs forward to the trunk in the cartilage, and is taken up by it. The special branchial arteries issuing from the primordial trunks pass between the two rows of gill-laminæ, which are in separate gill-sacs, a special artery supplying the anterior hyoid gill. In many ganoids (*Lepidosteus*, *Acipenser*) the first gill receives the first branch from the arteria branchialis, and the last gill the last branch. In these the branchial arteries run towards the first gill, then bend posteriorly and give off branches successively. In *Spatularia* the first gill receives the second branch, the second gill the first branch, the others regularly. The arrangement in *Amia* is as in the Teleostei.

In Actinopteri the gill-artery stem runs forward in a canal beneath the copulæ of the gill-arches, which bound it above; laterally it is bounded by processes of the same; beneath by the euliform membrane (which latter is wanting in Apodes). Often (e. g., in *Salmo*) it gives off first a common stem, which divides to the fourth and third gill-arches; then gives one to the second arch, and one to the first, by the forking of the trunk. But (e. g., in *Muraenophis punctata*) two distinct branches of the common trunk can be given to the two posterior gill-arches. In Dipnoi two trunks leave

the branchial artery on each side: (1) a common vessel for the half gill and the two gill-less "visceral" arches, and (2) a stem for the posterior gill. The first divides in two, which as aorta-bows unite under the skull to form an aorta-root. The first aorta-bow gives off a branch for the half gill, which sends off the carotid before entering the half gill. The aorta-bow gives off also a posterior carotid before union with the posterior aorta-bow. From the second goes

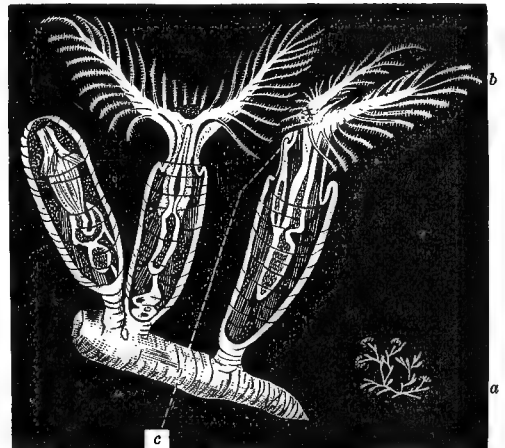


FIG. 24. *Plumetella*: a, natural size; b, magnified; c, the vent.

an artery for the fibres of the external gill. The second trunk divides into two gill-arteries for the fourth aorta-bow. The extremities of both become arteries for the outer gill-threads. The last gill-artery from its upper extremity gives off a branch for the posterior half gill.

The gill-veins unite (in the absence of an arterial heart) for the construction of the great arterial trunk. But often arterial trunks for the body go immediately from the gill-veins. The carotid arteries leave the gill-veins. In myxinoide the gill-veins, after leaving the gill-sacs, form a median trunk, which is prolonged posteriorly as an aorta and anteriorly as an arteria vertebralis impar. All or most of the gill-veins are connected by a trunk running parallel to the aorta, which is continued anteriorly as the arteria carotis communis. Both carotids accompany the oesophagus forward, giving branches to it and to the hyoid region. Each divides behind the head into the arteria carotis externalis (for the tongue and the muscles of the head), and the arteria communis internales, which unite, forming a bow, at the origin of the vertebral column, which receives the vertebralis impar; from the latter originates a median head-artery, which, extending anteriorly, gives off branches for the nose, etc. In *Petromyzon*, with the exception of the first and last, each gill-vein issues from the interstitium between two adjacent gill-sacs. There is no arteria vertebralis impar. The carotis communis rises from the first gill-vein, which sends another branch to the formation of the aorta. Each carotid divides into an external and internal; the two internal carotids do not unite to form a median head-artery.

In other fishes each gill-vein originates from the two connected "gill-leaf rows," except those from the two half gills. In Elasmobranchii all or most of the gill-veins come together to form the aorta, either immediately or after the union of some (thus forming homologues of the aorta-roots).

The arrangement of the carotids is various. In *Chimera* the first gill-vein from the half gill forms the posterior carotid; the second, which like the rest contributes to the aorta, sends off the carotis anterior. In *Raja* the posterior carotid originates from the aorta-root which is formed by the union of the two first gill-veins. It runs in the canalis spinalis. The carotis anterior originates from the vessels of the pseudobranchiæ of the spiracle. In *Chimera* and *Rajidae* the posterior carotids remain ununited; wherefore no anteriorly united circulus cephalicus exists. In the sharks they run under the base of the skull, and unite and give origin to the cerebral artery.

In the Ganoidae there are various arrangements of the gill-veins in the formation of the aorta. The carotids are as in Plagiostomi. (See *Raja* above.) In *Lepidosteus* there is a third cerebrials from near the origin of the aorta. In it the union of the anterior gill-veins is the origin of the aorta. The second pair unite below this, and forming a thicker trunk receive the first aorta. The third pair unite below the union of the second pair and the aorta origin, and forming a still thicker trunk, receive the second stem,

all forming three steps in profile. The sections would be—first 0, second 2, third 3. The posterior carotid comes off anteriorly to the mouth of the third pair of gill-veins. The subclavians are vessels disproportionately large; they come off on each side a little behind the embouchure of the posterior gill-vein tube, take the place of the celiac and superior mesenteric arteries, and send a branch to the stomach, which does not give a strong branch to the spleen, but approaches the pylorus as a bundle of little vessels. In Actinopteri, by the gill-veins is formed a complete arterial circle (circulus cephalicus) without the cavity of the cranium. The gill-veins of each side unite to form the commencement of the aorta, and run together anteriorly as the sphenoidum, through a cross anastomosis. This circulus can be wider or narrower. It is the former when all the gill-veins of each side unite into the aorta-bow, and where both bows are connected anteriorly by a cross trunk, and unite posteriorly to form the aorta, as in *Gadus* and *Lota*. It is narrower when each of the bows forming the aorta is formed from the anterior gill-veins only, and where the hinder gill-veins enter the aorta; e. g., *Scomber*, *Salmo*, etc. The aorta is sometimes independent, free, entirely surrounded by strong tissue, as in most Teleostei, sometimes in a canal of the processes of the vertebrae, without the usual distinct trunk-envelope; sometimes it is in a canal inferior to the vertebral column, with the superior surface

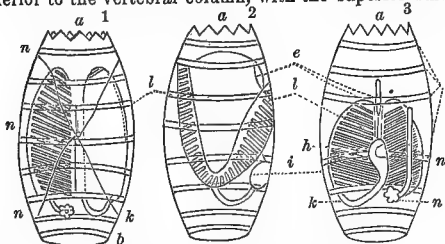


FIG. 25. *Doliolum Ehrenbergii*, Kr.: 1, from above; 2, from side; 3, from below; a, mouth; b, vent; d, annular muscle-bands; e, endostyle; h, oesophagus; k, intestine; l, branchial membrane; n, nervous system.

thin walled. The commencement of the aorta, in which the gill-veins empty, is under the cranium, first enclosed superiorly by the basilar cartilage. A short section is enveloped below by a fibrous membrane, but soon it is enclosed beneath by the vertebral arch elements, which are arched upward and supplied with intervertebral cartilage. Along the whole length of the aorta-canal there runs in its cavity, from the base of the skull, an elastic band which adheres above to a skin-fold whose continuation as a very thin perichondrium lines the inner side of the canal, to which it closely adheres.

In the Squalidae and many Actinopteri the aorta is embedded in a gutter of the vertebral bodies. On the side of this there are (in *Esox*) fibrous longitudinal ridges. In these the aorta possesses an external skin on the inferior surface only. It appears from point to point swollen with sinuses. Each such swelling is separated from that succeeding by a contraction. There is a small cross bridge of thread tissue within from one lateral ridge to another. Within the canal is found (in *Esox*, Clupeidae, Salmonidae, *Silurus*, etc.) a fibrous longitudinal elastic band, as in *Acipenser*. It commences at the skull beneath, and extends along the whole vertebral column. As an immediate continuation of the basis of this is the elastic artery-envelope. Although in *Eventognathi* the aorta is more isolated from the vertebral column, and the fibrous longitudinal band is absent, it yet exhibits sinuses in regular position. When the aorta is free it does not always run under the median line; in *Belone* it is on the left side.

In Reptilia and Batrachia the aorta is formed of two roots (which do or do not result from more than one pair of aorta-bows) from the bulbus arteriosus, and which embrace the oesophagus. A ramus communicans anterior exists between the carotids. Each corresponding branch of the aorta either becomes an intercostal artery, or enters the intervertebral foramen for the spinal canal.

The Batrachia have a carotid from each anterior aorta-bow, and a pulmonalis from each posterior aorta-bow. In all Urodela aorta-bows, either united or directly or indirectly issuing from the bulbus arteriosus, contribute to the formation of an aorta-root by the perennial rami communicantes on each side. The Trachystomata agree with fishes in the arrangement of the greater vessels. The bulbus arteriosus upon issuing from the ventricle makes a bend to the right side, and is thereafter in its longer portion straight. At its fore end three arches on each side issue, which are functionally gill-arteries. Through the union of three corresponding gill-veins into one stem an aorta-root arises, two

of which form the aorta. The anterior gill-vein sends out a carotid, the hinder a pulmonic artery. The Proteidae have the system differently arranged. The bulbus is divided into two diverging branches, each of which results in two aorta-bows. The anterior follows the first gill-vein; the second divides in two, of which the anterior follows the second gill-vein; the posterior the third. Each of the two aorta-bows proper consists of an uninterrupted continuation and a respiratory portion. The third bow wants the direct continuation. The three respiratory portions each consists of a gill-artery, intermediate respiratory vessels, and a gill-vein. The two anterior gill-veins of each side empty into the continuation of the original aorta-bows. The third gill-vein passes over into the continuation of the second aorta-bow. The continuation of the two primitive aorta-bows and the second and third gill-veins forms an aorta-root. The point of confluence of the aorta-roots lies over the heart. The anterior vessel which results from the union of the continuation of the anterior aorta-bow and anterior gill-vein has two branches—an arteria hyoidea mandibularis and a carotis interna anterior. Each aorta-root formed from the second aorta-bow possesses a posterocephalic elongation forward, which gives off a carotis posterior, and forms the commencement of an arteria vertebralis. The aorta-root gives off posteriorly a visceral artery, which, after branching for the oesophagus, is destined to become a spermatica interna. From the single aorta proceed subclavian arteries, which are continued as the epigastric, gastric, celiac, many small mesenteric, renal, and symmetrical iliac vessels. Besides there are pairs of dorsal arteries, which pierce the transverse processes on each side, and emerge in the longitudinal vertebral artery. In *Protonopsis* four vessels on each side go directly from the bulbus arteriosus. They follow the gill-arches. The anterior sends branches to the tongue, and finally becomes the carotid. The two middle vessels form the aorta-root, and, after giving off branchlets for the head, unite close behind the cranium. The fourth vessel bends over the oesophagus, gives it branches, gives a branch to the third aorta-bow, and becomes the pulmonic artery. In *Salamandra* in the neighborhood of the pharynx is placed the somewhat forward-curved bulbus arteriosus. From its anterior enlargement go on each side four aorta-bows with three mouths. The three posterior bows on each side form aorta-roots which are prolonged anteriorly. The union of both bows into an aorta occurs behind the skull, beneath the first vertebra and above and before the heart. The issuing point of the arterial twigs on the anterior bow is an enlargement—the so-called carotid tumor (or gland). The branches issuing from it are the arteria hyoideo-mandibularis and carotis. The latter divides into the cerebral and occipital. An obliterated continuation of the anterior aorta-bow, binding it to an aorta-root, is called ductus Botalli. The fourth aorta-bow, whose mouth is that of the third, sends off a visceral artery which gives branches to the pericardium and oesophagus, and becomes the pulmonalis. From the aorta-roots issue the arteria maxillaris interna from its anterior prolongation, and the arteria occipitalis to the occiput and glandula auricularis. The aorta is under the vertebrae, and descending gives off the subclavian and intercostal (in pairs), the gastric, celiac, mesenteric, and numerous renals. Between the kidneys go off the iliaes (which give off the femoralis and epigastrica), and a cloacal branch which is continued as a caudal artery.

In the Anura, on each side are three bows, of which the foremost and hindmost do not contribute to form the aorta-root, which is a continuation of the middle bow. It unites with that of the other side far posteriorly. Two pipes issue from the bulbus. There is one semilunar valve at the base of each. Each of these vessels is internally divided by two partitions into three canals, and each partition is prolonged to the wall of each issuing vessel. At the farther end of the anterior of these canals is an enlargement (carotid tumor), from which issue the arteria hyoidea (lingualis) and the carotid. The latter is divided into ophthalmic and cerebral branches, which last enters the cranium and has anterior and posterior branches. The latter form the basilar, which becomes the anterior spinal artery, into which below the supravertebral vessels empty. The middle canals form the aorta-roots. The right is large, but the left small, after giving off the celiaco-mesenteric artery, which is so large as to appear like its proper continuation. The third canal gives off two branches. The first, after giving branches to the ramus mandibuli and shoulder muscles, becomes a strong cutaneous vessel, which, with its accompanying vein, running between the levator and anterior adductor muscles of the humerus, gives off branches to the integument of the whole back. The second branch is the pulmonic. Each aorta-root before their union gives off other branches to the larynx, oesophagus, and shoulder, also a subclavian and a supravertebral artery, which runs longitudinally,

crossing the diapophyses, and giving a branch to each intervertebral foramen. The left root also gives off a coeliacomesenteric artery. Union of the aorta-roots takes place opposite the sixth vertebra. The descending aorta gives branches for the kidneys and generative organs. To the two latter go five and six vessels. Each gives a branch to the kidney on one side and to the genitals on the other. Division into common iliac arteries then takes place. In the Gymnophiona, *Cecilia* have a long muscular bulbus, at whose narrow origin are valves. The cavity is divided by a septum at its anterior extremity into dorsal and ventral chambers. The dorsal terminates in the arteria pulmonalis for the lung; from the ventral proceed two aorta-roots, each of which near the trachea reaches to the hyoid apparatus, and forms a bow behind the skull, from which the carotids proceed. The union of the aorta-roots is hypaxonic, above and a little before the heart. Each root gives off intervertebral (mostly obliquely directed forward) and vertebral arteries.

In *Reptilia* there is a completed form of heart. The division of the auricles is externally visible. The division of the ventricles is partial or complete. In embryonic forms

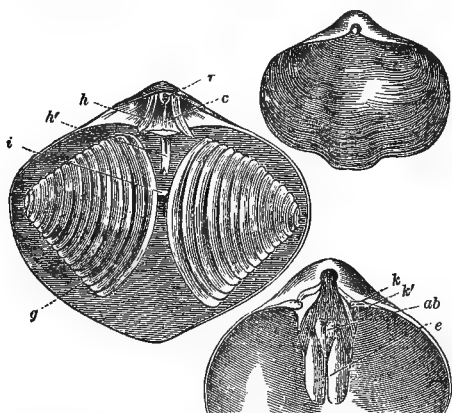


FIG. 26. *Spirigera concentrica*: *ab*, insertion of adductor muscles; *c*, of divaricator muscles; *e*, of adjustor ventralis; *g*, branchial arms; *h*, hinge-sockets; *i*, gill-bridge; *k*, hinge teeth; *r*, tubular body.

the position of the heart is near the gill-slits. This state is characterized by the presence of several aorta-bows which embrace the oesophagus, and form the aorta-roots by successive obliterations of most of the aorta-bows and their connecting anastomoses. There is a ductus Botalli, so that each aorta-root is permanently formed, either through confluence of two aorta-bows, or it is a continuation of a single trunk.

In *Lacertilia*, *Ophidia*, and *Testudinata*, in the ventricle are found fleshy columns of various sizes, which enclose spaces opening into a common cavity. The septum ventriculorum (more or less incomplete) is connected to the sides of the ventricle by tendinous or fleshy cords. The left ventricle is narrower, more dorsal, thick-walled, communicating with the left auricle; the right is broader, straight, ventral. That into which arterial blood enters, and which, as regards its position, is homologous with the left ventricle, is called the cavum arteriosum; the right is the cavum venosum. No trunks arise from the first. From the cavum venosum there issue by three ostia the arteria pulmonalis and two trunci arteriosi, each ostium having three semilunar valves. The space between the orifice of the arteria pulmonalis and those of the trunci arteriosi is the originating point of a flap or muscular valve which extends towards the right border of the ventricle. This divides the cavum venosum into two incomplete cavities, an anterior and posterior, which are completely separated by the systole, during the latter part of which it shuts the entrance to the arteria pulmonalis. A simple bulbus arteriosus is wanting, but its place is supplied by the confluence of the bases of the three great vessels, which are then separated by simple walls. This arterial trunk, containing a cone, is covered by the pericardium, and wants (except in some *Testudinata*) the striped muscular walls.

In *Lacertilia* the heart is not far removed from the hyoid region. It is farthest in *Amphisbena*; among *Lacertilia* it is farthest in the *Varanidae*. Among *Varanidae* the septum atriorum is nearly complete, except near the ostium venosum dextrum. Among *Pachyglossa*, *Gecconidae*, *Chalcidae*, and *Scincidae*, the septum is very incomplete. The walls of the great vessels are united near their origin. A peculiarity of most *Sauria* is that each aorta-root takes up the common carotid from an arterial trunk which origi-

nates afterwards, so that each aorta-root is formed by the union of two aorta-bows as follows: The trunci arteriosi continue, the right as an aorta-root, the left the same after giving off the truncus impar, which divides into the carotids. Each of the latter gives off near its basis an outward directed arterial bow, which empties into the aorta-root of its side. It constitutes thereafter a primitive aorta-bow, whose original branches are the carotids. This occurs in (1) *Scincus*, *Anguis*, *Pseudopus*, *Lacerta*, *Ameiva*, *Platydictylus*, *Uromastix*, *Iguana*, etc., and the aorta-bows from the truncus impar are obliterated, while they are utterly wanting in (2) *Varanidae*, *Chamaeleonidae*, *Amphisbena*.

In the hearts of serpents the form is elongate, and is far removed from the hyoid region. The end of the pericardial sac appears confluent with the serous lining of the thorax. The cavum venosum arteriosum is always incomplete. The walls of the three trunks are separate, as far as is known. The left trunk continues as the aorta-root without branches; the right gives off the coronaries, etc.; then, where it turns itself posteriorly, a subvertebral anterior branch; then numerous intercostals.

The truncus caroticus impar divides into two arteriae carotidae communes, of which the right is scarcely visible in some species; but when visible it may be smaller than, equal to, or larger than, the left.

The *Testudinata* have the heart broad, abbreviated posteriorly, and widely removed from the hyoid apparatus. The outer sac of the pericardium is attached to the end of the ventricle by a band which encloses the portal vein. The valve, stretching to the right wall of the ventricle, is in some furnished with an ossified cartilage. The walls of the three trunks are slightly united near their origin, forming a bulbus, which in *Emys Europaea* is surrounded by a ring of striped muscle-tissue. The truncus dexter soon after its origin gives off a short anterior arteria innominata, which gives off the carotids and subclavians. The truncus sinister gives off (before union with the dexter) the cardiac branch for the heart and oesophagus, also the gastro-epiploica and mesenterica. After these branchings the aorta-root is narrow. Each carotid gives off (1) the hyoidea (for the pharynx, trachea, larynx, hyoid, and lingual regions); (2) the mylohyoides; (3) the carotis externa; (4) the carotis interna; and (5) the intervertebrales, which pass through the foramina intervertebralia to the arteria spinalis. The posterior cervical, the dorsal, and caudal pass from epaxial trunks. The cervical is a single vessel which passes from the carotis externa to the subclavian. From each side the neck there runs to the rump, over the diapophyses in the canal covered by the carapace, a trunk, which, besides the intervertebralis, gives off arteries analogous to the intercostals. The continuation of this is a caudalis, superior to the diapophyses. The intercostals of each side open into a lateral longitudinal trunk, which communicates anteriorly with the subclavian, posteriorly with the iliac vessels. From the aorta proceed symmetrical spermatic, suprarenal, iliac, renal, and hypogastric vessels. It is continued as the caudalis inferior.

The *Crocodylia* have a complete septum ventriculorum; the right ventricle anterior; each ventricle emitting its respective truncus arteriosus. There is an opening connecting the trunci arteriosi (which corresponds to the bulbus arteriosus), by which arterial and venous blood are mixed. The heart is over the sternum; the left ventricle is thick walled; the right more capacious, reaching to the apex. The right contains a muscular fold which is stretched from a septum behind the origin of the pulmonary artery to the outer wall. It has two valves at each ostium venosum. From the left ventricle issues the truncus arteriosus dexter; from the right ventricle the truncus sinister and pulmonalis. These two trunks are separated at their origin by a common septum; at the origin of each are two semilunar valves. The walls of all three are united between the trunci arteriosi near the semilunar valves. Before uniting, the trunci arteriosi give off the dexter truncus innominatus and subclavia dextra. From the truncus arteriosus sinister, near its union with the dexter, issues the coeliac artery; it then becomes much narrower. The common carotid divides near the head into two branches. Besides these there are other branches to the larynx, neck, tongue, and other parts.

In *Aves* (birds) the septum ventriculorum is complete. The heart's position is in the middle line of the thorax, its axis parallel with that of the body, its apex between the lobes of the liver, the heart-sac attached to the membrane of the lungs. The auricular appendages do not project, but are tightly drawn down. The right auricle is stronger and with larger appendages than the left. They have comb-shaped muscular columns or ridges. Into the right auricle empty the venae cavae. At the mouths of the veins are weak muscular flaps which are attached to the pectinate muscles, whose contraction assists the passage of venous blood into



the right ventricle; the foetal foramen ovale is closed. The chambers of the ventricles are not very different in size; they do not reach the apex. The septum is very convex into the right chamber. The orifice of the right ventricle is closed by a very strong muscular valve as thick as the outer wall. It is strongest in Natatores, weakest in Cursores, especially in *Apteryx*, where it is almost membranous, and is attached by its free borders by short chordae tendineae to the wall of the ventricle. Its free border in most is turned towards the convex septum, to which it is closely pressed in systole, thus preventing regurgitation. It is opposed by a second very weak muscular valve. At the origin of the pulmonalis are three semilunar valves.

From two low ridges at the orificium atrio-ventriculare sinistrum proceed usually numerous tendinous threads, which attach themselves to two or three valves which correspond to the mitrals. Three semilunars are found at the origin of the aorta. The boundaries of the left ventricle are nearly three times the thickness of those of the right. The left auricle has numerous and complicated muscle-bundles; it receives two pulmonic veins through one ostium. There is a valve-like muscular process whose free border is turned to the cavity, and apparently directs the blood to the ventricle. The single aorta, giving off immediately the coronaries, very soon divides; the truncus arteriosus has a branch which is either the innominata or subclavia. In the latter case there is a common carotid. It continues as aorta descendens on the right side of the vertebral column. The left arterial trunk is an innominate or a subclavian. Either each innominate furnishes its common carotid, which is most usual, or else the left or the right furnishes a truncus caroticus impar. Examples of the first kind are furnished by all Natatores (except *Podiceps*); of the second by many Insectores, and some of the Cursores; of the third the *Phenicopterus* furnishes the only example. In *Botaurus stellaris* both aortas unite on the neck. Sometimes one of the two carotids runs laterally and superiorly on the neck (e.g., *Peittacus chrysotis*). They run in the whole length of the never entirely closed canal, beneath or in front of the vertebral processes. From each originates a vertebral artery, which before entering the cervical canal gives off the oesophagea descendens, transversa colli, and transversa scapulae. It finally joins the occipital. It does not form the basilar, which results from the union of branches of the cerebral carotids; and after giving off branches finally results in the arteria spinalis anterior. When one truncus caroticus only exists the vertebralis of the imperfect side originates from the subclavian. Sometimes (in *Anas boschas* and *Ciconia nigra*) the vertebralis continues itself downward in the canal of the rib attachments as the common stem of the intercostales. Each common carotid usually divides into the facialis and the cerebialis; more rarely it is continued as the latter and gives off the branches of the former. The subclavian gives off an external thoracic and axillary; the latter, the brachial, and then the ulnar and radial. From the aorta descendens arise more or less numerous intercostales and lumbales, a strong coeliaca, then a mesenterica superior (both penetrating the diaphragm in *Apteryx*), afterwards renales; from which branches for the generative parts proceed.

Next are two crurales, each giving off an epigastrica. Each results in the ischiadica, which descends to the knee. The sacra media usually gives off the renales posteriores, the mesenterica inferior, two lateral pudendae internae, and the hypogastricae. Finally, it produces the vascular network on the breast and abdomen which is devoted to the panniculus adiposus laid bare by the shedding of feathers during incubation.

In Mammalia the heart is unattached by cellular tissue to the diaphragm, except in man, the higher apes, and Cetacea. It is straight (except in man, the higher apes, and *Talpa*), has two ventricles, and the foramen ovale is always closed. The ventricles are externally separated (in part) in Sirenia. The heart is broad and flattened in all Cetacea; a little less so in *Phoca*, *Bradypus*, *Manis*, and *Elephas*; rounded in Carnivora, Rodentia, and Marsupialia. It has a valvula tricuspidalis; in *Ornithorhynchus*, a transverse muscular valve of the right ventricle, as in birds; the valve in *Echidna* is membranous, has a large tuberculum Loweri,\* and no Eustachian valve (in *Felis*, *Canis*, *Ursus*, *Phoca*, *Gulo*, *Mustela*, *Procyon*, *Talpa*, *Halmaturus*, *Equus*, *Sus*, and

*Ruminantia*). There is no tuberculum, but two semilunar valves to the vena cava ascendens in *Didelphis*, *Dasypus*, *Hystrix*, *Cavia*, *Lepus*, *Sciurus* (in *Sciurus maximus* a trace of the tubercle). No Eustachian valve, but a crossband below the fossa ovalis, with filamentous muscle-processes in *Myrmecophaga* and *Bradypus*. It has a Eustachian valve and weak tuberculum Loweri in man, many apes, lemurs, *Lutra*, etc. Both valve and tuberculum are wanting in *Ornithorhynchus* and *Delphinus*.

In many ruminants and perissodactyls in advanced age there is a single or double bone in the septum atrio-ventriculare, and occasionally in Solidungula in the septum opposite the ostium venae cavae ascendents. The aorta-stem at its root is single and curved to the left; it soon gives off coronales (one only in *Elephas*). Its branches vary; e.g. (1) A short aorta divides into an anterior (superior) and posterior. (2) The aorta superior gives off a subclavia sinistra, and continues as the truncus caroticus, or divides into a truncus caroticus and both subclaviae; in Solidungula it also gives off the vertebralis dextra. From the aorta-arch originate the innominata, giving off carotides subclavia dextra and subclavia sinistra in most Marsupialia, in Rodentia, Edentata, Carnivora, *Sorex*, *Halicore*, *Auchenia*, *Sus*; in which last the two carotids spring from a truncus impar vel primus. (3) In other cases two trunci innominati alone are given off, as in Cheiroptera, *Talpa*, *Phocæna*. (4) The aorta gives off a truncus anonymous dexter, carotis sinistra, subclavia sinistra (as in Monotremata, *Phascolumys*, and *Bradypus*, *Dasypus*, *Cyclotura didactyla*, all Muridae, *Erinaceus*, Phocidae, many Quadrumana, man, etc.). (5) Two subclaviae arise, with a truncus caroticus impar between (*Elephas*). (6) Besides the above subordinate arteries from the aorta, are thoracica interna sinistra and dextra from innominata dextra in *Phocæna* and *Halicore*. In some plunging animals occur widenings of the aorta (*Lutra*, *Phoca*, the young of *Delphinus*, *Monodon*, etc.). The common carotids have their length proportioned to that of the neck. In the short-necked Delphinidae there is none, both carotids springing

from the innominata. It is often divided into two (facialis and cerebialis). The cerebrales enter as single trunks into the cranium in Quadrumana, Cheiroptera, Insectivora, Rodentia, Marsupialia, Solidungula, and some Carnivora, as *Ursus*, *Lutra*, *Canis*, *Mustela*, or pass through a rete mirabile (*Phocæna*) formed of branching trunklets, or springs from a rete mirabile formed from its origins (Ruminantia, Suidae, Felidae). When without retes the cerebrales have various points of origin; they are either head branches (1) or collateral branches (2) of the carotids; or they are branches of the carotides internae, which give off the cerebrales after some others (Cheiroptera, Insectivora, most Rodentia, some Carnivora, as in *Lutra*, where the carotis interna, a branch of the common carotid, gives off the occipitalis first), or they appear as branches of the maxillares internae (*Hystrix cristata*) or as branches of Ophthalmicae (*Cavia dasypsecta*). The bipolar retia mirabilia, from which the cerebrales spring, may be formed of branches from various sources. In *Felis* they come from a larger rete, which is composed of terminal twigs from the common carotid. In *Sus* they are composed of terminal branches of the carotis interna, and give rise to the cerebral vessels. In *Ovis* three branches of the internal maxillary are the sources of each rete mirabile. In *Bos* they are formed from branches of the internal maxillary, which enter through the foramina ovale and opticum and the fura orbitalis. Here also the branches of the occipital and vertebrales lose themselves in a network which communicates with each rete mirabile. The retia mirabilia of the

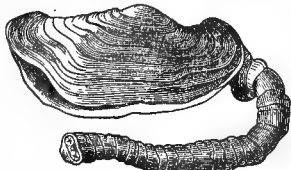


FIG. 27. *Panopea australis*.

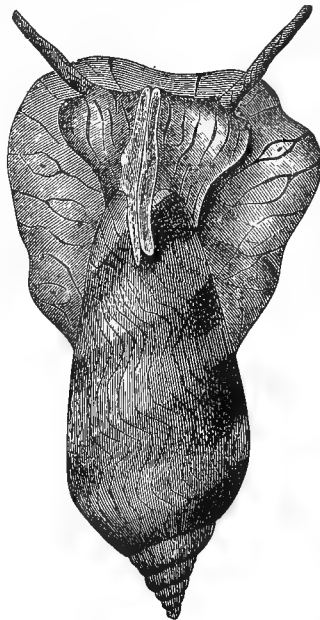
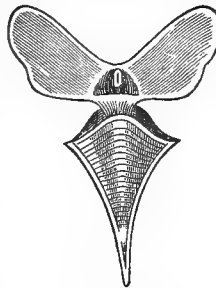


FIG. 28. *Voluta undulata*.

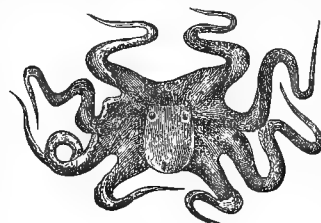
\* A process separating the mouth of the vena cava descendens from the vena cava ascendens in the right auricle.

Delphinidæ (with artery traversing) are principally formed from the branches of the carotis interna, yet are closely connected with retia lying outside the cranium, formed of branches of the carotis externa and cervico-occipitalis. The rete of each side always communicates with that of the other. The vessels bearing blood from the carotids to the brain enter the skull as follows: through the canales carotici (in *Quadrupana*, *Ursus*, *Mustela*, *Meles*, *Lepus*, *Castor*), through the foramina jugularia (*Equus*, *Sus*), through the foramen lacerum anterius (*Hystrix*), foramen opticum (*Cavia*), foramen ovale and fissura orbitalis superioris (*Ovis*). In Cheiroptera and many Insectivora and Rodentia the carotis interna passes through the "pessulus," which is between the limbs of the stapes. Besides the cerebrales, the vertebrales conduct blood to the brain. In man and many others these unite and form the basilaris, in others (*Mustela*, *Canis*, etc.) they continue as occipitales, and send smaller branches, which form the basilar artery. Sometimes a communication before reaching the basilar forms a circle. In ruminants this arises from the vertebrales (which is set apart for both canalis spinalis and neck muscles), for the basilaris is very small, and still smaller in Solipedia and Suidæ, where it is constituted by the union of the occipitales in the foramen magnum; and finally in Delphinidæ, by the shortening of the neck, the vertebrales is wanting. It, with the cervicalis ascendens and occipitalis, forms one stem, the cervico-occipitalis, which connects with the spinales through numerous retia mirabilia. The always present circulus Willisii is formed either partly in the cerebrales and partly by division of the basilaris, or through the cerebrales and divided basilaris-occipitales, or only by the cerebrales. There are still other modifications of the circle of Willis. The subclavian becomes the axillary and the brachial; the latter in Cetacea and Phocidæ is absent. In many Edentata, and in *Stenops* and *Tarsius*, the arm-arteries possess many retia mirabilia (*Dasypus searcinctus*, etc.). In *Bradypus* and *Stenops* the trunk of the brachialis passes through many embracing extended arterial vessels. In *Cyclothura didactyla* and *Tarsius* the artery empties itself into these; in other cases they are confined to the fore arm. In *Sus* there is a small one connecting the ulnaris and radialis. In some the brachiales give off only subordinate branches (*Trichechus*, *Mustela*, *Cricetus*, *Sciurus*); in others it is forked. The division of ulnar and radial arteries is variously situated, either high on the humerus (*Phocæna*, *Cebus*, *Callithrix*, *Lagothrix*, where they are often afterwards connected, etc.), or in the middle of the same (*Didelphis*, *Halmaturus*), or near the elbow (*Homo*, *Felis*). Sometimes the brachialis, oftener the ulnaris (in very many apes, marsupials, many rodents), passes through the foramen supracondyloideum humeri.

FIG. 29. *Cleodora*.

The aorta thoracica of most Mammalia is peculiar in not giving off immediately the intercostales. In *Mustela* there springs from it at the extremity of the chest a trunk (which divides into two vertebrales), from which the arteriæ intercostales issue. In the Delphinidæ there are two descending arteriæ thoracicæ internæ (or mammariæ internæ), which arise, the left from the arcus aortæ, the right from the innominata dextra, which give off the five anterior intercostales. Here also descends from the aorta thoracica a single trunk, which communicates by branches with the arterial network of the thorax and of the vertebral canal. The intercostales pass through this enormous thoracic rete mirabile, which connects with those of the vertebral canal and the base of the skull. The branches of the aorta abdominalis are usually the phrenicæ inferiores, suprarenales, renales, spermaticæ internæ, lumbales, the cœliaca, the mesenterica superior, and the mesenterica inferior. The cœliaca and mesenterica superior are one stem in *Cavia cobaya*, or originate as one and soon divide (*Talpa* and *Vespertilio murinus*), or originate separately, but connect by strong anastomoses (*Phocæna*). The mesenterica inferior often is trifling, in Marsupialia and Monotremata wanting. Certain twigs of it, forming retia mirabilia, occur in *Sus*; in the same genus is a rete on the stomach for the coronaria ventralis sinistra. Branches for the transversalis and oblique muscles for the psoas, etc., leave the aorta abdominalis. The arteriæ iliacæ communes (so called) seldom are homologous with those of man. In Cetacea they correspond generally with the hypogastricæ. They give off the epigastricæ, which otherwise come from the crurales. In most Mammalia they are homologous with the crurales, since not from them, but from a continuation of the aorta,

are given off the hypogastricæ, or at least vessels which rise in *Homo* from the hypogastricæ. So in Monotremata and marsupials the ischiadicæ, and in many others the sacra laterales, spring in pairs from the aorta beyond the iliacæ communes. In some, with strong skin-muscle or skin-system, from the crurales arise large musculo-cutaneæ, which anastomose with similar descending branches of the axillares (*Erinaceus*). The division of the crurales is higher or deeper than in *Homo*. In the posterior extremity of the Phocidæ, in many Edentata, and *Stenops* are retia mirabilia, which are weaker than those of the upper extremity,

FIG. 30. *Octopus vulgaris*.

and the sacra media is a continuation of the aorta; larger in large-tailed animals, running in an inferior vertebral canal, often forming retia (*Stenops*, *Bradypus*, *Myrmecophaga*). In *Phocæna* it passes through retia; sometimes weak (in *Erinaceus*, *Lepus*, ruminants, often in Solipedia). There is none in *Manatus australis*, where the aorta forms two hypogastricæ, which lose themselves in two huge retia subvertebralia.

#### X. THE RESPIRATORY SYSTEM.

Apparatus for oxygenizing a circulating fluid is wanting in Protozoa and Cœlenterata. In the other branches its type varies so that a number of distinct systems must be recognized, which are adaptations of as many distinct regions of the body for the purpose of respiration. These may be reckoned as follows:

1. The external pore-system of the Echinodermata.
2. The system of diverticula from the alimentary canal of the Holothurida-Dendropeumones and of most Vertebrata.
3. The gill-system of Mollusca and Crustacea.
4. The tracheary system of terrestrial Arthropoda.
5. The pharyngeal gill-system of Ascidia, fishes, and Batrachia.

It will, however, be convenient to divide the subject first between the Invertebrata and Vertebrata.

1. In Invertebrata.—The wall of the body of the Echinida and Asteroidea is pierced with a great number of pores, which terminate in blind sacs and are filled with water. In all echinoderms the cavity of the body is filled with water, by which blood is oxygenized. It enters through perforated plates (laminae cribrosæ) situated in the angles of the arms in the Asteroidea, but the orifices which admit it into the body of the Holothurida are not certainly known. In the latter class singular organs called the "slipper-shaped bodies" depend freely from the viscera; their hollow stems are said to contain a blood-vessel; the extremity is like the open end of a short slipper.

The Holothurida-Dendropeumones possess an extensive system of branching blind tubes, which form a mass extending throughout the body. They form two bodies, one on each side of the rectum, and open into the latter near the anus: from it they are filled with water. In some Asteroidea (*Petaster militaris*) five radiating tubes, the one for each arm, issue from the rectum, and are filled and emptied of water from it.

In Polyzoa (Bryozoa) and Brachiopoda we have a somewhat similar arrangement of branchiæ. In the former they form a double crest of tentacular fringes round the mouth; they are hollow, and the circulatory fluid moves through them, as elsewhere in the body-cavity, by ciliary movements on its walls. In Brachiopoda, as already stated, there are well-developed arteries. The gills are situated as fringes on straighter and shorter or longer and spirally-coiled arms within the shell, one on each side of the mouth. Their position is somewhat like that in the Polyzoa when retracted. In hingeless Brachiopoda the calcareous arms are wanting, but here the gill-supports are cartilaginous. In Lingula the inner surface of the mantle is furnished with folds and crests, which are supposed to aid respiration. In the Acephala the arrangement is totally different. The gills are curtain- or sheet-like (whence the name of this class, Lamellibranchiata), and hang two from each side of the body within the mantle. Sometimes their margins are free (many Monomyaria, Mytilidæ, Arcidæ, Lithodomus, Cyclas, etc.); in others immediately united (*Veneridæ*, *Macra*, *Donax*, Unionidæ, Pholadidæ, etc.), or are connected by an intervening membrane (*Solenidæ*, *Cardium*, etc.). The union of the pairs of margins encloses two chambers, one within the other. Each gill-lamella consists of two layers, which enclose tubes and other cavities between them.

Sometimes the outer gill lacks one layer, or sometimes the whole gill is wanting (*Lucina*, *Corbis*, etc.). In others its outer lamina is truncated above, so as to expose the ends of the cavities it embraces. The lamellæ of the opposite side are symmetrical, or not in accordance with the relations of the shell-valves.

The branchial structure in Gasteropoda presents many varieties. In the division Opisthobranchia the branchiæ and auricles lie behind the ventricle of the heart; in Prosobranchia the relative positions are reversed. In the former

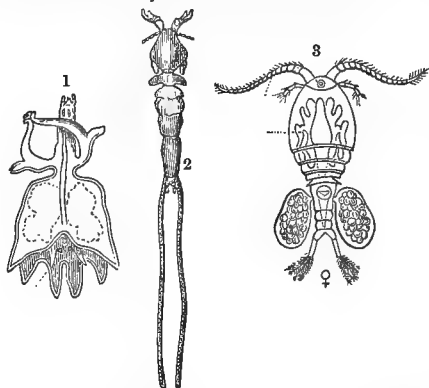


FIG. 31. 1, *Brachiella*. 2, *Dichelesthium*. 3, *Cyclop*.

the branchiæ are variously extended processes of the dorsal integument of the body, each of which is supplied with an artery. In the lowest group, the Dermatobranchia, these branchiæ are wanting, and the arteries are distributed for blood aëration beneath the dorsal integument. In the Placobranchia they are represented by lateral wing-like expansions of the integument, which may fold over the body. In numerous types the processes are distributed over the body in thread, prism, leaf, and other forms. These are the Ceratobranchia; many of the processes contain liver-cells. In the Polybranchia the processes are arranged along the back, and are branched or forked, and sometimes of diverse forms on the same animal. Other families, as Dorididæ, have a rosette of branchiæ round the arms only. All the preceding groups form the "naked-gilled" primary division, Nudibranchia. In the remainder of the sub-class the gills are concealed by the edge of the mantle, forming the Tectibranchia. The least specialized of these (Hypobranchia) have symmetrically arranged fringes round the edge of the body, with but few interruptions; while in the higher division, Pleurobranchia, the fringe exists on one side only. The fringe becomes more localized and drawn under the mantle as the size of the shell increases in the succession of genera. Especially in *Bulla*, where the shell is large, the gill is drawn beneath the mantle, and concealed by the upturned margin of the foot.

In Prosobranchia the gill or mantle-sac is generally well defined. It consists of a chamber bounded within by the body-wall and above by the mantle, which also closes it laterally by adhesion to the body-wall. The gills and excretory orifices of the digestive, urinary, and genital systems are seen on its walls. There is generally a single gill, shaped like a half feather, and with two dependent (in *Paludina* three) laminae of transparent membrane. In many genera there is a rudiment of a second, while in a few the latter is well developed. The orifice of the mantle-sac is on the left side, and can be closed by a sphincter muscle. The mantle is originally composed of lateral halves, which are not always completely united; their separation at the margin produces the deep fissure in the shell of *Pleurotoma*, and divisions higher up correspond to the holes in the shell of *Haliotia*. In the latter genus there are two gill-sacs and two gills, and in others two gills. In some a thickened rib marks the halves of the mantle, and the two gills are placed closed together on it, so as to appear as one. In Patelidæ and Chitonidæ there is no distinct gill-sac, the branchiæ being marginal fringes, as in many Opisthobranchia. In the Pulmonata the mantle-sac does not contain any gills; it has an opening on the right side of the body, produced by a fissure in the mantle margin, which is closed by a sphincter muscle. This orifice opens and shuts regularly for the admission of air. The mantle-sac becomes a lung by the distribution of the venous trunks and branches over its surface. An extensive ring-like trunk (circulus pulmonalis) surrounds its margin, from which vessels converge towards the centre, forming a network which gathers itself again into a few, then a single trunk, the vena pulmonalis, which empties into the auricle of the heart.

In Cephalopoda the mantle is free, and encloses a cavity

on the abdominal, instead of, as heretofore, the dorsal face of the body, agreeing in this respect with the Pteropoda. The cavity contains two branchiæ in the greater number of genera (Dibranchiata), or two in *Nautilus* and probably its extinct allies, the Ammonitidæ, etc. These constitute the sub-class Tetrabranchiata. The gills are elongate, triangular, feather-shaped bodies, whose axis bears on one side the artery, on the other the vein. In Dibranchiata it bears a row of bows on each side, in which a blood-vessel passes from artery to vein. On each of these stand bipinnate processes, so that the whole becomes tripinnate. The arch bounds a membrane in the decapod division, but in the Octopoda the loop is not closed. In Tetrabranchiata the first branches of the gill are leaf-like, with pinnate, leaf-like subdivisions. They are free in the mantle-sac; those of the dibranchiata are attached to the mantle.

In all Crustacea except the Decapoda the gills consist of fringes and expansions of the limbs. In the latter they are regular feather-shaped bodies, arranged within an abdominal cavity above the limbs; the bases form a curved line and the apices are directed inward. The tracheary system prevails in all other Arthropoda. It consists of a great number of tubes, which communicate with the air by means of small orifices or stigmata. These pierce the walls of the segments, usually one on each side, where they are present. They subdivide to a great extent internally, and penetrate all the organs of the body. There are marked varieties of this structure. Instead of issuing by stigmata, the trachea may be produced into a leaf-shaped process which arises from the usual position of the stigma, and may there ramify extensively within the lamella, constituting a trachean gill. This occurs in the larvæ of many Neuroptera. The walls of the trachea are elastic, yet firmly bound by a spiral thread, whose close volutions form an interior layer of the tube-wall. In other localities it is wanting, and the tube expands sac-like. In some insects these exist near the stigmata. In the Arachnida (except the group of low forms, the *Trachearia*) this sac-like structure only exists as a large pulmonary chamber, with single stigma, situated on the anterior part of the abdomen on each side.

In insects the stigmata rarely exceed nine or ten pairs; in Myriopoda they are far more numerous. In the Acarina there are but two. In insects they usually have a valve, which opens externally to prevent the entrance of foreign bodies; in some forms they project in laminae, branched, pinnate, or botryoidal. In the larvæ of many Phryganidæ and some Lepidoptera the trachea-gills are arranged in six rows along the back. In the larvæ of *Libellula* and *Æschna* they are attached to the inner wall of the rectum.

In ascidian Mollusca there are no free or pinniform gills. There is, on the contrary, a large pharyngeal cavity, which lies between the mouth and the digestive system proper, the alimentary canal both issuing from and discharging into its cavity in many cases. In others it discharges at the side. The pharynx may occupy a small part of the whole length of the cavity of the body; in the latter case the other organs are pushed to one side of it (*Boltonia*, *c. g.*). The mouth and other parts are frequently furnished with cilia. The gills consist of a sac whose walls are abundantly pierced by holes of different forms in the different groups, or it is reduced to a band of such structure only.

2. In Vertebrata.—In the Leptocardii there is a large pharyngeal cavity, with a large open mouth whose border is supported by a cartilage. This gives out branches which are the axes of abundantly ciliated tentacles which sur-

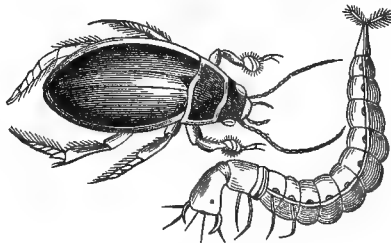


FIG. 32. *Dytiscus* and larva.

round the mouth. On the sides of the pharynx are numerous fissures, which communicate with the outer medium. In the Dermaptera the respiratory organs consist of a series of sacs on each side (which number seven to ten), on whose septary walls the arteries and veins are distributed. In some genera these communicate internally with the pharynx or œsophagus; in the lamprey, on the other hand, with a blind tube which lies beneath the œsophagus and empties into the pharynx. Each sac opens externally by a slit. In Elasmobranchi-Plagiostomi (sharks, rays) the arrangement

is similar, the slits numbering five, rarely six and seven, and communicating with the oesophagus. The septary walls are double, and contain a cartilaginous arch with radii, which elevate the walls into transverse ridges. A trace of the first embryonic external fissure remains in this order as a spiracle or tube from the pharynx to the sides of the top of the head behind the eyes. In *Holocephali* (*Chimæra*) the external slits are concealed by an opercular flap, which produces the appearance of a single slit. In *Actinopteri* the hyoid respiratory system is fully developed. The arches support, instead of sac-septa, radiating fringe-like laminae, which receive the branches of the branchial artery and vein. The fissures are only those between the arches, which are covered externally by an osseous "operculum" or lid. The number of branchiae is usually four and a half, but in some *Pediunculati* there are but three, in some eels but two. In *Lepidosiren* there is but one. While the processes are usually narrow, lamellar, in *Lophobranchii* they are subcylindric and branched, each one forming thus a tuft; their number is also reduced.

Besides these fringes there are in some *Dipnoi* and some *Batrachia* (*Trachystomata*, *Proteida*), and in the larvæ of many salamanders, cartilaginous processes of the arches which bear a double row of fringes, forming the external gills.

The true pulmonary system consists of ducts and chambers, which originate from the alimentary canal, and are connected with it or the pharynx. It is not found in any Vertebrata below the *Actinopteri*. On the other hand, the hyoid respiratory organs do not exist above the *Batrachia*. In *Actinopteri* the pulmonary system consists of a sac with walls either thin and semi-transparent, or rarely thicker and lined with muscular meshes or a few cells (*Lepidosteus*, *Dipnoi*, etc.). In *Physostomi* it is connected with the stomach or oesophagus by a tube, the ductus pneumaticus; in *Lepidosteus* the latter enters the oesophagus on the upper side; in *Polypterus* on the under side of the same. In *Physoclysti* this sac is entirely isolated. Its function is that of a float, and it is hence called the swim-bladder. It usually forms a single chamber, but in *Cyprinidae*, *Characinae*, and *Sternopygidae*, it is divided by narrow constrictions into two, sometimes into three, chambers. In *Cobitidae* and some *Siluridae* (*Clarias*, *Gasterobranchus*, *Ageniosus*, and *Saccobranchus*) the anterior part, or the whole of it, is enclosed in an osseous case. In *Gadidae* the diapophyses are expanded and adherent to it; in *Campostoma* it is suspended in the abdominal cavity, and surrounded by the spirally coiled intestine. It is furcate, and sometimes branched posteriorly, in *Scienidae*. In *Nematognathi* and *Plecostomyli* it is immediately connected with the auditory organs by a chain of small bones, which are supported on the sides of the anterior vertebrae. Besides *Lepidosteus* and *Amia*, the genera *Platyotoma* (*Nematognathi*) and *Chirocentrus* (*Isospondyli*) possess cellular layers on the inner side of the swim-bladder. In *Lepidosiren* only among fishes is the swim-bladder deeply divided longitudinally, its halves being homologous with lungs. They are cellular within, and lie above the alimentary canal next the vertebral column. They unite, and passing round the oesophagus enter it below by a glottis with small cartilage. In *Saccobranchus* a sac extends on each side above the ribs from the pharyngeal cavity, which is designed to contain water to supply the gills during drought.

In *Batrachia* we have a further development of the structure seen in *Lepidosiren*. Here the sacs are separate, being connected by the branches of the tube or trachea which leads to the oesophagus. The sacs, now lungs, are occupied by a central longitudinal cavity and a thick layer of cells round the walls. The trachea from this order upward consists of cartilaginous rings, partly or completely closed, which are modified at the glottis into a vocal organ. This consists of a number of segments, the uppermost of which support two parallel tendinous plates (*chordæ vocales*), whose edges are separated by a slit-like opening, which is opened or contracted by their relaxation or tension. The trachea is longer in reptiles and other vertebrates than in *Batrachia*, and its inferior branches are called bronchiæ. In all, the oesophagus passes above the lungs, and the stomach is behind them. The interior of the lung continues as a sac in reptiles, being especially elongate and thin-walled posteriorly in serpents. In these animals one of the lung-sacs is nearly always wanting or rudimental. In birds and *Mammalia* the central cavity is only represented by the bronchi and their branches, the cells occupying the remaining space. In *Aves* the bronchi are each dilated into a chamber, which is furnished with muscles for altering its form. These are most fully developed in singing-birds, of whose musical faculties they are the organ.

## XI. THE UROGENITAL SYSTEM.

### 1. In Invertebrates.—The Reproductive System.—In the

lowest forms of life reproductive organs are only periodical appearances, and their sexuality can only be determined by microscopic examination of their products. In most *Echinodermata* the organs are permanent, but it is not till we reach *Mollusca* with a head, that the organs of the sexes essentially differ. A usual mode of reproduction in *Protozoa* and *Coelenterata* is by budding and by fission. The production of ova is a higher form of the budding process, the result being a germ of a new generation, which may or may not require the offices of opposite sexual cells for their further development. Examples of full development of the female element alone (*agamogenesis*) are known in animals as high in the series as insects. In the *Mollusca* the two sexual elements, ova and spermatozooids, are constantly produced, even in hermaphrodites, although they may be the products of the same glandular follicles, as in *Gasteropoda*-*Opisthobranchia* and *Pulmonata*, and in *Pteropoda*.

The following table exhibits the relations of the classes as far as the Vermes:

#### I. No Urinary Apparatus.

♂ ♀ organs identical.

#### Radiata.

\* No permanent generative organs.

*Polypi*. Either androgynous on each mesenterial fold, or the fold monœcious, or rarely the animals dioecious; spermatozoa or eggs in sacs, which are in band-like mass on sides of mesenterial folds.

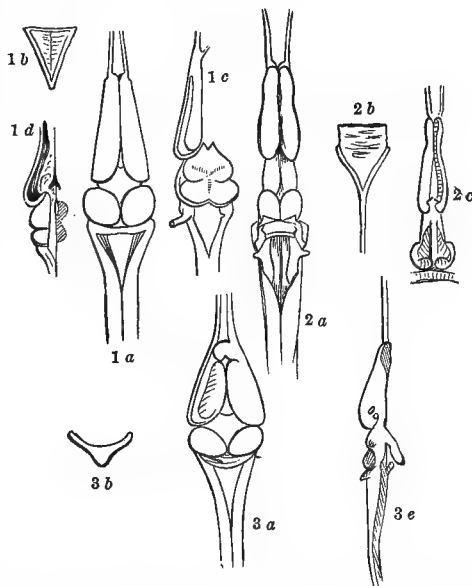


FIG. 33. 1. *Rana esculenta*. 2. *Dactylethra Capensis*. 3. *Bufo viridis*. a, brain from above; b, choroid plexus; c, horizontal section of the lobes and hemispheres; d, of hemisphere; e, longitudinal vertical section.

*Hydræ*. Androgynous; the eggs single in a lower sprout, spermatozoa in a higher sprout; no permanent organs.

*Medusæ*. Dioecious; eggs and spermatozoa developed in large cells or bladders, which are attached to stomach, water-canals, mouth, feet, border, etc., etc.

*Ctenophora*. Androgynous and monœcious; capsules of both kinds in combined or separate bands on radial water-canals; sometimes on central canal or stomach, emerging by same canals.

*Crinoidæ*. Comatula; sacs on swollen bases of pinnules monœciously containing eggs or spermatozoa without tails. (By one observation sometimes androgynous.)

#### \*\* Permanent organs.

*Asteriida*. One or many blind sacs each side of septum (which terminates between arms near or far off); sometimes found to reach the end of the arm; much subdivided; orifice of emission through lamina cribrosa in some *Asteriadae*; into the body-cavity in others and in *Ophiuridae*; all androgynous, with very few dioecious exceptions; in some not known.

*Echinida*. Dioecious; five (ever less?) sacs or masses of saclets, each opening by narrow duct through separate openings (sometimes four or three) near vent, and lying near together, reaching to middle of shell; males white colored, yellow, red, etc.

*Holothuriida*. Bunch of few or many tubes embracing oesophagus, and opening on median dorsal line; dioecious, or in *Synapta* and *Apneumona* androgynous; the spermatozoa in projecting masses of walls of ovary-tube.

#### Mollusca.

\* Generative organs not always permanent.

*Bryozoa*. Androgynous; ♂ organs round body below stomach on a string, with many cells, containing spermatozoa; ♀ with very few ripe ova behind stomach, also on a string; spermatozoa bursting into body-cavity, and reaching ovary; ova break through outer wall or a posterior orifice.

*Tunicata*. Androgynous; some doubtful, some of same species dioecious, others androgynous; testes and ovary separate, both emptying into cloaca separately; ovary usually with but one egg; organs slightly different in appearance.

\*\* Always permanent.

*Brachiopoda*. Androgynous; a thick branching glandular body following pallial or generative artery filled with ovary-cells, and surrounded and penetrated by a reddish cell containing male element; discharging near mouth from a large, much-plicate, trumpet-mouthed oviduct, which is not continuous with genital mass.

## II. Urinary Organs Present (Bojanus' Glands).

A. ♀ ♂ organs identical, permanent.

*Acephala*. ♀ and ♂ organs not different, of minute cells gathered in more or less compressed masses, which form main mass, or more simple along central tube or duct, which passes through Bojanus' body or unites with duct of latter, or has opening near latter; spermatozoa in *Dimyaria* long-headed and round-headed; in *Monomyia* round only; dioecious, except a *Pecten* or *Cardium*, etc., and hermaphrodite individuals of *Anodonta*. In Unionidae sexes externally different; gills serve as brood-sac. Androgynous; genera *Ostrea*, *Cyclas*, *Pandora*, *Pecten*, etc.

AA. ♂ organs distinguished by penis or stylet.

a. Animals hermaphrodite.

*Gasteropoda-Opisthobranchia*. Spermatozooids and ova produced by the same glandular body (with few exceptions).

*Pulmonata*. An oviduct with abdomen gland and seminal receptacle; a vas deferens terminating in penis; a stylet-sac with stylet, all emptying into a common cloaca.

*Pteropoda*. Similar to the last, but no distinct vas deferens, and no stylet; penis usually separate from and in front of vagina.

aa. Sexes distinct.

*Gasteropoda in general*. Penis behind the right eye; ovary and testis embedded in the liver; oviduct frequently enlarged into a uterus, issuing on the right side; rarely an albumen gland or receptaculum seminis; no stylet.

*Cephalopoda*. ♀ with ovary enclosed in a peritoneal sac, and with two (sometimes one) oviducts continuous; ♂ without stylet; with a vas deferens and so-called seminal vesicle and prostata near the penis.

The preceding structures present in their details the greatest variety. The generative organs are situated on the right side of the body, but the exits are in some groups on the opposite side, and usually (the female at least) in the mantle-sac. Their inner walls are lined with ciliated epithelium. The stylet is a slender, acute calcareous body of various form, which is inserted into the vagina or body of the other individual in coitus. Its function is supposed to be that of an irritant only.

The males of *Cephalopoda* are more readily distinguished from the females than in *Gasteropoda*, being generally smaller. In *Argonauta* the female only bears the shell. But the chief peculiarity of the male is seen in the modified structure of one of the arms, by which it is said to be "hectocotylized." It differs from other arms in being stouter and entirely hollow, terminating in a hollow thread which is open at the extremity, giving exit to the contents. It is developed in a bladder on its inner wall, and is first closely rolled together; the thread bears a bladder which is later lost. The primary bladder finally bursts, its remains form-

ing a fringing membrane on the sides. At the period of impregnation its cavity becomes, in some way unknown, filled with spermatozooids. During an embrace it is torn off, and enters the mantle-sac of the female. It swims independently as a worm, and several are sometimes found in one female. The spermatozooids are supposed to be discharged into the vagina by the hollow thread.

Many opisthobranchs are self-impregnating. *Pulmonata* impregnate each other, while in *Limnæa* an individual impregnates a second, and is impregnated by a third, forming thus a chain of individuals.

In *Arthropoda* the sexes are always in separate individuals (dioecious), excepting in the lowest *Crustacea* (*Cirripedia*) and the lowest *Arachnida* (*Tardigrada*). These orders are either sessile or with but little power of movement; hence the appropriateness of their monœcious condition. The sexes of *Arthropoda* are generally distinguishable by external characters, but it is in the *Insecta* and *Entomostraca* (*Lernæoidea*) that this difference becomes most remarkable. Thus in *Hymenoptera* (bees and ants) and *Neuroptera* (termites) not only are the sexes very distinct, but there are other forms (neuters, workers, soldiers, etc.) produced in connection with imperfect development of the reproductive organs. In the bees and wasps the additional forms are repressed males; in ants, repressed females. In termites it is asserted that both sexes contribute to produce them.

The external orifices of the reproductive system are confined to the abdomen, and are below and before the vent of the alimentary canal. In most orders they are posterior, but in *Myriopoda*, scorpions, and some higher *Crustacea* they are in front of the abdomen. The female internal organs consist of ovary and oviduct on each side, or the two oviducts may unite into one on the middle line, or there may be a single median ovary. On the oviduct are usually found diverticula, the receptaculum seminis (which is wanting in *Crustacea*, except *Ostracoda*) and another sac of uncertain use. The lower part of the oviduct is enlarged and the muscular walls are thick, forming a vagina, which often continues past the proximal part of the oviduct as bursa copulatrix. The ovaries consist of cœca of varying forms. In *Crustacea*, *Arachnida*, and *Myriopoda* they are few in number, but in *Insecta* they are very numerous, forming a gland-like body whose component cœca are bound together by connective tissue. In *Termites* their number reaches 2000 to 3000. Other glands (glandulæ sebaceæ) pour their contents into the oviducts, which serve many important purposes—i. e., to attach the eggs to a solid base (*arilus*) or to the parent's body; to construct a shell (*Blatta*) or cocoon. In certain low *Crustacea* (*Lernæoidea*, *Isoptera*, etc.) these glands open outwardly independently of the oviducts, and the secretion forms a sac round the eggs, by which they are suspended externally. The last abdominal segments in many insects are modified into organs designed for the conduct of eggs to a proper nidus; thus, in *Orthoptera* it is composed of sabre-shaped plates with saws within; in *Hymenoptera* it is partly represented by an offensive weapon, the sting. In *Chrysidiæ*, *Diptera*, and *Phalangia* and *Acari* they are modified into a tube which is projected telescope-fashion.

The male organs of *Arthropoda* consist of testes, vasa deferentia, glands, vesiculi seminales, and penis. The testes resemble the ovaries of the female in structure and position, but are frequently less complex. They are more commonly also united on the median line, as in low *Crustacea* (*Cyclopidae*, *Cyprididae*, *Myriopoda*), and among *Insecta* in *Lepidoptera*, many *Hymenoptera*, *Orthoptera*, etc. The vasa deferentia on the other hand remain distinct in these cases, except in *Scolopendra* and various *Entomostraca*. In many *Crustacea* and chilognath *Myriopoda* the vasa deferentia issue externally separately, but in many others unite to form a ductus ejaculatorius, which is enlarged in diameter. The muscles of this region are especially developed where a penis is well developed. Glandulæ mucosæ discharge into these ducts in insects and myriopods, but are wanting or rare in *Crustacea* and *Arachnida*. They are sometimes sac-like, sometimes filiform. They secrete a substance which hardens round a body of seminal secretions, forming a capsule which is usually taken into the female vagina, but may be attached to the body externally, or even (*Chilopoda*) to external objects.

The penis is present in most *Arthropoda*, but is wanting in *Entomostraca*, *Chilopoda*, and scorpions. In *Crustacea*, *Brachyura*, and *Isoptera*, etc., it is double. In all cases it is composed of a modified pair of limbs, which is especially clear in crabs. The intromittent organ is occasionally far removed from the orifice of the vasa deferentia. In spiders (*Aranea*) the extremity of the palpus bears a receptaculum seminis and penis, which the animal fills voluntarily by application to the external orifice, and discharges in the oviduct of the female. In *Argulus* a similar mode of connec-

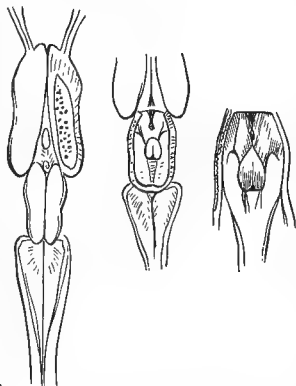


FIG. 34. Brain of *Necturus maculatus*.



tion depends on the structure of one of the legs, and in chilograth Myriopoda a pair of legs is altered for a similar purpose. In certain tailed Decapoda there are two pairs of such organs, those on the last segment of the post-abdomen serving as conductors from receptacles in the fifth pair of legs. In dragon-flies the exceptional case occurs where the accessory organ is a fissure in the second abdominal segment.

In Vermes the type of the reproductive system presents the varieties seen in Mollusca. Thus, they are androgynous, monœcious, and diœcious. Many of them develop by an alternation of generation, the one produced by true reproduction, the other stages by gemmation. In Turbellaria (or planarians) the Dendrocoela are bi-sexual, but the Rhabdocœla possess a common outlet for the two organs, testis and ovarium. Trematodes (flukes) are monœcious, each animal possessing distinct sexual organs of both kinds. The developmental stages of the young vary from three to six, and all but the first of these are due to gemmation in the cavity of preceding stages, or metamorphosis while encysted, etc. In tape-worms (Cestodes) the animal is made up of a head with organs of attachment, which, posterior to a long neck, is followed by a great number of identical segments. These contain each male and female organs, and a water-vascular system. The ovary and testis are at opposite ends of the segment, and between them is the branched uterus. This terminates in a vagina, which is approximated by a sheath containing a penis, which is perforated by the vas deferens. There are glands attached to the female organs. Each segment of a cestode is then self-impregnating. In Acanthocephala and Nematoda we have the higher condition of an entire separation of the sexes. In the former there is a penis which is retracted in a bursa which is prehensile in function. In this order there are alternate generations produced by gemmation in the body of the nurse stage. In Nematodes many genera (Strongyliidæ, Ascaridæ, and Filariidæ) are furnished with a penis and bursa at its base. In the last family *Trichocephalus* has a bristle-like penis, one-third the length of the body, which, when projected, is accompanied by an extended sheath. In Ascaridæ the penes or "spicula" are two in number. In *Sclerostomum* (gape-worm) the male is much smaller than the female, and becomes attached to her permanently. In *Heterura* he remains attached for considerable periods. Cucullanidæ are without bursa. In *Anguillula* and other genera there are two oviducts, which unite to form a single vagina.

aa. *The Urinary Organs.*—These are present in Mollusca from the Acephala upward. In the latter they are represented by a pair of kidneys and their discharge ducts only. These are called "Bojanus' organs;" they are relatively of large size, and lie one on each side above the heart, etc., extending from muscle to muscle. They are frequently united together along the middle line. They are hollow and spongy, and their fibres are lined with secreting cells. They terminate either by a single duct near that of the reproductive system, or unite with the latter, or the genital duct enters that of Bojanus' bodies. These bodies have communication with the external water, and by a cribriform surface with the heart-sac; likewise with the capillary veins. The function of the organs is not only that of a kidney, but as a mingler of water with the blood.

In Gasteropoda the kidney is single and contains calcareous nodules; its secretion is purple in *Murex*; it is large and hollow, and contains water. It is surrounded by a network of veins, which frequently open into it, so that blood-corpuscles are found in it, as well as its products in the blood. It usually opens directly into the mantle-sac, but otherwise by a ureter, and always independently of the rectum, vagina, or vas deferens.

The kidneys of Cephalopoda differ much from those of other classes, and for a long time their nature was considered doubtful. They form a large, rather loose mass on that part of the vena cava which approaches the gills, and on the gill-veins as well, consisting of a great number of minute sacs with bifurcations and internal processes. Each principal one opens by a fissure in the walls of the vein. They are constantly in motion.

In Arthropoda the existence of kidneys is a matter of question. The vasa Malpighii (described under the "Digestive System") are diverticula of the alimentary canal, and their function was formerly believed to be that of the liver. Gall has, however, never been found in them, but on the contrary uric acid. This has also been found in the intestine and in the corpus adiposum.

2. *In Vertebrata.*—a. *The Reproductive System.*—Vertebrates are usually diœcious, but a few fishes—viz., the eels and certain Serrani—are hermaphrodites. The organs of the female are primarily an ovary; an oviduct may or may not be present. Thus, in the Leptocephali the ovaries are collections of cells along the sides of the abdominal cavity,

which drop their ova into it, which are discharged by an orifice anterior to the anus. In Dermopteri the structure is similar, except that the ovarian cells are collected into plate-like masses. In Elasmobranchii the ovaria are included in a peritoneal sac; occasionally, as in Squalidæ and Scylliidæ, there is but one, medial and symmetrical. The oviducts are here present, and are homologous with the tubæ Fallopii of mammals; each dilates into a uterus, and empties into a common uro-rectal cloaca. Their proximal ends are open and expanded, presenting the so-called fontanelles. In true fishes we have various structures: in the Salmonidæ and some Clupeidæ there are no oviducts, but the eggs fall into the abdominal cavity and are expelled through a pore. In most other fishes and in *Lepidosteus* the ovarian membrane is prolonged as an oviduct, and usually discharges externally without union with other canals; in *Lepidosteus* they enter the ureters. They are united in various Physoclysti. They are, as in Elasmobranchii, open as internal fontanelles in *Amia*, *Chondrostei*, and *Polypterus*; in all they have a common external opening with the ureters.

In Batrachia the tubæ Fallopii are proximally open, and extend in many coils far in front of the ovaries. They are distally united with the ureters. In Reptilia, Aves, and Mammalia, the oviducts (or tubæ Fallopi) are not ordinarily connected with the ovaries, but only at certain seasons by their trumpet-shaped fontanelles. In birds these organs are not developed on one side of the body. In reptiles, birds, and monotrematous mammals, the genital, urinary, and digestive canals have a common exit or cloaca. In marsupials and placentals the genito-urinal excretory ducts are separated from the digestive, being in the female

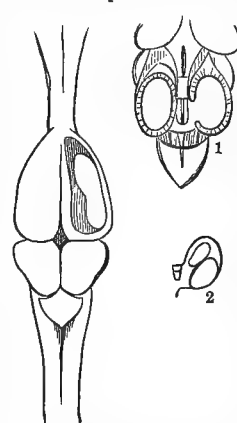


FIG. 35. Brain of *Varanus niloticus*: 1, horizontal section of optic lobes; 2, vertical section.

distinct or opening into a common vulva, but in the male are united for some length. In Mammalia the females are viviparous, and the ovum is hatched in expansions of the oviducts, or uteri. In marsupials these are separate, and the distal parts of the oviducts are not united into a vagina. In placental mammals, on the contrary, the oviducts unite, forming a single undivided vagina. In Edentata and Rodentia this union does not produce an expanded uterus, as the young are developed in the separate oviducts; but in higher mammals the enlarged oviducts unite into a muscular chamber, the uterus. A false uterus occurs in the kangaroos by the union of the cavities of the oviducts near the middle of their length; two opposite symmetrical curvatures are in contact, and their adjacent walls disappear; they then turn shortly back (forward in the animal) and make another short bend before they take a direction to the external orifice.

In placental mammals the embryo is attached to the wall of the uterus by a body called the placenta. It is on the allantois, and presents to the wall great numbers of villi, which interdigitate with corresponding processes from the mother. Both are furnished with abundant blood-vessels, which maintain intercommunication with each other, thus nourishing the embryo. As we descend the scale we only find a trace of this structure in some of the sharks. The allantois is an embryonic structure which characterizes exclusively vertebrates above and including Reptilia. The amnion is another sac, formed by the folding of the germinal layer of the embryo over its back; the edges of the folds then uniting, the two inner enclose the amniotic sac; the outer becomes the chorion. The amnion is absent, like the allantois, in all classes below Reptilia.

The placenta exhibits several distinct typical forms in Mammalia; it may be disciform or ring-like (zonary), or may be scattered in tufted bodies over the chorion (cotyledonary), or the villi may be scattered all over the same (diffuse). The orders of mammals may be thus arranged in this respect:

1. With decidua, placenta discoidal: Primates, Cheirop-tera, Insectivora, Rodentia, Edentata (Orycteropidæ, Dasypidæ).
2. With decidua, zonary: Carnivora, Proboscidea, Hyracoidea.
3. Without decidua, cotyledonary: Perissodactyla, Artiodactyla, and Ruminantia, Edentata (Bradypidæ).
4. Diffuse: Artiodactyla-Omnivora, Cetacea, Edentata (Manidæ).

The male organs are, in the early stages of growth, as in the lower animals, undistinguishable in structure. They are generally homologous with the female in details, even when most distinct. The relation may be thus expressed:

♂	♀
Testis.	Ovary.
Vas deferens.	Oviduct.
Uterus masculinus.	Uterus.
Cowper's glands.	Cowper's glands.
Penis.	Clitoris.
Serotum.	Labia majora.
Preputium.	Labia minora.

The vas deferens is, however, generally a persistent Wolffian duct, which in the embryo is the excretor of the embryonic bodies (Wolff's) which precede the kidneys. The Fallopian tube of higher mammals, on the other hand, is the persistent Müllerian duct, which passes outside of the former. In the batrachian Urodela the efferent ducts of the testis pass through the kidney and empty into a genito-urinary duct, while in Anura (except Discoglossidae) they only pass through the edge of the kidney and discharge into the ureter.

Among reptiles the penis is present in the tortoises and crocodiles only, and in no lower forms; it is merely grooved beneath. In the ostrich it is quite similar. In the lower groups of birds it is present, but wanting in the more specialized; in Mammalia it is universal. It is composed of two superior bodies, the corpora cavernosa, originating from the pubis, and the corpus spongiosum, whose lower face embraces the urethral tube, and whose extremity forms the glans or head. The testes are almost universally situated near the kidneys, in the abdominal cavity, but in the higher mammals they descend from that position, and carrying a fold of the serous membrane (tunica vaginalis) and musculo

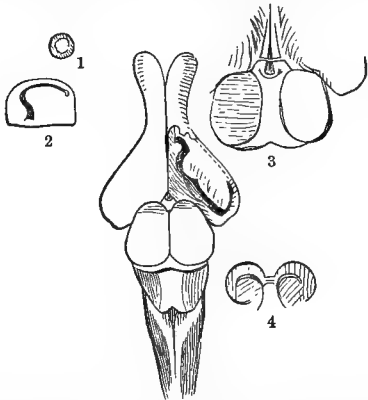


FIG. 36. Brain of *Dipsos dendrophila*: 1, vertical section of olfactory lobe; 2, vertical section of right hemisphere; 3, vertical section of optic lobes; 4, transverse section of lobes.

(cremaster), they are suspended externally, generally behind the penis; in Marsupialia in front of it. In some rodents and others this descent of the testes is periodical.

#### aa. Urinary organs.

Kidneys are present in the higher Vertebrata, inclusive of the Reptilia, but are supposed to be represented in Batrachia and fishes by structures which are embryonic in the former—i. e., the Wolffian bodies. The latter consist of two bodies, one on each side of the vertebral column, and are composed of transverse tubuli terminating in expansions which embrace convoluted capillaries, the "Malpighian tufts." The Wolffian tubules empty in the Wolffian duct, which extends along their outer side, and empties in the embryo into the allantois. The kidneys appear later in embryonic life, behind the Wolffian bodies, and have a similar structure. They also discharge by a duct on each side, which is distinct from the Wolffian, and constitutes the ureter. This discharges at first into the allantois, but with the approach of the lateral walls in the embryo, and the closing of the ventral fissure, a portion of the allantois is included, and becomes the urinary bladder.

The Leptocardii are not known to possess either Wolffian bodies or kidneys. In the Pisces the connection of the ureters with the oviducts is various. Thus in *Polypterus* they unite and enter a single tube, the united ureters. In *Lepidosteus* each ureter receives its corresponding oviduct; in *Amia* the oviducts are open proximally. In Batrachia the ureters are always connected with the oviducts. In the tailed order the ureter becomes a genito-urinary duct, because it receives the vasa efferentia of the testis, which pass through the kidney to reach it; it empties into the cloaca. In the Anura the vasa efferentia enter the kidney,

but do not reach the ureter, but are collected into a special duct analogous to the deferens, which enters the ureter at its lower part. This tube also receives the secretion of the kidneys, so that the original ureter becomes useless, and is atrophied in the frogs, or persists as a caecum in the toads. In the discoglossid frogs the arrangement is as in the salamanders. In the allantoideal vertebrates the ureters discharge into the urinary bladder, which in turn empties by a single urethra, of greater or less length, into a genito-urinary chamber in the higher Mammalia, or the cloaca in the other classes. It is continued throughout the penis in those males that possess that organ. The kidneys in most Carnivora, in the Cetacea, and some Artiodactyla, are lobulate, or like a bunch of grapes in form, as is seen in the embryos of man and other mammals. In the cats (*Felidae*) the divisions are not visible externally.

The osseous system will be discussed in an article especially devoted to that subject. EDWARD D. COPE.

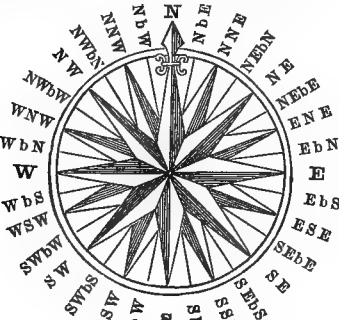
Comparative Philology is that branch of the science of language which examines and classifies languages as undivided wholes—not, like etymology, tracing individual words through the various languages in which they occur, but comparing languages chiefly by the study of the general character of their vocabularies. It, however, does not confine itself to the mere collation of vocabularies and to the study of grammatical forms. By the study and comparison of literatures, of the literary history of nations, of popular traditions, mythologies and creeds, and of the dialectic variations of time or place, it seeks to discover the marks which integrate languages into groups, and which differentiate these groups from each other. It thus renders important services to the nearly related science of ethnology, since, with some limitations, kinship in language implies kinship in blood—a doctrine the truth of which is now generally admitted, though formerly opposed by eminent philologists.

Comparative philology, though almost entirely a growth of the present century, took its origin long since. The missionaries of the Roman Catholic Church in America, especially in the Spanish regions, long ago collected great numbers of vocabularies, which are now prized not only as collections of words, but as affording illustrations of the relative fixity or mutability of barbaric languages—a point in regard to which the greatest diversities exist, some languages changing greatly, it would appear, in a single generation, while others preserve a large degree of sameness over great areas of space and through great epochs of time.

But the British occupation of India, and the consequent study of Sanscrit literature, gave to all branches of linguistic science a wonderful impulse; indeed, not till that time did studies of this class assume a truly scientific character. (See BÄCKER, "Grammaire Comparée des Langues de la France" (1860); BAISAC, "De l'Origine des Dénominations Ethniques" (1867); BALBI, "Atlas Ethnographique" (1826); BASTIAN, "Sprachvergleichende Studien" (1870); BAUDRY, "Grammaire Comparée des Langues Classiques" (1868); BEAMES, "Comparative Grammar of Modern Aryan Languages in India;" KUHN and SCHLEICHER, "Beiträge zur Vergleichenden Sprachforschung," etc. (1856-69), *sqq.*; BENLOEW, "Aperçu Général de la Science Comparative des Langues" (1858); BLEEK, "Ueber den Ursprung der Sprache" (1868), and "Comparative Grammar of South African Languages" (1869); LOUIS LUCIEN BONAPARTE, "Specimen Lexici Comparativi" (1847); the writings of BOPP, especially his "Comparative Grammar" (1833; 3d ed. 1869, *sqq.*, translated by Eastwick; 3d ed. 1862); DIEFFENBACH, "Lexicon Comparativum" (1847-51); EICHOFF, "Grammaire Générale Indo-Européenne" (1867); FICK, "Vergleichendes Wörterbuch" (1870); J. GRIMM, "Deutsche Grammatik" (2d ed. 1869-72); KELLE, "Vergleichende Grammatik" (1863); LATHAM, "Comparative Philology" (1862), and his other writings on language; F. MAX MÜLLER, "Lectures on the Science of Language" (6th ed. 1871); A. F. PORT, "Etymologische Forschungen," etc. (1833-36; new ed. 1859-71), and his other works; RAPP, "Grundriss der Grammatik," etc. (1852-55); RENAN, "De l'Origine de la Langue" (4th ed. 1864); "Histoire Générale et Système comparé des Langues Sémitiques" (4th ed. 1864); "Revue de Linguistique" (Paris, 1807, *sqq.*); DE SACY, "Principes of General Grammar" (translated by Fosdick, 1847); SCHELE DE VERE, "Outlines of Comparative Philology" (1853); SCHLEICHER, "Compendium der vergleichenden Grammatik" (3d ed. 1871); "Sprachvergleichende Untersuchungen" (1848-50); "Zur Morphologie der Sprache" (1859); STEINTHAL, "Charakteristik der hauptsächlichsten Typen des Sprachbaues" (1860); WHITNEY, "Language and the Study of Language" (1867); "Zeitschrift für vergleichende Sprachforschung" (Berlin, 1851, *sqq.*); LAZARUS and STEINTHAL, "Zeitschrift für Völkerpsychologie und Sprachwissenschaft" (1859-69).

**Com'pass** [perhaps a corruption of the Lat. *circum*, "around," and *passus*, a "step," originally "that which goes round" or "embraces," because it embraces, so to speak, the entire horizon with its circle; Fr. *compas*, also *boussole*], the name of an instrument used to show the magnetic meridian or the position of objects with reference to it. Among its various forms are the *mariner's* compass, the *azimuth* compass, and the *variation* compass. These several applications each demand a special construction, but the essential parts are invariably the same. These parts are the needle, which consists of a magnetized bar of steel, and, fitted to its centre, a cap, which is supported on a pivot upright and sharp at the point to lessen the friction, and on which the needle may move with the slightest attraction. A circular card is attached to the needle of the *mariner's* compass, which turns with it, and indicates the degrees, which with the thirty-two points, divided into half and quarter points, are all marked on its circumference. The pivot is fastened to the bottom of a circular box, which contains the needle and card, and has a glass cover to protect the needle from the air. This is called the compass-box, and is suspended in a larger box or binnacle by two concentric brass circles called gimbals; the outer one is attached by horizontal pivots to the inner circle and to the outer box, the two sets of axes being at right angles to each other. Thus, the inner circle, carrying the compass-box, needle and card, is sustained in a horizontal position, and is not subject to the rolling of the ship.

"Boxing the compass" is the enumeration, by name, of the thirty-two points which are marked upon the compass-card. These points are—north, north by east, north-north-east, north-east by north, north-east, north-east by east, east-north-east, east by north, east, etc. The point "east"



Mariner's Compass.

is frequently marked O on compasses. This is from the German *Ost*, "east." The steering of ships is much more difficult since the introduction of iron-plated ships. These vessels, being highly magnetic, produce much disturbance of the needle, and it requires all the skill of science to counteract it. It is found best to build the ship with her head south, but to change it to the north during the process of plating, as the magnetism acquired during building is modified by the hammering attendant on the plating. It is, however, found requisite to often change the first adjustments.

The *azimuth* compass has its circle divided only into degrees; it is used to show the bearing of objects with respect to the magnetic meridian, and is furnished with sights for the more accurate noting of the angles.

The *variation* compass shows such changes as occur daily in the deviation of the magnetic from the true meridian. The needle is much longer than in the mariner's compass, in order to make minute variations more apparent.

The origin of the compass is undoubtedly to be ascribed to the Chinese, who more than a thousand years B. C. made use of the loadstone to guide their cars or carriages without the aid of the sun or stars. It is certain that they employed the magnetic needle in the navigation of vessels soon after the Christian era, if not earlier. There is, indeed, every reason to believe that the mariner's compass was not an original European invention, but was introduced from China. None of the early European writers speak of it as invented in Europe; and it is certain that the compasses used by the Italians in the thirteenth century were constructed exactly like those made in China about the same period. The compass is mentioned by Guyot of Provence as early as 1190, and by Raymond Lully, 1286. (See *EARTH*, VII.)

**Compass Plant**, the *Silphium laciniatum*, a remarkable plant of the order Composite. It grows on the rich prairies of the Mississippi Valley, and its radical leaves have, while growing, especially in midsummer, the property of pointing quite nearly to the north and south. It

was first made known to the scientific world by General Benjamin Alvord in communications to the National Institute in Aug., 1842, and Jan., 1843. The accuracy of his statement being questioned by the botanists, he made another communication in Aug., 1849, to the American Association for the Advancement of Science. The truth of his observation was then admitted by Dr. Asa Gray, who attributed its polarity to the action of light. W. F. Whitney, in the "American Naturalist" for March, 1877, gives the result of a microscopic examination of the leaves, showing on each face an equal number of "stomates" or "breathing-pores," which confirms the conclusion that its position, facing the rising and setting sun, is due to the action of light. All the other experiments confirm this theory. Mr. Longfellow, in "Evangeline," made a noteworthy allusion to it, in the latest editions using the phrase "vigorous plant" instead of "delicate plant," thus making his notice more accurate. (See article "Compass Plant" in "Nature" for Feb. 1, 1877.) B. ALVORD.

**Compasses.** See *DIVIDERS*.

**Compensation of Errors**, the neutralizing in philosophical instruments for measurement (e. g. of time, pressure, temperature, distance, etc.) of errors caused by certain properties of the material agents used, by the introduction of other material agents which, acting alone, would produce errors of an opposite character. Thus, the expansion of the pendulum-rod by heat may be counteracted by making its weight of a much more expansive material, as lead or mercury, and connecting it with the rod by its lower end. (See *PENDULUM*, by F. A. P. BARNARD.)

**Compiègne**, a town of France, department of Oise, on the Oise and on the railway from Paris to Saint-Quentin, 44 miles N. N. E. of Paris. It has a communal college and a public library of 28,000 volumes; also manufactures of muslin, hosiery, and cordage. Here is a palace built by Louis XV., originally simply a hunting-lodge, but it was one of the most magnificent structures of the kind, with a park and a forest of 30,000 acres. Pop. in 1881, 14,008.

**Com'plement** [Lat. *complementum*, from *com* (for *con*), intensive, and *pleo*, to "fill"), a full quantity or number; the number required or limited; that which completes or fills up. In mathematics, the complement of any magnitude is a second magnitude, which, added to the first, gives a sum equal to a constant third magnitude, which is purely arbitrary and conventional. Thus, the complement of an angle is its defect from a right angle. The arithmetical complement of a number is its defect from the next higher power of ten. Thus, the arithmetical complement of 64 is 36.

COMPLEMENT, in music, the quantity required to be added to any interval to complete the octave; for example, a fourth is the complement of a fifth.

**Complementary Col'ors.** Each of the three primary colors is complementary to that secondary color which is produced by blending the other two; thus, red is the complementary color of green. Blue and orange are complementary colors, and each presents the most complete contrast to the other. The secondary colors have also each their complementary colors. Colors complementary to each other are always harmonious, and hence the subject is one of practical importance in personal and artistic decoration. The following is a table of some of the principal colors which are complementary to each other:

Red is complementary to Green.
Blue " Orange.
Yellow " Purple.
Red-purple " Yellow-green.
Blue-purple " Yellow-orange.
Dark-purple " Citron-yellow.
Dark-green " Red-orange.
Olive " Dark-orange.
Russet " Dark-green.

**Complexion.** See *SKIN*.

**Com'plin, or Com'pline** [from the Lat. *compleo*, to "complete," because it finishes the day], the last of the canonical hours in the Greek and Roman Catholic churches, following vespers; also the prayer for that hour, anciently ordained to be said about nine o'clock in the evening.

**Compluten'sian Bi'ble**, a polyglot in six volumes, folio, so called from *Complutum*, the Latin name of Alcalá in Spain, where it was printed. It was projected by Cardinal Ximenes, who spent about \$150,000 upon it. It was commenced in 1502, printed between 1514 and 1517, authorized by Pope Leo X. in 1520, but apparently not circulated before 1522. Only 600 copies were printed, which were sold for about \$20 a copy. A copy purchased for Union Theological Seminary in 1883 cost about \$750.

**Compo'nent** [from the Lat. *com* (for *con*), "together," and *pono*, to "put," literally, "composing" a part; hence, as a noun, "that which composes" a constituent part], something which unites with another to form a compound.

**Compo'ser** [for etymology, see preceding article]. This term is usually applied to a person who composes operas, oratorios, airs, or other pieces of music; one who invents new combinations of musical notes.

**Compos'itæ** [from the Lat. *com* (for *con*), "together," and *pono, positum*, to "put," referring to its compound flowers], the largest natural order of exogenous plants, distinguished by heads of flowers which are composed of florets crowded together upon a common receptacle, and surrounded by an involucre, so as to resemble single flowers. Another marked peculiarity is that the five (rarely four) anthers of each floret unite into a tube. The order contains both herbaceous plants and shrubs, those which are natives of temperate climates being generally herbaceous, those found in warm regions not unfrequently shrubby, and several, especially in St. Helena, are arborescent. They have alternate, opposite, or verticillate leaves, without stipules. The florets are bisexual, unisexual, or neutral, those of the circumference (or ray) often differing in this respect, as well as in form and color, from those of the centre (or disk) of the same head. Chaff-like bracts are often interspersed among the florets. The calyx is superior, adhering to the ovary, and afterwards to the fruit, its limb being either wanting or divided into a pappus of bristles, hairs, or feathers. The corolla is monopetalous, superior, strap-shaped, tubular, or more rarely labiate, different forms often appearing in ray and disk of the same head. It is rarely three or four-toothed, but often five-toothed. The ovary is one-celled, with a single ovule, the style simple, with a cleft apex; the fruit an achenium; the seed destitute of albumen. The order contains more than 1000 genera and about 10,000 known species. In the Linnæan system they form with a few others the class Syngenesia.

The order is divided into three sub-orders—the Tubulifloræ, the Labiatifloræ, and the Ligulifloræ. The artichoke, thistle, daisy, chamomile, sunflower, dandelion, chicory, and lettuce are well-known plants of this order.

From the seeds of some a fixed drying oil is expressed, the oil of the sun-flower, the *Madia*, and the *Guizotia* being among the most important. Many are valuable for their medicinal properties, as chamomile, arnica, wormwood, tussilago, etc. Not a few are characterized by bitterness and by stimulating properties; also anodyne, narcotic, diaphoretic, and diuretic properties. Some, as arnica, are poisonous. A large number are ornaments of our flower-gardens, especially in the latter part of summer and in autumn. Amongst these are the xeranthemum, dahlia, aster, and chrysanthemum. This order is called Asteracæ by Lindley and others.

**Composite Order**, in architecture, a style of build-



Composite Capital and Base.

ing characterized by the employment of pillars designed to combine the lightness and grace of the Ionic order with the ornate finish of the Corinthian. In many cases the Ionic volute was blended with the Corinthian acanthus leaf, as in the example given. This union is regarded by most critics as an incongruous one, and the Composite style is considered effeminate. It was employed chiefly in the Roman empire in its period of decadence. The accompanying cut represents the Composite style as seen in the temple of Vesta at Tivoli. It is comparatively free from the characteristic faults of the order. Many writers consider the Composite order a mere variety of the Corinthian.

REVISED BY C. COOK.

**Composi'tion** [Lat. *compositio*], in general, is the act of composing, or that which is composed; in literature, the act of inventing or combining ideas and expressing them in words; also a literary production, book, or essay. In music, it is the act or art of disposing and arranging musical sounds into airs, tunes, songs, etc. The term is also applied to an air or other piece of music. In printing, it is the setting of types, or putting them together to form words and sentences.

COMPOSITION, in the fine arts, is that combination of the several parts by which a subject is agreeably presented, each part being subordinate to the whole; such an arrangement of the objects represented that they shall all tend to illustrate the central thought or idea.

COMPOSITION, in bankruptcy, a percentage which creditors agree to receive from a bankrupt instead of full payment. (See *INSOLVENCY*, by PROF. GEORGE CHASE, LL.B.)

**Composition of Forces or Motions**, in mechanics, signifies combining or uniting several forces or motions, and determining the result of the whole. If a body is impelled by two forces which act in the same direction, the *resulting force*, or *resultant*, is equal to the sum of both; that is to say, the effect produced is the same as would be produced by a single force acting in the same direction, and equal to their sum. If the two forces act in opposite directions, the resultant is equal to their difference, and the body will move in the direction of the greater. If the lines of direction of the two forces make an angle with each other, the resultant will be a mean force in an intermediate direction. Thus, if the two forces be represented in intensity and direction by the two sides of a parallelogram, then the resultant is represented in intensity and direction by the diagonal of the parallelogram which passes through the angle formed by those two sides. F. A. P. BARNARD.

**Com'post** [from the Lat. *com* (for *con*), "together," and *pono, positum*, to "place"], a mixture of substances adapted to the fertilization of the soil, which substances, being allowed to undergo chemical changes for a considerable time in heaps, become more valuable than they could have been if applied separately. Composts are made of farmyard manures and earth, road-scrappings, peat, leaves, and clearings of ditches. By allowing these to lie for six months in heaps of from three to four feet in depth, food is prepared for plants. The use of guano and other light manures will no doubt supersede in a great measure the necessity of this laborious process. The wonderful effects that have resulted from the application of nitrates, ammonia salts, and phosphoric acid should impress farmers with the truth that the valuable elements bear a small proportion in weight to the whole mass of farmyard dung or composts, and that the mixing of manures in heaps with earth often does not pay for the labor expended. Still, in some circumstances, the chemical or commercial fertilizers are best applied to the soil after composting them with earth or with coarse manures. The action of frost upon composts is highly beneficial, especially when peaty earth is used.

**Compostella**. See SANTIAGO DE COMPOSTELLA.

**Com'pound** [from the Lat. *com* (for *con*), "together," and *pono, "to put"*], a substance formed by the union of two or more substances joined by chemical affinity. The adjective "compound," which means composite or composed of several parts or elements, is applied in botany and other sciences to various objects which are not simple. A compound leaf is formed of several leaflets articulated to a common petiole, and is either pinnate or digitate. Compound motion is that which is effected by two or more conspiring forces or powers.

**Com'pound Animals** are organisms of low grade, in which parts regarded by some theorists as individuals, and which are certainly distinct in many vital functions, are merged into one compound system. The living mass in all truly compound animals appears to originate from a single ovum, and the subsequent development of the individual parts by gemmation resembles in some respects the growth of vegetables. Examples of compound animal life are found in coral-polyps, cestoid worms, certain mollusoids,

etc. There is, however, much difference of opinion as to what constitutes animal individuality.

**Compound Fracture**, in surgery, is a fracture of any bone when the skin and tissues covering the bone are so lacerated that air may enter the fracture. The treatment of compound fracture requires the highest surgical skill. (See FRACTURE.)

**Compound Interest**. See INTEREST.

**Compound'ing of Fel'ony**, in England and the U. S., is the act of taking, or agreeing to take, a reward for forbearing to prosecute a felony, and is punishable with fine and imprisonment. A note or other promise taken on such a consideration is illegal in its inception, and cannot be enforced in a court of justice by the promisee. (See FELONY, by PROF. T. W. DWIGHT, LL.D.)

**Compound Microscope**. See MICROSCOPE, by PROF. J. W. S. ARNOLD, M. D.

**Compressed Air**, as a means of the transmission of motive-power, has been thoroughly tested in the railway tunnels of Mont Cenis and the Hoosac Mountain in Massachusetts. Compressed air, as an agent for transmitting power, is advantageously used only in those cases where belts or shafting could not be employed on account of the great distance between the motive-power and its point of application. At the Hoosac Tunnel the air was compressed partly by water-power (as at Mont Cenis), and partly by steam, which works by means of air-pumps. The compressed air is transmitted through tubes, and gives motion to drills by means of pistons working in cylinders somewhat as in steam-engines. The exhaust air aids in ventilation and in keeping down the temperature.

**Compressed Air-Bath**, an apparatus in which patients with pulmonary diseases are placed and submitted to increased atmospheric pressure.

**Compressibil'ity**, the property of being compressible into smaller space; susceptibility of being reduced by pressure to smaller dimensions. All bodies, in consequence of their porosity, are compressible, though liquids resist compression with immense force. Water, if subjected to a pressure of 15,000 pounds on a square inch, loses one-twentieth of its volume. Solids are compressible in different degrees. Gases are more compressible than either liquids or solids. A number of cubic inches of air can be compressed into the space of one cubic inch. Carbonic acid and several other gases can be condensed by pressure into a liquid and even a solid state.

**Com'promise** [from the Lat. *com* (for *con*), "together," and *promitto*, *promissum*, to "promise"], something promised or agreed upon mutually; an amicable agreement between two parties or persons who have been involved in a controversy that they will settle the difference by mutual concessions, or, as used in the civil law, a mutual promise of such parties to refer their differences to the decision of arbitrators.

**Compton** (HENRY), an English prelate who had a large share in the revolution of 1688. He was born in 1632, held first a commission in the army, then entered the Church, became bishop of Oxford in 1674, was transferred to the see of London in 1675, was the instructor of the daughters of the duke of York (afterwards James II.), who became consequently attached to the Protestant faith. He incurred thereupon the bitter hostility of James, who, through the infamous Judge Jeffries, deposed him from his episcopal functions. This was one of the grievances done to the Protestant religion alleged by William in his proclamation on landing. James, in alarm, re-established Compton, who, however, openly joined himself to the party of the invader, and with his own hands crowned him king. Died July 7, 1713.

**Comptrol'ler** [for pronunciation and etymology see CONTROLLER], a name applied in the U. S. government to three highly important officers in the treasury department.

The FIRST COMPTROLLER countersigns warrants drawn by the secretary of the treasury upon the treasurer, examines the accounts of the first and fifth auditors, receives appeals from the sixth auditor, superintends unsettled accounts of the treasury, navy, war, and interior departments, prosecutes all debts and delinquencies in behalf of the U. S., etc.

The SECOND COMPTROLLER examines the accounts of the second, third, and fourth auditors, countersigns warrants for the pension and Indian bureaus, and performs duties in the navy and war departments analogous to those of the first comptroller in the treasury department.

When a claim has been granted by the proper comptroller there is no revision or appeal allowed. When a claim has been refused by the comptroller, appeal may be made to the court of claims. (See CLAIMS, COURT OF.)

The COMPTROLLER OF THE CURRENCY issues printed notes

to the national banks, exchanges new currency for that which is worn out, superintends the national banks, reports their condition annually to Congress, and has numerous other important duties. He gives heavy bonds when entering upon his duties, and is allowed no share in the profits of any banking association.

**Comstock** (ANDREW), M. D., an elocutionist, born in New York in 1795, published a "System of Phonetics" and "Elocution" (16th ed. 1844), and other works.

**Comstock** (CYRUS B.), an American officer, born in 1831 in Massachusetts, graduated at West Point in 1855; lt.-col. of engineers July 17, 1881. He served in constructing fortifications 1855-59; as assistant professor at the Military Academy 1859-61; in the civil war in erecting defenses of Washington 1861-62; in Virginia Peninsula 1862, engaged in various engineer operations; in Maryland campaign 1862, engaged at South Mountain and Antietam; as chief engineer Army of the Potomac 1862-63; in Rappahannock campaign 1862-63, engaged at Fredericksburg and Chancellorsville; in the department of the Tennessee 1863, engaged at Vicksburg (brevet major), and as chief engineer Army of the Tennessee; assistant inspector-general of the military division of the Mississippi 1863-64; as senior A. D. C. to Lieut.-Gen. Grant, rank of lieutenant-colonel, 1864-66; in Richmond campaign 1864-65, engaged at Wilderness (brevet lieutenant-colonel), Spottsylvania, Cold Harbor, assaults of Petersburg and mine, and Fort Harrison; as chief engineer of the expedition to Cape Fear River, N. C., 1865, engaged at Fort Fisher (brevet colonel U. S. A. and brevet colonel and brigadier-general U. S. V.); as senior engineer in Mobile campaign 1865, engaged at the siege of Spanish Fort, storming of Blakely, and capture of Mobile (brevet brigadier-general U. S. A. and brevet major-general U. S. V.); and A. D. C. to the general-in-chief, rank of colonel, 1866-70, superintendent of the geodetic survey of the northern lakes 1870-83, president of the Mississippi River Commission Dec. 1, 1882.

GEORGE W. CULLUM.

**Comstock** (GROVER S.) born at Ulysses, N. Y., Mar. 24, 1809, graduated at Hamilton College, Clinton, N. Y., in 1827, studied law, and was admitted to the bar in 1830. Powerfully moved by the preaching of Rev. C. G. Finney, he studied theology at the institution at Hamilton, N. Y., and became a Baptist minister. He sailed in 1834 as a missionary to British Burmah, and finally went to Aracan. In 1837 he founded a church at Kyouk Phyou. Here he remained, in spite of the deadly climate, which carried off his wife and children until his death, April 25, 1844.

**Comstock** (JOHN HENRY). See APPENDIX.

**Comstock** (JOHN LEE), an American author, born at East Lyme, Conn., in 1789, served as an army-surgeon in the war of 1812-15. His work on "Natural Philosophy" is said to have reached a sale of about 1,000,000 copies. Besides numerous works for schools on natural and physical science, he published a "History of the Greek Revolution" (1829), etc. Died at Hartford, Conn., Nov. 21, 1858.

**Comstock Lode**. See APPENDIX.

**Comte** (ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER, generally called simply AUGUSTE), born at Montpellier Jan. 19, 1798, died in Paris Sept. 5, 1857, the founder of the positive school of philosophy. (See the article POSITIVISM.) In 1814 he entered the École Polytechnique, and soon distinguished himself as one of its most brilliant pupils. But in 1816 the school was broken up on account of the conspiracy of the scholars against one of the professors, in which he took a prominent part. He remained in Paris, and supported himself by giving lessons in mathematics. In 1818 began his intimate connection with Saint-Simon, which lasted to 1824 and was broken off in a rather ungracious manner. To Saint-Simon, Comte is indebted for the general direction of his philosophical speculations terminating in sociology, and, no doubt, also for some aphoristic ideas, but he is far from being a Saint-Simonist; indeed, he is something much more. Having married in 1825, and having been appointed examiner of the candidates for the École Polytechnique, he in 1826 made an attempt to place his philosophical ideas before the public in a series of lectures, but after the third lecture was overtaken by a cerebral derangement which lasted for a whole year. In 1828 the lectures were renewed, and from 1830 to 1842 appeared his "Positive Philosophy," in 6 vols., translated into English and condensed into 2 vols. by Harriet Martineau (1853). Meanwhile, his marriage had proved very unhappy; in 1842 he separated from his wife. A passage in the preface to the last volume of his "Positive Philosophy" gave grave offence, and he lost his position as examiner. The last part of his life he spent in very straitened circumstances, partially relieved by a national subscription. Nevertheless, in 1851 he published



the first volume of his "Positive Polity" (fourth and last volume in 1854), translated into English 1875-77; in 1852 his "Catechism of Positivism," translated into English by Dr. Congreve, 1858, etc. A peculiar incident in his later life is his connection with Madame de Vaux and the influence which that connection exercised on his ideas of a positive religion, penetrating them with a sentimentalism which makes them ludicrous. (See LITTRÉ, "Comte et la philosophie positive," 1864. STUART MILL, "Aug. Comte and Positivism;" FISKE, "Outlines of Cosmic Philosophy," 1874.)

**Co'mus** [Gr. *Κῶμος*] was originally the Greek name of those songs of carousal which young people would sing when passing the houses of their friends or lovers. Thence it became the name of the god of such revel; and Philostratus gives a description of a picture in which Comus was represented as a youth, drunken, sleeping, leaning forward on a down-turned torch. Milton makes him a foul sorcerer, the son of Bacchus and Circe.

**Con**, a Latin particle signifying "together," and sometimes "with." It is commonly changed to *col* before *l*, *com* before *b*, *m*, and *p*, *cor* before *r*, and to *co* before a vowel or *h*. Hence we have *collect*, *combine*, *compress*, and *correct*, instead of *conlect*, *conbine*, etc.; *coagulate* and *cohabit*, instead of *conagulate* and *conhabit*. Sometimes *con* is intensive, as *concutio*, *concussus*, to "shake violently."

**Co'nant** (HANNAH O'BRIEN CHAPLIN), wife of T. J. Conant, was born in Danvers, Mass., in 1812. She was distinguished for her great attainments and fine literary taste. She was the author and translator of numerous works, among which is a "History of the English Bible" (1859). Died in Brooklyn, N. Y., Feb. 18, 1865.

**Conant** (ROGER), a colonist, born in Devonshire, England, in 1593, settled in Plymouth Colony in 1623, founded Salem, Mass., in 1626, and became a justice of the "quarterly court." Died Nov. 19, 1679.

**Conant** (THOMAS J.), D. D., born at Brandon, Vt., Dec. 13, 1802, graduated at Middlebury College in 1823, professor of languages in Waterville College (now Colby University) till 1833, and appointed in 1835 professor of biblical literature in the Theological Seminary at Hamilton, N. Y. From 1850 to 1859 he occupied a similar position in the Theological Seminary at Rochester, N. Y. In 1839 he published a translation of Gesenius's "Hebrew Grammar;" in 1857, a new version, with notes, of "the Book of Job"—a work which has attained a European reputation. He has since published similar versions of "Genesis" and the "Psalms" in the interest of the American Bible Union. By common consent he is one of the most accomplished Hebraists in America.

**Con'cave** [from the Lat. *con*, intensive, and *cavus*, "hollow"]. A curve is said to be *concave* at a given point when the lines joining the latter to adjacent points on the curve fall between the spectator and the curve, and *convex* when the curve is interposed between the spectator and the small chords in question. A surface is said to be *concave* or *convex* at any point when the plane sections through that point and the spectator's eye are all *concave* or *convex*; when some of these sections present their concavity and others their convexity to the spectator, the surface is sometimes said to be *concavo-convex*. This is the case with the hyperboloid of one sheet. When at a point on a curve the centre of curvature and the point of view fall on the same side of the tangent, we have *concavity*; when on opposite sides, *convexity*. (See LENS.)

**Conceal'ment**, in law, the suppression of the truth to the injury of another. A distinction is taken between such facts as are extrinsic to the contract, such as the existence of war or peace, and those which are intrinsic. Concealment of extrinsic facts is not, in general, fraudulent. (See FRAUD, by PROF. T. W. DWIGHT, LL.D.)

**Conception'**, a town of the Argentine Republic, capital of the province of Entre Rios, on the China, is the see of a Catholic bishop and a national college. Pop. 6050.

**Concepcion**, a province of Chili, between the ocean and the Argentine Republic, and the provinces of Maule on the N. and Aurico on the S. Area, 3861 square miles. It is traversed by the Biobio. The climate is mild and favorable for tillage and pasturage. The fruit of the *Araucaria imbricata* (*piñon*) is abundantly produced. Coal, wheat, and excellent wine abound. Pop. 167,239.

**Concepcion, La**, a seaport of Chili, capital of the above province, is situated on the river Biobio, 7 miles from its mouth; lat. 36° 49' S., lon. 73° 5' W. It has broad streets and many handsome houses. It is a bishop's seat. Its port, Talcahuano, is one of the best in Chili. It has an extensive foreign trade, and exports large quantities of

hides and tallow. Concepcion was ruined by earthquakes in 1730, in 1752, and in 1825. Pop. 19,000.

**Concept'** [Lat. *conceptus*, from *concepio*, to "conceive;" Ger. *Begriff*], in metaphysics, a thing which may be conceived; a collection of attributes united by a sign, and representing an object of possible intuition. Kant and his followers use the word *concept* to indicate notions which are general without being absolute. They divide these into three different classes: "Pure concepts," which derive nothing from experience; "empirical concepts," wholly derived from experience; "mixed concepts," ascribable partly to experience and partly to the pure understanding. A concept is "clear" when its object can be distinguished from any other; "distinct," when its component parts can be defined.

**Concep'tion** [Lat. *conceptio*, from *concepio*, *conceptum*, to "conceive"] is a psychological term denoting the last, finishing process by which consciousness takes possession of an object. It is distinguishable from sensation as active from passive. As long as an object is allowed to impress the mind through the senses, immediately and directly, without any reaction or interference from the side of the mind, consciousness is in a merely passive state; and this passive state of consciousness is called sensation. In order to master an object, the mind cannot stop, however, at the mere sensation; it must make the sensation itself the subject of a scrutiny and discrimination; and this active part of the whole psychological process by which the mind takes possession of an object is called perception and conception; the former referring to the sensation as representing the details of the object, the latter as involving the whole of it. As we go over an object with the finger-tips to ascertain the exact position and relations of its outlines, thus perception runs over all the outlines given in the sensation, partly verifying their truth with respect to the object, partly lifting them into perfect clearness of consciousness. Conception does not begin its work until perception is through with its task. The mode and the meaning of an object as a whole is the task of conception, and thus the conception of an object corresponds very nearly to that which we generally call a view of the object; with this difference only, that a view always is understood to be more or less influenced by the individuality of the subject, while the conception always is supposed to be, strictly and scientifically, the subjective equivalent for the idea of the object. The difference between conception and imagination is, simply, that conception is a process and imagination a faculty; in the process of conceiving the faculty of imagination is very largely used.

**Conception**, in physiology. See EMBRYOLOGY, by PROF. J. C. DALTON, M.D.

**Conception, Immaculate, Doctrine of the.** See IMMACULATE CONCEPTION OF THE VIRGIN MARY, by PROF. PHILIP SCHAFF, Ph.D., S. T. D., LL.D.

**Conception, Orders of the Immaculate.** Among the orders of the Roman Catholic Church there have been the following: (1) The Knights of the Immaculate Conception of the Blessed Virgin, an order founded in 1618, at Vienna, with the intention of bearing arms against heretics and infidels. The institution was confirmed by Pope Urban VIII. in 1623, but the brotherhood did not flourish, and soon was extinct. (2) The Nuns of the Immaculate Conception of Mary, founded at Toledo, in Spain, in 1484, by Beatrix de Sylva, and confirmed by Pope Innocent VIII. in 1489. They afterwards joined the Clarisses, and took their rule, which rule was changed by Pope Julius II. in 1511. They are often called Conceptionists. (3) The Congregation of the Immaculate Conception of the Blessed Virgin is the appellation of the lay sisters attached to the nuns of Notre Dame, who were established by the blessed Peter Fourier (1565-1640).

**Concep'tualism**, a doctrine of the Schoolmen intermediate between realism and nominalism. The Realist asserts that genera and species have an independent existence—that there exist certain "ideas," the pattern after which single objects are fashioned. The Nominalist asserts that nothing exists but things and names of things—that universals are mere names. The Conceptualists assign to universals an existence which may be called psychological—that is, independent of single objects, but dependent on the mind of the thinking subject in which they exist as conceptions. Abelard is considered the founder of this doctrine, which was held by Reid, and probably by Aristotle.

**Concerti'na** [from *concert*], a modern musical instrument invented by Prof. Wheatstone of London. Its sounds are produced by free vibrating metallic springs, as in the accordion. The scale of the concertina is very complete and extensive, beginning with the lowest note of the violin, G, and ascending chromatically for three and a half octaves

to C. Every sound in the scale is double, and can be produced either by opening or closing the bellows.

**Concerto**, an Italian term applied to a piece of music composed for a particular instrument, as a piano or violin, which bears the chief part in it and is usually accompanied by the full band. It is a composition for a solo instrument with orchestral accompaniments, adapted to give the performer an opportunity to display the highest artistic skill as well as intellectual cultivation.

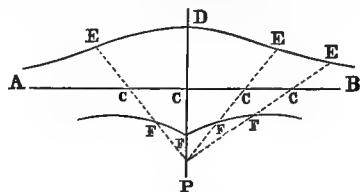
**Concetti**, kon-chet'tee [an Italian term, rendered by English writers on rhetoric "conceits"], ingenious thoughts or turns of expression, points, *jeux d'esprit*, etc. in serious composition. In the sixteenth century the taste for this species of brilliancy, often false and always dangerous, spread rapidly in the poetical composition of European nations, especially in Spain and Italy, where the name of concetti was applied rather in a good than a bad sense, the critical taste being much perverted. Tasso is not free from concetti. For a century after his time they became offensively prominent in Italian poetry. Marino and Filicaja are marked examples. In France concetti were equally prevalent in the seventeenth century, and were peculiarly in vogue with the fair critics of the *Hôtel Rambouillet*, so well ridiculed in Molière's "Précieuses Ridicules." Donne and Cowley are instances of a style full of concetti.

**Con'cha, de la** (Don José), MARQUIS DE LA HABANA, a Spanish general, born at Cordova del Tucuman, in Buenos Ayres, in 1800. He was captain-general of Cuba from 1849 to 1852, and again from 1854 to 1856. In 1862 he was sent as minister to France. In 1863 he was Spanish war minister, in 1864 president of the senate, and governor-general of Cuba from 1872 to 1875.

**Concha, de la** (Don MANUEL GUTIÉRREZ), MARQUIS DEL DUERO, brother of the preceding, born in Madrid 1794, died in the battle of Muro, June 28, 1874. He was educated for the army, made his first campaigns in the war against Napoleon, served against the revolution in Buenos Ayres 1816-24, afterward against the Carlists, and was made a general in 1839 and field-marshal in 1840. In politics he belonged to the moderate and conservative party. Nevertheless, in 1853 he, together with O'Donnell, Bravo, Soto, Mayor, and others, issued that address to the queen which became the signal to the revolution. After the fall of the queen he retired for some time into private life. He was serving with great success at the head of the republican army against the Carlists when he fell in the battle of Muro.

**Conchifera** [from the Lat. *concha*, a "shell," and *fero*, to "bear"], in Lamarck's arrangement of mollusks a class containing those which have bivalve shells. The term is now used to indicate the class usually called Acephala, but it does not include the Brachiopoda.

**Conchoid** [from the Gr. *κόγχη*, a "shell," and *εἶδος*, "appearance"] of Nicomedes, a curve of the fourth degree, invented by Nicomedes as a means of trisecting an angle, of constructing two geometrical means between two given straight lines, and of finding a cube double a given cube. The curve may easily be described, and is occasionally used in architecture as a bounding line of the meridian section of columns. It is generated as follows: Let A B be



Conchoid.

a straight line, and P any point not upon it; then if lines P E, P E', etc. be drawn, cutting A B, which is called the directrix, in points C C', and let C E, C F be laid off from the points of intersection, each equal to a given line; the curves traced by the successive points E and F form the conchoid. That branch which is most remote from P (the "pole" of the conchoid) is called the first or superior conchoid, and the other branch, traced by points F F', is the second or inferior conchoid. Both branches may extend to infinity, and they have the line A B for a common asymptote. The constant distance C E of the points E and F from the points of intersection is called the modulus of the curve. If we take C in the line E P as origin, and the lines A B and E P, at right angles to one another, as co-ordinate axes,

the equation to the conchoid is  $x^2 = \frac{(b+y)^2(a^2-y^2)}{y^2}$ , where  $a$  is the modulus of the curve, and  $b$  = the perpendicular dis-

tance of P from A B. If  $a = b$ , P becomes a cusp point of the first species.

**Conchoidal**, a term used in mineralogy to describe a variety of fracture. When the fractured surface of a mineral exhibits curved concavities similar to the valve of a bivalve mollusk, it is said to have a conchoidal fracture, as flint, anthracite coal, etc.

**Conchology** [from the Gr. *κόγχη*, a "shell," and *λόγος*, a "discourse," a "treatise"], a treatise on shells; also the science which treats of shells and their inhabitants. The soft parts of the Mollusca were almost unknown to the earlier naturalists, hence their external coverings or shells were separately classified, without reference to the contained animals. The more scientific modern method requires that the species shall be thoroughly investigated, as well as regards their soft as their hard parts. MALACOLOGY (from the Gr. *μαλακός*, "soft," and *λόγος*, a "discourse," a "treatise," i. e., a "treatise on soft animals") is a more proper designation for this science, but the word Conchology has become so well known in this connection that it has been found difficult to supersede it. Thus, the latter name is still commonly used, but with the enlarged signification that it is the science or classification and description of molluscous animals, including their shells.

MOLLUSCA (from the Lat. *mol'lis*, "soft") is the second of the five great divisions or structural types of the animal kingdom. An external shell, in nearly all cases, protects the animal, and may be regarded as an exo-skeleton, replacing the bones of the Vertebrata. Occasionally, as in the cephalopods or cuttle-fish, the shell is internal, and in some of the gasteropods it is rudimentary or entirely wanting; still, the absence of the internal skeleton, and consequently of the bony envelopes protecting the great nerve-chord, will, even in such cases, sufficiently distinguish the Mollusca from the Vertebrata. Shells are composed principally of carbonate of lime, with but little other mineral or animal material, and are therefore much harder than the bones of the vertebrates, which contain a large proportion of gelatin. The Mollusca also have colorless blood, while that of the vertebrates is red.\*

The Mollusca do not attain the size and strength or exhibit the complex structure of the vertebrates, but they cannot justly be said to be of inferior or lower type; their plan of conformation is more simple, but it is just as perfectly adapted to the purposes of their existence. The greater number of individuals of the more simple organisms seem to compensate, in the economy of nature, the superior individual force of the more complex ones.

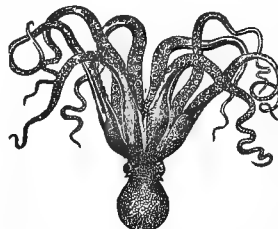
Geology reveals to us that in the early ages of the world shells were among its first inhabitants, flourishing in its waters almost to the exclusion of other types of animal life, and leaving their imperishable coverings on the geological shores, to become in our day the great record of the succession of strata by the aid of which the geologist reads so unerringly the history of the past.

**Classification.**—The Mollusca are divided into three great branches or types of structure called *classes*, corresponding to the classes Mammalia, Aves, Pisces, etc., of the sub-kingdom Vertebrata, and it will be convenient for our purposes to diagnose these three classes somewhat hastily, before describing in detail their structural peculiarities and habits.

The first two are *encephalous*—that is, the animal is furnished with a distinct head, and the shell, when developed (as it usually is), is univalve or in one piece. They are named

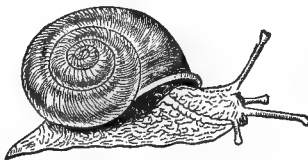
1. **CEPHALOPODA** [from the Gr. *κεφαλή*, the "head," and *πούς*, *πούδος*, a "foot"]. In this class the head is encircled by eight or more feet, or more properly arms, used in swimming and in seizing food.

2. **GASTEROPODA** [from the Gr. *γαστήρ*, the "belly," and *πούς*, *πούδος*, a "foot"]. The



CEPHALOPOD:

*Octopus tuberculatus* (about one-tenth its natural size).



GASTEROPOD:

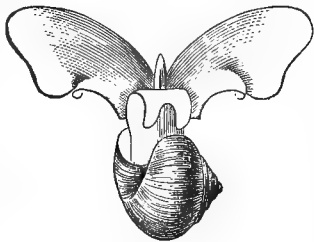
*Helix desertorum*.

\*A few molluscous animals possess red blood, but, viewed with a microscope, the entire fluid is found to be colored, whereas in vertebrate blood the color is due to red corpuscles floating in a colorless fluid.

animal is destitute of separate limbs, but glides, creeps, or swims by the muscular action of the under part of its body.

In an aberrant form of this class, formerly considered a distinct class, locomotion is effected solely by means of a pair of wing-like fins attached antero-dorsally, and used in swimming. These are the PTEROPODA (from the Gr. πτερών, a "wing," and πούς, πούς, a "foot").

The third class is acephalous, or without a head, and the shell (which always envelops the animal) is bivalve, or composed of two distinct, generally similar, pieces, united at the back by a horny hinge called the *cardilage*. The distinctive nomenclature used for the encephalous classes is inapplicable here, because the foot is more or less specialized or entirely wanting in the various bivalve families—some of them being sedentary or attached, while others are locomotive. The best designation for the class is



PTEROPOD:  
*Limacina antarctica* (enlarged).

3. ACEPHALA [from the Gr. α, privative, and κεφαλή, the "head"]. Most conchologists use the term *Conchifera* (shell-bearers) for this class, but it is an objectionable word, inasmuch as it is equally applicable to the other two classes. Others call the bivalve mollusks *lamellibranchiata* (plate-gilled), describing their respiratory organs, but this term is also objectionable, because (as we shall show hereafter) the differences in the organs of respiration enable us to divide the gasteropods satisfactorily into orders, and a designation indicating inferior value in one class cannot properly be used to express a high value in another.

Until quite recently systematists have included among the mollusks certain aberrant forms, such as the brachiopods or lamp-shells, the tunicates, and the bryozoans. Of these the first only possess a shell, but the external bivalve test differs in its relation to the contained animal from the acephalous mollusks in this respect, that its valves are applied dorsally and ventrally instead of bilaterally. Internally, we find in one valve a shelly process acting as a support to the animal, and (in this respect) simulating the vertebrate skeleton. The tunicates are shellless animals, enclosed in elastic gelatinous integuments, having two openings only—an orifice for the mouth, and one for the excretions. The organ of respiration is a ribbon-like band crossing the interior cavity. Finally, the Bryozoa, microscopic polypous animals, attach themselves in generally symmetrical patterns upon the surface of rocks or shells, the aggregation of their minute cells resembling corals. All these aberrant forms have been excluded from the true Mollusca by some of the best systematists of the age; but by way of compromise they are generally assigned a position immediately following them as a sub-branch, named MOLLUSCOIDEA (which see). The brachiopods are generally represented in conchological cabinets and described in conchological works. Scientific opinion as to their place is by no means uniform.

While dealing with exclusions it may be well to mention the cirripeds or barnacles, and the echinoderms or sea-urchins. These were included in the Mollusca by Linnaeus, whose "Systema Naturæ" divided all invertebrates into two classes—the VERMES (mollusks, etc.) and the INSECTA. Lamarck and Cuvier also included the barnacles in the

Mollusca, and even so recently as 1855, Professor T. Rymer Jones so arranged them.\*

ANATOMY AND PHYSIOLOGY OF THE MOLLUSCA. 1. REPRODUCTION.—The Cephalopoda and nearly all of the marine Gasteropoda are *diœcious*—that is, the sexes are distinct; but the pulmoniferous terrestrial and fluviatile snails, the Pteropoda, the Nudibranchiata or naked marine mollusks, and a few other marine genera, such as *Bulla* and its allies, are *monoœcious*, or with sexes united in the same individual. The Acephala are partly *diœcious* and partly *monoœcious*.

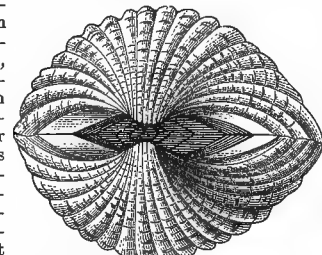
In the Cephalopoda or cuttle-fishes one of the arms of the male becomes a specialized reproductive organ, and in copulation becomes detached from its owner. It has been found *living* within the sac of the female. In consequence of this very curious method the male organ has been considered by some naturalists to be a parasitic worm, while others have supposed it to represent the normal form of the male animal.

The sexes in the cephalopods are distinguished by external differences of form, as well as by the *pen* or internal shell. The eggs in their passage from the ovary are invested with a gelatinous fluid which greatly enlarges after deposition. The egg-mass is always clustered; in the genus *Se'pia*, the typical cuttle-fish, it assumes the appearance of a bunch of black grapes; in *Octopus* it is irregular and attached to sea-weed; and in *Loli'go* it is pudding-shaped, the eggs united by a ligament to a common centre. The liquid of the eggs is at first colorless, but soon after impregnation a central speck appears in each, which grows so rapidly that before the yolk is consumed the embryo has attained a recognizable form; so that previous to hatching the foetal cuttle-fish already presents all the organs necessary to its after existence. The most remarkable physiological feature of the embryo is the duct for the conveyance of the yolk which communicates with the œsophagus through the head, penetrating in the front of the mouth, instead of entering the walls of the abdomen, as in the vertebrates. Only one oviposit takes place yearly, but the number of eggs contained in the mass is considerable, reaching forty thousand in the *Loli'go vulga'ris*.

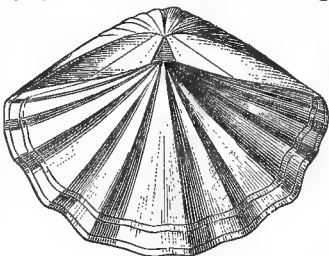
The shell of the *Argonaut*, the paper nautilus as it is called, is not a mere egg-case, being developed both by the male and female. It is therefore a true shell, although produced under abnormal conditions, being formed *after* the birth of the animal.

The powerful, complexly-organized gasteropods, including the predatory tribes respiring by the aid of branchiæ, are *diœcious*, and of course sexual union is with them a necessity; but it is no less necessary with the *monoœcious* helices or garden snails, in which the co-operation of two individuals is required for reciprocal impregnation. As a preliminary to actual connection the two snails become lively and crawl around one another, while from the generative orifice on the right side of the neck of either is protruded a sacculus containing a sharp-pointed spiculum or dart, with which they strike one another upon the skin; the dart-sack is then withdrawn, and another sack extruded containing both male and female organs. In the eggs of the Gasteropoda much diversity is exhibited, and three distinct types are recognizable, according with the habits and situation of the animals. Thus, the land snails deposit separate eggs covered by calcareous shells; the phytophagous fluviatile and marine species, animals inhabiting shore-lines and shallow waters, cover their eggs with a gelatinous substance, by means of which they are agglutinated into one mass; and finally, the zoophagous mollusks, inhabitants of deeper and rougher waters, where the spawn is more exposed to the depredations of other animals, protect them by horny pouch-shaped coverings variously aggregated: these masses, small and gelatinous when expelled from the female, rapidly enlarge and toughen until they frequently attain a bulk exceeding that of the parent, and the integument becomes as tough as parchment. Sometimes these egg-cases are separately extruded, and in such instances they are individually attached to a piece of timber, shell, or rock by the animal, but ordinarily the whole cluster is expelled together. The process of laying is thus described by Sir E. Home: "A friend of mine saw the female (*Turbinel'la py'rum*) shed her eggs; a mass, apparently of mucus, passed along the deep groove in the lip of the shell in the form of a rope, several inches in length, and sunk to the bottom; this rope of eggs, enclosed in mucus at the end last discharged, was of so adhesive a nature that it became attached to the rock or stone on which the animal deposited it. As soon as the mucus came in contact with the salt water, it coagulated into a firm membranous structure, . . . and this connected nidus, having one end fixed and the other loose, was moved by the waves, and the young in the

\* "Animal Kingdom and Comparative Anatomy," 2d edit., p. 466, London, 1855.



*Arca gramosa* (acephalous shell).



BRACHIOPOD:  
*Spirifer Walcottii* (fossil).

eggs had their blood aerated through the membrane, and when hatched they remained defended from the violence of the sea till their shells had acquired strength."

The terrestrial mollusks lay few eggs, but the marine and fluviatile species are more fecund. The *Helices* deposit from twenty to fifty oval eggs, pure white in color, which they hide in the earth or under stones, or cover with leaves. They so rapidly increase in size and hardness that in a day or day and a half they aggregate a greater bulk than the parent, and the shells have become opaque and consistent. The arboreal *helices* and *bulimi* of the Philippine Islands generally deposit their eggs in clusters, within two leaves previously curled together by the animal for their protection; the *Bulimus Mindoroensis* arranges its eggs in parallel rows agglutinated perpendicularly to the surface of a leaf. The eggs of the African *Achatina* differ from those of other land snails in the color being deep yellow instead of white. An *Achatina Numidica* which I kept alive for two years deposited about seventy yellow eggs, which were loosely covered with earth; in a few days nearly every one of them had hatched, and shortly afterwards they entered the earth to pass the torpid season. Alas! the rigor of an American winter proved too much for their tender constitutions, although my vivarium was kept in a heated apartment, for in the ensuing spring fifty-one of them were no more. Those that survived had by that time attained a bulk three times exceeding that of the egg.

The large South American snails lay eggs as large as those of a pigeon, and they are eaten by the natives, but African snails of equal size deposit eggs not more than one-eighth of the above bulk.

The *Natica*, a predatory sea mollusk, constructs a nest of agglutinated sand, in form resembling an inverted bowl with convex sides, a small circular aperture at the top and attached by its broad base. The eggs, encased in the usual tough tissue, are suspended to the inner surface, so that the sea-water has access to them through the contracted aperture, while at the same time they are shielded from the attacks of enemies of their race.

The *Acephala* were, until a few years ago, supposed to be generally hermaphrodite, but the number of these is being constantly reduced by the discovery of the dioecious character of various families. In the dioecious bivalve *Mollusca* the spermatozoa are discharged into the water, whence they are inhaled with the respiratory currents by the opposite sex. In many cases the sex cannot be distinguished by the shell alone, but in others the posterior portion of the shell of the female is enlarged in order to cover and protect the charged ovary. So great is the sexual difference in the shells of some of the *Unionidae* or fresh-water mussels of the United States, that they have been frequently mistaken for distinct species.

Reproduction commences in the *Acephala* long before full growth is attained. The *Cyclus* or *Sphaerium* reproduces when so immature as to possess hardly any of the external characters of the species; and oysters, although they do not attain full growth under three or four years, spawn when four months old. So prolific are they that the ova of a single oyster have been estimated as high as ten million in number. Mr. Isaac Lea found the oviducts of the *Anodonta undulata* charged with about six hundred thousand individuals. This accurate observer has described and figured the embryonic forms of numerous species of American *Unionidae*, which in all cases differ widely from the parent; the valves are granulose on their external surfaces, and frequently furnished with basal hooks, which, by interlocking, keep them together; in form these valves are rounded or oval, and they are attached to the animal by a single central muscle, instead of the two lateral muscles of the adult. As the ovary is included in the body of the animal, its enlargement when gravid would, in many cases, be so great as to preclude the closing of its valves, thus endangering its safety: in such cases the ova are expelled from the nidus while still immature, but allowed to complete their growth in the branchial fringes, where, spread over a much greater surface, they enjoy the advantage of respiration in the ciliary currents.

The *Brachiopoda* are believed to be all monœcious.

**Viviparous Reproduction.**—This is not uncommon in the phytophagous gasteropods; indeed, different species of the same genus are dissimilar in reproduction; thus, one of the periwinkles (*Littorina rudis*) is viviparous, while another (*Littorina littorea*) is oviparous—that is, in the former the young are lodged and retained in the branchial cavity until fitted for a separate existence. The *Paludina* is another familiar example, exhibiting the same care for its young, which may be found within the parent shell perfectly formed and numbering from fifty to a hundred individuals. The *Cymba Neptuni*, a zoophagous gasteropod, is retained within the folds of the large foot of its parent until its shell has grown to the length of one and a half inches.

Maternal instinct is shown in the selection of favorable situations for oviposition, as in the *Ampullarie*, which deposit their eggs in shallow water, where, anchored to a stick or stone, they are exposed to the sun's vivifying influence; the fresh-water snails, which attach the mass of gelatinously-enveloped ova to floating objects, in order to obtain for them the advantages of the solar heat and protect them from the dispersing action of the waves; the *Ianthina*, a mollusk inhabiting the mid-ocean, which constructs a float (attached to her own body), to the under surface of which the eggs are glued; while the *Argonaut* hatches them within the protection of her beautiful shell. But perhaps the most extraordinary instance of maternal care is that exhibited by one of the limpets (*Calyptra Chinenensis*), which actually sits upon her eggs, and continues thus to protect the young animals when hatched until they have acquired shells sufficiently strong to defy aggression.

The study of the larval metamorphoses of mollusks has recently received much attention, and many curious and important discoveries have been made in this connection. We have already noticed the larval condition of the *Unionidae*, and like differences occur in many *Acephala*. The larvæ of the attached species are provided with a ciliated swimming-disk, and are extremely active; they are also provided with eyes, which are lost when the animal, becoming adult, attaches itself for life and has no further use for visual organs. Similar changes occur in the brachiopods; and the development of the nudibranchiate sea snails is thus described by Messrs. Alder and Hancock: "The spawn is deposited in the shape of a gelatinous band, always arranged in a more or less spiral form, and fastened to corallines and the under sides of stones by one of its edges. The ova are minute and very numerous, amounting in some species to several thousands. Before the period of exclusion the young may be seen revolving on their own axis by means of vibratile cilia, and on escaping from the egg they swim about freely in the water by the same means. The larva is extremely minute, and has more the appearance of a rotiferous animalcule than a mollusk. It is enclosed in a transparent, nautiloid, calcareous shell, with an operculum. Its structure is very simple, showing no signs of the external organs that distinguish the future adult. The principal portion visible outside the shell is composed of two flat disks or lobes, fringed with long cilia, by the motion of which it swims freely through the water. These are often withdrawn into the shell, and the operculum is closed upon them when the animal is at rest." In this stage of its existence the tentacles are not developed, but are replaced by two ear-like veils; afterwards the tentacles appear, the foot enlarges and projects beyond the operculum, and the mantle becomes detached, yet the shell remains; finally, the latter is displaced, and except in the retention of the frontal veils the appearance is that of the adult; soon the foot exercises its locomotive function, the gills are developed, the jaws and tongue appear, and finally the veils fall, and the animal has attained its full development.

Thus we find that the larval gasteropods are provided with an external shell even in those genera in which it is finally concealed in a fold of the mantle or entirely absent in the adult, and that they are temporarily furnished with a pair of ciliated fins by which they can swim about freely. In this manner nature has provided alike for the protection of the young animal and for the dispersion of the species.

**2. Nervous System.**—The principal nerve-centre is a ring of ganglia surrounding the throat in the cephalopods and gasteropods, and situated on the posterior adductor muscle in the *Acephala*. This ring is perhaps somewhat analogous to the vertebrate brain in its functions, and from enlargements of it are distributed the nerves to every portion of the body. From this typical plan of the molluscan nervous system there are, in some cases, considerable variations. In the most complex organisms the concentration into an esophageal ring is the most perfect, but in those animals which are more simply organized the centres are more or less dispersed; so that in the *So'len*, for instance, the cerebral and abdominal nerves have their origin at opposite extremities of the long body, but are connected by a long commissure.

The various senses are unequally developed in the different classes of the *Mollusca*. The animal, when protruded from its protecting shell, is of course measurably defenceless; hence the most delicate and the most important of the senses is that of

**Touch.**—This sense resides in every external portion of the animal, the moist, glutinous skin being particularly sensitive. So delicate, indeed, is it that the slightest impression alarms the mollusk and causes its immediate retreat. Specialized organs of touch exist in the *tentacula* of the encephalous species, organs arising from the top of the head or near the mouth, generally two (but sometimes four) in

number. They are very flexible, and generally retractile at the will of the animal. In the *Nautilus* about one hundred of these tentacles surround the mouth, but only four of these are organs of sensation. There are also, in many genera, tentacular filaments arising from the sides of the mantle or body, and not generally retractile. The *Halio'tis* or ear-shell, *Cypræa* or cowry, *Tur'bo*, etc., are genera possessing these beautiful fringed appendages. In the bivalve species these filaments also exist; in those having the mantle open, like the oyster, they form the beard or fringe which lines its margin, while in those having a closed mantle they are attached to the circumference of the orifices. It is supposed that mollusks are not very sensible to pain, and their tenacity of life and power of reproducing lost or mutilated parts is wonderful; the latter extends to the growth of new tentacula, and even, in well-ascertained instances, of a new head!

**Taste.**—The possession of this sense is rather inferred from the habits of the animals, the selection of food, etc., than from any specialized organs discovered by naturalists—their use being in most cases conjectural only. We can readily suppose that the *Acephala*, which swallow everything small enough to enter the mouth, cannot have very delicate gustatory organs; indeed, the only selection made by them is in the reflex muscular action of the stomach, which enables them to eject through the mouth indigestible substances. The encephalous species, however, and particularly the carnivorous ones, are certainly endowed with the faculty of taste, as their food is carefully selected.

**Smell.**—There is no reason to suppose that this sense is possessed by the bivalves, but its existence in the univalves is very evident, as snails will approach food for which they have a preference, directed by the odor only, and cephalopods are known to avoid the vicinity of certain strong-smelling plants.

**Sight.**—The encephalous mollusks are provided with two eyes, placed on the sides or front of the head; they are either sessile or elevated on stalks or pedicels. Sometimes these stalked eyes are on short tubercles placed in the rear of the tentacles or branching from them, and sometimes they are situated at the extremity of the tentacles themselves. The eyes of cuttle-fish and of many carnivorous gasteropods are complex in organization, and endowed with visual powers equal to those of vertebrates, but the structure is much more simple in the plant-feeders, and is believed to possess only limited powers, having perhaps in most cases no faculty of distinguishing form or color, but merely a general susceptibility to light.

It can no longer be doubted that the black objects which occupy the summits of the tentacles in helices are eyes; it is said that the snail will avoid an object placed in its path before ascertaining its position by actual contact, and that it is capable of perceiving, and is attracted by, gay colors. Nature has provided for the safety of these tentacular eyes by giving the animal the power of withdrawing them rapidly through the tubes to their bases upon the approach of danger. This action is accomplished by the disappearance of the tentacle through its own cavity by a motion which may be likened to the inversion of the finger of a glove.

The bivalve Mollusca enjoy visual faculties proportioned to their locomotive powers; thus, those which, like the *Pecten*, are of active habit, have a number of eyes situated among the tentacular filaments on the margin of the mantle, but in the fixed genera the eyes are rudimentary or absent. The North American Unionidæ appear to be sensitive to light. In a communication addressed to the Academy of Natural Sciences of Philadelphia, 1857, Mr. Lea says: "I became satisfied that the closing of the siphonal tubes, on my approach to the specimens I had in my vivarium, was not altogether occasioned by the vibration caused by my approach, and I accordingly arranged numerous individuals of several species with a view carefully to observe them. In the course of these examinations, repeatedly made, I found several species of *Unio* quite sensitive to my passing my hand between them and the light, while others showed no signs of sensitiveness. Some individuals were more sensitive than others, and the females exhibited this power much more than the males, often withdrawing not only their siphons, but their mantle, within the valves. It is difficult to say with certainty how far their visual organs are developed. The fringes of the branchial and anal siphons are, in the Uniones, formed of small, subconical tentacula. With a good lens the terminal points of the tentacula may be observed to be rounded and furnished with at least the appearance of an eye; and that it will prove to be a true eye, however imperfect, there can be but little doubt."

**Hearing.**—Some of the cephalopods possess external ears, and auditory capsules, connected with auditory nerves, are found near the bases of the tentacles in gasteropods. The capsules contain one or more oval or rounded vibratory bodies

termed *otolites*, and the occurrence of one of these vibrators in the vesicular cavity indicates the single auditory organ of the *Acephala* and *Brachiopoda*. Considering that such an exquisitely delicate sense of touch pervades the whole exposed surface of the mollusk, thus enabling it to perceive by vibration the approaching objects, it may be doubted if the auditory faculty be very highly developed.

**Voice.**—With but few exceptions, mollusks are dumb. The cephalopods squeak and groan when removed from the water, and some of the nudibranchiates, the *Æolis* and *Tritonia*, emit audible sounds.

**3. Muscular System.**—The prehensile arms of the cuttle-fishes, the foot of the gasteropods and of some bivalves, and the wings of pteropods, exhibit great muscular power. It is with its foot that the *Pho'las* excavates the cave in solid rock or mud which becomes its lifelong dwelling, and with the same organ the razor-shell (*Solen*) buries itself with great rapidity beneath the wet sand of the sea-shore. In many of the gasteropods the foot is the swimming organ, as it is that of locomotion in all of them; but in bivalves another class of muscles become more important; they are those which, attaching the animal to the valves of its shell, enables it to open and to close them. These *adductor* muscles are sometimes two in number, as in the clam (*Ve'nus*), and to this class the term *dimyaries* is applied, whilst others have but a single central muscle of attachment, like the oyster, and these are called *monomyaries*. We find also in the *Acephala* other muscles in the border of the mantle, controlling its movement. Their position is indicated upon the inner surface of the valves by an impression running parallel with the margin, and called the *pallial line*. When the animal possesses retractile siphons, the position of the siphonal muscle is shown in the shell by a *sinus* of the pallial line, which otherwise is said to be *entire*.

Gasteropods are attached to the axis of their shells by muscles passing into the foot and operculum, thus enabling them, when alarmed, to retire quickly and to close the door against the enemy. In non-spiral shells, like the limpet, this muscle is attached to the inner surface in a half circle, making a horseshoe impression within the shell.

The cephalopods only, have muscles attached to internal cartilages, representing the attachment to the bones in the vertebrates.

**4. Digestive System.**—The cephalopods are furnished with a pair of horny jaws (*maxillæ*), of which one is much superior to the other in size. They may be likened to the mandibles of the parrot, have cutting edges and sharp-pointed ends, which are useful in dividing their food. In the helices the mouth has an upper jaw only: it is frequently ridged across to assist the process of comminution, which is effected by its opposition to the siliciously armed tongue; in the fresh-water snail (*Limnea*) this superior jaw is assisted by two lateral accessory ones. None of the gasteropods are possessed, like the cuttle-fishes, of both superior and inferior maxillæ, and many of them are entirely destitute of these organs. Bivalves have a mouth supplied with a pair of soft membranous palpi.

Encephalous Mollusca are provided with a tongue or *lingual ribbon* studded with denticles, which usually are arranged in the form of a triple band. The central portion is the *rhachis*, and the similar lateral portions are called the *pleuræ*. The recurved silicious denticles are in numerous transverse series, those of the centre being differently shaped from the pleural ones. As they are worn away with use, a constant growth maintains their effectiveness, and they number in some cases as many as twenty-five thousand in a single individual. Following the threefold division of the tongue or lingual ribbon, the teeth of the central portion are called *rhachidian* or centrals, the others *uncinian* or laterals. The tongue is elliptical in the land snails, forked, fleshy, and placed at the end of the muscular proboscis of the carnivora; but in most of the phytophagous tribes it is very long—in the limpet, for example, when extended, it exceeds the length of the animal, and when retracted it lays reversed along the gullet and coiled spirally within the stomach. In the *Bulla* the rhachis is unarmed, and trituration is effected by the calcareous plates lining its muscular gizzard.

The bivalves have no tongue; the so-called *gastric dart*, a styliform cartilaginous body contained in the stomach of some species, is the representative of a gizzard rather than of a tongue.

Modern investigators have assiduously studied the lingual dentition of mollusks, and many hundreds of specific forms have been described and figured. Unfortunately for conchological science, many of these students, misled by the great significance of dentition characters in the classification of the Mammalia, have attempted classifications of mollusks based entirely on relationships of dentition, which, instead of according with other structural resemblances, destroy the natural groups and force into juxtaposition the



most heterogeneous forms. It might be supposed that the study of the dentition would at least indicate whether the animal be carnivorous or herbivorous, but even in this respect it fails, because its relationships have occasioned the separation of carnivorous mollusks from others to which they are closely allied, to place them among the herbivora, with which they have no other affinities.

In mollusks the liver is always of large size, and the existence of a renal organ has been demonstrated in nearly all the species observed. The intestine is sometimes straight, terminating posteriorly, as in the *Chiton*, but more generally it is convoluted, and is more so in the herbivorous than in the carnivorous species. In the *Encephala* it generally turns upon itself, the funnel opening on the under side of the neck in the cephalopods, and on the right side, behind the head, in the gasteropods. In bivalves the intestine is much convoluted, passes through the ventricle of the heart and terminates near the respiratory aperture, whence the excrements are washed away by the water from the gills.

5. *Circulation*.—The heart includes an auricle, occasionally double, which receives the blood from the gills, and a ventricle for its propulsion into the arteries; from the capillary extremities of these it is collected into the veins, again passes through the gills, and becomes arterial blood. It is colorless or pale gray. In the cephalopods there are two additional branchial hearts, and the cesophagus is more or less enveloped in a wide venous sinus. In the *Acephala* the visceral cavity forms part of the circulatory system. Mr. Alder has counted 120 pulsations per minute in the *Vitri'na*, and half as many per minute in some nudibranchs; but it may be fairly inferred that the difference is due partly to the condition of excitation of the animals under observation.

6. *Respiration*.—The cuttle-fishes, *Acephala*, and brachiopods are water-breathers—that is, they respire water containing air, absorbing the oxygen of the latter during the process. The gasteropods, however, are divided into water- and air-breathers, and the latter class, besides including all of the land snails, comprehends most of those inhabiting fresh water, as well as a few marine species.

In the pulmoniferous species the lung is formed by a fold of the mantle, forming a chamber having pulmonary vessels distributed over its walls. The cavity of the lung opens on the anterior portion of the right margin of the mantle, and its alternate expansion and contraction in breathing is quite visible to the eye unassisted by a lens. The same folded mantle forms the cavity for the gills of the aquatic species, except in the nudibranchiata; in these the branchiæ are arranged in a plumose festoon on the animal's back, and entirely exposed.

The bathymetrical distribution of marine mollusks is determined principally by the quantity of oxygen required by them for respiration, and a transition from sea to fresh water, or *vice versa*, or even a great change of depth in the same element, is generally destructive to their existence. Some sea mollusks, although water-breathers, are littoral in station, the moist sea air and visits of the tides sufficing for their respiration; such animals will sometimes live for a lengthened period when removed from their native element. For example, a species of *Littor'na*, or periwinkle, of which several individuals were collected at San Domingo (1871), has now survived for nearly a year in various cabinets in Philadelphia.

The carnivorous gasteropods generally receive the water for respiration through a tube specialized from the mantle-margin, and called the *siphon*; while in the herbivora the mantle is simply somewhat prolonged and curled up. The bivalve Mollusca are in the same manner divided into those having specialized siphons, and those having merely a rudimentary fold of the mantle.

7. *Food*.—The bivalve species, generally sedentary or attached, and seldom active, obtain microscopic food from the currents of water directed into the mouth by the joint action of the lips and branchiæ, while the cephalopods, on the other hand, dart through the water with great rapidity after their prey, seize it with their long arms, and draw it to their powerful jaws. Once enclosed in the eight powerful arms, which are covered with formidable sucker-like disks, escape is impossible, and even large fishes and crustaceans become the victims of these voracious animals. Man has been attacked by them, and there are well-attested instances of narrow escapes from these monsters—some of the species attaining gigantic proportions, with bodies several feet long, and arms still longer, the whole weighing several hundred pounds.

The food of the zoophagous gasteropods includes fishes, crabs, zoophytes, and particularly bivalve Mollusca. With their spiny tongues they bore through the shells of the latter, which are incapable either of resistance or escape. Tender, succulent plants, algæ, etc. are eaten by the land and

fresh-water species; the snails showing a preference for the tender shoots of cabbage, lettuce, etc. which is very annoying to gardeners. In Europe these animals multiply so fast and are so destructive to gardens that it is necessary to collect and destroy them. An American gentleman on his first visit to the Royal Botanical Gardens at Kew was surprised to see a bucketful of snails in the hand of a gardener, who informed him that it was part of his daily duty to collect and destroy that quantity, which he had done for years.

8. *Shell-Growth*.—The majority of the mollusks are covered with an external shell; the *Acephala* always are so covered, the shell being in two pieces, united at the back or commencement of growth by a ligament or hinge; these are called *bivalves*. The gasteropods are generally provided with a single or *univalve* shell, which is in form some modification of the spiral principle, varying from *fusiform*, in which the elongation of the axis gives it a conspicuous spindle shape, through countless intermediate forms to *planorboid*, in which the whorls revolve on the same plane with the initial one. A few gasteropods have no shell whatever, the nudibranchiata, for example; others have a more or less perfect internal one secreted beneath the mantle, as in the naked slugs or snails. In the genus *Chiton* it is composed of a number of transverse pieces called valves, united by a ligament, and allowing some freedom of motion, by which the convexity can be accommodated to the surfaces over which the animal passes or to which it attaches itself. In the *Patella* and the limpets generally the spiral nucleus is obscured or lost, so that the shell assumes a conical form, open at the base.

Only two living genera of cephalopods, the *Nautilus* and the *Argonaut*, have external spiral shells; all others are possessed either of an internal calcareous plate imbedded under the back, of porous texture, called cuttle-bone, or of a somewhat horny narrower plate called the *pen*.

The nucleus of the shell covers the young animal in the egg even before its internal organs assume definite form; it is generally of a transparent horn-color. After birth the enlargement of the shell is effected by additions to the lip or circumference of its aperture; these additions are effected by an exudation of carbonate of lime and animal matter from the mantle or contiguous part of the animal, which becomes calcified on exposure. Of course as the animal increases in bulk, so the circumference of this growth-margin enlarges, and the spiral shell "grows;" and the lines running parallel with the aperture which the outer surface exhibits are called "growth-lines," and indicate these successive additions. The *epidermis*, or horny external skin of animal matter which invests most shells, protecting them from the corroding action of the elements, is exuded from the neck or collar of the animal, and here also originates the cellular or main substance of the shell; but the interior lining of porcelainous or pearly matter comes from that portion of the animal containing the viscera. Of course in limestone regions land and aquatic mollusks flourish, and their shells are large and ponderous, while in places destitute of that material they are rare and small, and their shells fragile and of horny rather than calcareous material.

In case any portion of the shell occupied by the animal becomes fractured, a viscid exudation takes place from the exposed portion of the latter, which soon hardens, repairing the fracture; but if the break occur in one of the earlier whorls, which the growth of the animal has compelled it to vacate, there is no means of repairing the injury, which accordingly remains, but a partition is thrown across the whorl immediately in the rear of the animal for its protection. Such being the method of construction of the shell, it will be readily understood that spines, tubercles, ribs, etc. on the external surface are the consequence of inequalities of like character in the mantle of the animal, and that colors, whether in bands or spots, are exuded by pigment-cells similarly arranged upon its collar. The inner surface being secreted by the transparent visceral covering which is never exposed to the light, is of course white. Some shells, like the cowry, olive, bulla, etc., are entirely enveloped in the mantle, and the colors are thus derived from its entire surface. In consequence of this protection, the epidermis is not developed in such cases. Thickening and contraction of the lip of the shell indicate adult characters, and further growth generally leaves these thickened portions visible externally, forming *varices*; but the animal in many cases possesses the power of removing both these external varices, spines, etc., and all internal thickenings—even the partitions of the whorls and the very axis of the shell—when the room is needed for its growth or when they impede its movements. Analysis has revealed the existence of muriatic and sulphuric acids in the saliva of some species, and it is believed that these are the agencies employed in the removal of superfluous shell-material.

In nacreous shells the beautiful *mother-of-pearl* constituting the lining or inner surface is composed of alternate, minutely-undulated layers of thin membrane and carbonate of lime. Precious pearls are similarly composed, and are originated by the irritation of intruding extraneous substances, causing the animal to cover them by the deposition of successive layers of pearly material. Pearls are frequently found attached to the internal surface of many species of bivalve mollusks, both marine and fluviatile, but the most valuable ones are those which are completely detached and spherical, and are only found in the soft parts of the animal. The Chinese and others have made the manufacture of pearls a branch of human industry by the careful introduction of irritating substances within the shells.

The *operculum* is generally a horny lid (sometimes stiffened by an exterior calcareous layer, and occasionally it is entirely calcareous) which is developed in the embryo, and grows with the growth of the animal; its accretions are exuded from the latter, and applied to the circumference in the same manner as in shell-growth. Typically, the operculum is closely fitted to the aperture of the shell, so that when the animal is at rest it acts as a door, preventing the intrusion of marauding enemies. It is a means of defence, hence generally developed in the harmless herbivorous species. It is occasionally found in the carnivorous Mollusca, but then it is often so small in proportion to the size of the mouth of the shell as to be nearly useless for defensive purposes.

**ORDINAL CLASSIFICATION.**—The following outline of the main features of the most approved classification will give an idea of the application of the foregoing structural details to the systematic arrangement of the Mollusca:

**Class I., CEPHALOPODA (the cuttle-fish).**

Order 1, *Dibranchiata*.—Animal swimming, naked (shell, when present, internal), mandibles horny; arms eight or ten, provided with suckers; branchiæ two.

Order 2, *Tetrabranchiata*.—Animal creeping, with an external shell (as the *Nautilus* and *Ammonite*); mandibles calcareous; arms very numerous; branchiæ four. Only a few living representatives of this order are known, but several hundred fossil species have been described.

**Class II., GASTEROPODA (univalve mollusca).**

Order 1, *Prosobranchiata*.—Animal creeping or swimming, protected by a shell, usually large enough to cover it; branchiæ plume-like, situated before the heart; sexes distinct.

This large order, containing fifteen thousand species, is divided into two sections, as follows:

A, *Siphonostomata*.—Carnivorous; provided with a breathing-siphon. The shell is spiral, with imperforate axis, the aperture terminating in a prolongation or canal. Operculum lamellar, horny. In this section are included the strombs, muriceæ, whelks, cones, volutes, and cowries, all well-known marine shells.

B, *Holostomata*.—Respiratory siphon wanting, or replaced by a lobe in the collar of the mantle; gills plume-like, placed obliquely across the back or attached to the right side of the neck. Shell spiral or limpet-shaped, generally somewhat globular, with the margin of the aperture mostly rounded and continuous. Inhabiting both sea and fresh water; a large portion of the former and all of the latter being phytophagous. The naticæ, pyramidellæ, cerites, turritellæ, periwinkles, nerites, turbos, trochi, ear-shells, and limpets are the familiar marine representatives of this section; while the fresh-water genera include the melanians, paludinas, and ampullariæ.

Order 2, *Pulmonifera*.—Plant-eating, air-breathing snails, inhabiting land or fresh water; some furnished with opercula; monœcious. Includes the garden snails, helices, cyclostomas, limnæans, etc., about seven thousand species. The terrestrial Mollusca are confined to this order; more than half of the fresh-water univalves also are lung-breathers.

Order 3, *Opisthobranchiata*.—Shell rudimentary or wanting; branchiæ arborescent, more or less completely exposed on the back or towards the sides of the body near its rear end. The sexes are united in each animal. These are marine snails, met with only on the high seas, swimming on the surface, which they render brilliant by their gaudy coloring. They can only be preserved in alcohol, which, unfortunately, destroys their brilliant tints. A few of them, the *Bulla* and its allies, secrete a shell within the folds of the mantle.

Order 4, *Pteropoda*.—Marine animals, swimming by the aid of a pair of wing-like fins proceeding from the sides of the neck. Shell glassy and translucent, sexes united. A small group of pelagic animals almost unknown to collectors.

**Class III., ACEPHALA (bivalves).**

Marine or fresh-water mollusks protected by a bivalve

shell. Two systems of classification have been proposed, neither of which is entirely satisfactory. The first divides them, in accordance with the number of adductor muscles, into *Monomyaria*, *Dimyaria*, etc., and the second is founded on the presence or absence of the siphon and the character of the pallial impression, thus:

1. *Without siphons. Pallial line simple.*  
(The oysters, arks, marine and fresh-water mussels.)
2. *With siphons. (a) Pallial line simple.*  
(Chamas, tridacnas, lucinas, cockles, cyclades, clams, etc.)

*(b) Pallial line sinuated.*

(Veneridæ, mactras, tellinas, razor-shells, gapers, pholades, or borers, etc.)

The above brief outline of classification is all that our space will allow us to present. Recent systematists admit no less than three hundred families of Mollusca, including several times that number of genera, and the species described amount to between twenty-five and thirty thousand living species, besides nearly an equal number of fossil forms. The latter characterize by peculiar genera and species every geological period. They have become the "testimony of the rocks" and "the medals of creation," for without them the geologist would, in many cases, be utterly at a loss to classify the earth's strata. The primary classes of the Mollusca are all represented from the earliest period containing their fossil remains, but some of the lower divisions have become extinct, while others have originated at various subsequent periods. The ammonites and the Brachiopoda are familiar shells, which at one time swarmed in the ancient seas; the former have become entirely extinct, while of the latter a few species still exist.

**Economical Value of the Mollusca.**—Small as most of these animals are, the immense number of individuals enables them to take an important position in the economy of nature; mountain-chains are formed of their disintegrated shells; ships and piers are destroyed by the insidious attack of the *Tere'do* or ship-worm, and by the same little animal the accumulations of floating timber which would otherwise block up the mouths of bays and rivers, and the wrecks which would impede navigation, are removed.

As articles of food, mollusks are of important value to man and beast. Large numbers of fishes, birds, and mammals prey on them habitually, and of many species they form almost the entire sustenance. Man has, in all ages, consumed large quantities of shell-fish—even the pre-historic cave-men ate them, and at the present time the annual consumption of them is so enormous that it would be difficult to calculate the quantities and values. In the waters of the State of Maryland alone, according to official report, 563 vessels are licensed for the oyster-fishery, and bring to market upwards of ten million bushels annually. The oyster of the waters of the Middle and South Atlantic coast of the United States belongs to the species *Ostrea virginiana*, while that of the northern coast (*Ostrea borealis*) is smaller, more rounded, and rugose. To the latter the European species is nearly related. *Ostrea virginiana* has been successfully transplanted to the waters of Europe and California, where it flourishes, and is regarded as superior in flavor to the "natives." Besides oysters, many other marine bivalves and univalves are brought to market. Among the terrestrial species the Roman snail is an esteemed delicacy in the Latin countries of Europe, and large numbers are bred for sale.

Shells are extensively used for manufacturing purposes—for the making of buttons and many other articles; for cameo-cutting, in which advantage is taken of differently colored layers to produce striking effects of figure and background. Precious pearls, as previously stated, are secreted in the soft parts of those genera of Mollusca which form nacreous shells. They have frequently been found in the fresh-water Unionidæ or mussels of both hemispheres, but the principal product is from the pearl-fisheries of the Indian Ocean, an industry employing over sixty thousand hardy divers. *Mother-of-pearl*, used in manufactures, is derived principally from the *Meleagrina margaritifera*, inhabiting the Gulf of California.

The byssus of the *Perna* or fan-mussel is spun into articles of hosiery in Italy: it is a beautiful but expensive material, resembling the finest silk. (See BYSSUS.) From remote antiquity mollusks have furnished brilliant dyes, such as the far-famed Tyrian purple, discovered and first used by the Phœnicians—a color yielded by mollusks of the genera *Purpura*, *Murex*, etc. Many of the natives of Africa and Asia use the shell of the money-cowry (*Cypræa moneta*) as money, and whole cargoes of this species are exported by civilized nations to be used in trading with the natives. The *wampum* of the North American Indians, consisting of strings of fragments of the shell of the clam (*Venus mercenaria*), was also used in lieu of coin.

The molluscan fauna of the United States is very rich

in species, including three hundred land shells, six hundred fluviatile gasteropods, seven hundred Unionidæ or fresh-water mussels, six hundred species of marine Mollusca of the Atlantic, and about the same number of the Pacific coast; in all, nearly three thousand species.

The study of conchology is one of the most fascinating subjects in the whole range of natural science, and has perhaps engaged the attention of more investigators than any other department of zoology. Collectors explore assiduously every portion of the earth's surface and its waters for specimens, and the habits of the mollusks, as well as their geographical and bathymetrical distribution, are thus becoming extensively known. Private collections and cabinets abound, and public museums containing large numbers of species are to be found in every large city. Perhaps the finest conchological collection in the world is that of the Academy of Natural Sciences of Philadelphia, which contains about twenty-one thousand species and numerous varieties, with extensive series illustrating geographical distribution; aggregating, probably, nearly two hundred and fifty thousand specimens. The library of this institution contains nearly a thousand published works relating to the science of conchology. GEORGE W. TRYON, JR.

**Conch-shell**, a popular name for the shells of certain carnivorous gasteropods of the genera *Triton*, *Strombus*, etc. They are found chiefly in tropical seas. Many tons of these shells are annually exported from the Bahamas to Europe, where the finest are used in cutting shell-cameos, and the rest are useful in the porcelain manufacture. Conch-shells were formerly much used in the U. S. as "dinner-horns" by farmers, but have been largely superseded by those made of tin.

**Con'chos**, a river of Mexico, an affluent of the Rio Grande, flows through the state of Chihuahua. Its general direction is N. N. E. Length, about 330 miles.

**Con'clave** [from the Lat. *con* (for *cum*), "with," and *clavis*, a "key," originally, a room that may be locked up]. This term is applied either to the apartment in which the cardinals of the Roman Catholic Church assemble to elect a new pope, or more frequently to the assembly itself. The usages of the Church require that the conclave must be held in a single apartment having only one door, which is actually walled up after the entrance of the cardinals, in order that they may have no intercourse with the public while the election is going on, only a small hole being left open, through which their food is passed. When a pope dies, nine days are allowed for the funeral solemnities. The cardinals assemble on the tenth day, and voting begins on the eleventh. From their separate cells, or, rather, wooden stalls erected for the purpose in the apartment, the cardinals come together twice a day till some one of their own number is made pope by a majority of two-thirds of all the votes. Each cardinal is attended by one or two waiters, called *conclavists*, sworn to secrecy like the cardinals. This method, in its main features, dates from 1274. The strict confinement, however, of the cardinals in conclave was originally involuntary. Thus, in 1272, Gregory X. was elected pope at Viterbo by seventeen cardinals locked up for that purpose by the inhabitants of the city, who, moreover, took off the roof of the building and allowed no other food to be forwarded to the cardinals than bread and water, in order to force them to a speedy agreement. Since Gregory XV. (1621-23), the choice has been either by scrutiny (ballot), by inspiration, or by compromise, usually the first. The scrutiny, or voting by ballot, is performed by means of specially prepared voting-papers which conceal the name of the voter. (See F. A. TROTTER, "On the Papal Conclaves.") Since 1823 the place of meeting has been in a long wing of the Quirinal Palace in Rome; for nearly 460 years before that, in the Vatican. (See CARDINAL.)

**Concom'itance, Sacramen'tal**, the doctrine of the Roman Catholic Church, that the body and blood of Christ sacramentally accompany each other, so that both are sacramentally received under either species, whether of bread or wine; hence, that the communion in one kind imparts all that is received sacramentally in both kinds. Aquinas substituted this term for the older one, "Unio naturalis." (See ASCHBACH, "Kirch. Lex." s. v., and TRANSUBSTANTIATION.) The Lutheran Church maintains that from a natural concomitance we cannot argue to a sacramental one, which is wholly supernatural and dependent on the will of Christ; that this doctrine implies that the officiating priest receives both body and blood twice; and that it holds equally good for one kind in the sacrifice of the mass. (See KRAUTH'S "Conservative Reformation," 620, 621.)

C. P. KRAUTH.

**Concom'itant** [from the Lat. *con*, "together," and *comitor*, to "attend as a companion"], a term of modern algebra, applied to a quantic which is related to a given

system of quantics in the following manner: Let  $u, u_2$ , etc. be a given system of quantics, which by linear transformation of their variables become converted into  $u', u'_2, u'_3$ , etc., and let  $u$  and  $u'$  be quantics respectively derived from these two systems according to the same definite rule; then if  $u$  is converted into  $m u'$ , where  $m$  denotes some power of the modulus of transformation, by the same or by reciprocal systems of linear transformations of its variables or facients,  $u$  is said to be a concomitant of the given system  $u_1, u_2$ , etc. If  $u$  should contain no variables, and be therefore identically equal to  $m u'$ , it is called an invariant of the given system of quantics; if, containing variables, it should be converted into  $m u'$  by the same linear transformations, it is called a covariant; but if its conversion into  $m u'$  should require linear transformations reciprocal to those first employed, it is called a contravariant. Lastly, if  $u$  should contain two sets of variables, and still become converted into  $m u'$  by transforming one set by the original and the other by the reciprocal substitutions, it is called a mixed concomitant of the given system of quantics. Concomitants, therefore, embrace covariants and contravariants.

**Concord**, capital of Hancock co., Ia. (see map of Iowa, ref. 2-G, for location of county). Pop. of township in 1870, 149; in 1880, 764; of village in 1885, 380.

**Concord**, a town of Middlesex co., Mass. (see map of Massachusetts, ref. 2-H, for location of county), is on the Concord River and Fitchburg R. R., 20 miles N. W. of Boston. Incorporated in 1635, it was the first settlement in New England off tide-water. The first Provincial Congress of Massachusetts assembled in its old church Oct., 1774, and made the town the place of deposit for the military stores of the colony. On the 19th of April, 1775, at the North Bridge, in an affair known as Concord Fight, a body of American soldiers, organized under legal authority, advanced against British troops, who had been sent to seize those stores, received their fire, by command of their officers returned it, forced the enemy to retreat, and by this first attack under military orders upon the soldiers of the king began the war of the Revolution. Concord is the home of Alcott, and was that of Emerson, Hawthorne, Thoreau, and other persons of literary distinction. It has a high school, a fine public library, and manufactures of cotton and woollen flannels and of wooden-ware. The new State prison is in the western part of the town. Pop. in 1870, 2412; in 1880, 3922; in 1885, 3727. G. REYNOLDS.

**Concord**, on R. R., Jackson co., Mich. (see map of Michigan, ref. 8-J, for location of county), 90 miles W. of Detroit. Pop. in 1880, 540; in 1884, 568.

**Concord**, a city, capital of Merrimack co., and of the State of New Hampshire (see map of New Hampshire, ref. 8-F, for location of county), is pleasantly situated on the



State Capitol, New Hampshire.

right bank of Merrimack River, 75 miles by rail N. N. W. from Boston, 474 N. N. E. from Washington, 130 S. from Mount Washington, White Mountains, and 30 S. from Winnipisogee Lake; lat.  $43^{\circ} 12' 20''$  N., lon.  $71^{\circ} 29'$  W. It is one of the largest railroad centres in New England. The city proper lies on the W. side of the Merrimack River, with three outlying manufacturing villages. It has an area of 64 square miles, with gas-lighted streets, a generous supply of aqueduct water for all purposes, a complete system of sewage, electric fire-alarm, steam fire department, etc.

**Streets and Public Buildings.**—The streets are wide, have fine sidewalks, and are beautifully shaded. Many of the business and public buildings are fine and expensive structures. The State-house is built of Concord granite at an expense of \$250,000, and contains a valuable law library and large collections of portraits of the State's distinguished sons. The court-house and city hall cost \$45,000. New Hampshire Historical Society library has a large collection of books, pamphlets, and pictures of an historical character. The city contains the State asylum for the insane, a new State prison, a government building for post-office, pension office, U. S. courts, etc., an orphans' home, an opera-house, and other public halls.

**Manufactures.**—The manufactures are varied, the most important of them being granite quarried and dressed, carriages, furniture, belting and leather hose, railroad repairs, foundry and machine work, harnesses, flour, woollen goods, cotton goods, leather tanned, organs and melodeons, etc. The water-power is valuable.

**Churches, Education, etc.**—The several religious denominations are represented here by 17 churches. Concord has graded schools and high school fitting pupils for college, St. Paul's, a noted Episcopal training-school for boys, a good public library, a daily and 3 weekly newspapers, and a monthly magazine.

**Finances.**—It has 3 national and 4 savings banks. Valuation of the city, \$11,000,000.

**History.**—This place was the headquarters of the Penacook tribe of Indians, under Passaconway, who were friendly to the English. It was granted by Massachusetts as Penacook in 1725; incorporated Rumford in 1730; came under the jurisdiction of New Hampshire, and was incorporated Concord in 1765; became State capital in 1816; shire-town of Merrimack county in 1823, and adopted city charter in 1853. A bronze statue of Daniel Webster, presented by Benjamin P. Cheney to the State of N. H., was unveiled in the State-house Park June 17, 1886.

**Population.**—In 1870, 12,241; in 1880, 13,843; in 1885, over 14,000.

GEORGE E. JENKS,

Supervisor 10th Census, Dist. of N. H.

**Concord**, on R. R., capital of Cabarrus co., N. C. (see map of North Carolina, ref. 3-E, for location of county), 20 miles N. E. of Charlotte. It has a cotton-factory and two public gins, iron manufactures, foundry, machine-shops, one boys' and two girls' academies; large mines are in the vicinity. Pop. in 1870, 878; in 1880, 1264.

**Concordance** [Lat. *concordantia*, from *concordo*, to "agree"], an index or dictionary in which all the important words used (*verbal* concordance) or subjects treated of (*real* concordance) in any work are arranged alphabetically, and references made to the places where they occur. Of biblical concordances the number is very large. The earliest was to the Vulgate by Antony of Padua (born in 1195; died in 1231 A. D.). Next in order was the Hebrew concordance of Rabbi Isaac Nathan (finished in 1448, published in 1523). The first Greek concordance to the New Testament, by Xystus Betuleius (whose real name was Birek), appeared in 1546. Kircher's concordance to the Septuagint appeared in 1607. The best are—For the Hebrew, Fürst (1840); for the New Testament Greek, Bruder (1853); for the Septuagint, Trommius (1718); for the Vulgate, Duttrion (1838). The first English concordance was by John Marbeck (1550); the best by Alexander Cruden (1737). The Englishman's Greek concordance to the New Testament (1839) is very valuable, also Thom's "Concordance to the Revised New Testament" (1883). Among the chief concordances to the German Bible are those of Lankisch (1677), Schott (1827), and Hanff (1828-34). The first French concordance was by Mark Wilks (1840). There is a concordance to Shakespeare by Mrs. Mary Cowden Clarke (1845), and to Tennyson by Brightwell (1869). The special lexicons, as to Homer by Crusius, and to Plato by Ast, are essentially concordances.

**Concordat** [Lat. *concordata*, "things agreed upon," from *concordo*, "to agree;" Fr. *concordat*; It. *concordato*], a treaty in relation to the ecclesiastical affairs of a Roman Catholic state, between the pope, as head of the Roman Catholic Church, and the government of that state. The treaties between the pope and Protestant powers are usually called conventions. The name concordat was first given to the treaties made by Pope Martin V. with Germany, France, and England in 1418. These treaties are called in history the Concordats of Constance. The name, however, is often given to various ecclesiastical treaties of older date than the ones just mentioned.

The usual subjects of concordats have been the right claimed by the popes to fill vacant sees and benefices, and to appropriate the whole or a part of the revenues during the vacancy, as well as to confer on the clergy certain immunities from taxation and civil jurisdiction, and to offer

an asylum to criminals. There is, however, a striking difference between the earliest concordats and those of a later date. The "Calixtine Concordat," one of the most famous of the earlier treaties of the kind, was concluded in 1122 between Henry V. of Germany and Pope Calixtus II., and has since been regarded as a part of the fundamental law of the Roman Catholic Church of Germany. But here it is the emperor who makes all the concessions. He gave up the right of investiture with ring and staff; he guaranteed the freedom of episcopal elections and consecrations throughout Germany; he promised to restore all ecclesiastical possessions usurped by the crown, etc. But the case presents quite another aspect after the beginning of the fifteenth century, when national kingdoms had been consolidated and monarchical states organized, and thus a basis founded from which an effective resistance could be made to the corruptions and encroachments of the Roman Catholic Church. It was now the pope who had to make concessions; or, at least, the concessions became reciprocal. By the concordat which Martin V. felt compelled to conclude with France and Germany, May 2, 1418, and with England, July 11 same year, limitations of the number and revenues of cardinals were fixed, restrictions of appeals to the pope, of papal dispensations and indulgences, etc., were made, and very severe rules against simony were enacted. This concordat was followed up in Germany by that of Frankfort (1447), and in Austria by that of Aschaffenburg (1448). By the latter the pope gained some advantages, but the former was very humiliating to him. Eugene IV. was compelled to yield, however, as Germany threatened to leave his guidance—that is, to accept the antipope, Felix V. In France the Pragmatic Sanction of Bourges—that is, the formal acceptance by the French clergy of the decrees of the Council of Basel—led to a new concordat, concluded between Leo X. and Francis I. Aug. 18, 1516. But it was so cunningly planned by the Curia, and so vaguely formulated, that it gave rise to perpetual haggling, and finally led to the famous declaration by the French clergy, with Bossuet at its head, in 1682. Among the most celebrated concordats is that which Bonaparte as first consul forced upon Pius VII. (July, 1801), and which has since, for the most part, regulated the relations of the Gallican Church to the Roman see. The clergy became subject to the civil power in all temporal matters; and though the pope in matters of discipline had very large powers, and was still to confer canonical institution, the appointment of all the bishops was retained by the government. By the concordat which was entered into between Rome and Austria at Vienna on the 18th of Aug., 1855, the emperor Francis Joseph I. promised that the pope should have direct communication, free from surveillance by the civil power, with the bishops, clergy, and people. Bishops were to have free communication with their clergy and their flocks, and to perform all functions which are prescribed by the canon law. The whole system of national education, even in private schools, was placed under the control of the Church. No one could teach theology without episcopal permission. The government bound itself to prevent the dissemination of books pointed out by the bishops as dangerous to religion. All questions of marriage, except in so far as they involved civil consequences, were reserved exclusively for the ecclesiastical courts. It opened with the declaration that the Roman Catholic Church should enjoy all its privileges and prerogatives in full and unimpeded, and it ended with cancelling as null and void all Austrian laws which were opposed to the doctrines of the Church in Rome. Indeed, all the most important institutions of social life—the school, the university, matrimony, etc.—and all the most important forms of personal life, literature, science, and art, were placed at the disposal of the Curia. But when it came to a practical realization of this concordat, it soon became evident that many of its stipulations were so strongly opposed to the spirit of modern times that it would be complete folly to try to carry them out. The people everywhere showed the greatest impatience with the pretensions of the Roman Curia, and finally the battle of Sadowa opened the eyes of the Austrian government, and after the Vatican council of 1870 the concordat was abolished without the consent of the pope. Important conventions were concluded in the nineteenth century with the Netherlands, Russia, and Wurtemberg.

**Concord, Book of** (*Concordia*, *Concordien-Buch*), the collection of the Confessions which are received either by the entire Lutheran Church or by the larger part of it. It was published in 1580, and supplanted a great number of bulky Corpora Doctrinae. It contains—1, the three General Creeds, the Apostles', Nicene, and Athanasian; 2, the Augsburg Confession; 3, the Apology of the Confession; 4, the Schmalcald Articles; 5, the Smaller and the Larger Catechism of Luther; and 6, the Formula of

Concord, to which the "Book of Concord" is related as the whole to a part, though the two are often confounded. (See KRAUTH's "Conservative Reformation," art. vii.)

C. P. KRAUTH.

**Con'cord, For'mula of** (*Concordia Formula*), the last part of the "Book of Concord," in which it appeared, for the first time, in 1580. It consists of two parts, of which the first may be said to be the text, the second the commentary, and has an appendix of testimoniae. It was occasioned by the vacillations of MELANCHTHON (which see), real and seeming, the Crypto-Calvinistic and other controversies, and the appearance of a number of Corpora Doctrinae objectionable in various respects. Protracted and patient conferences and labors, in which the greatest divines of the Lutheran Church, especially Andreae and Chemnitz, took part, preceded and accompanied the preparation of it. Eighty-six of the states of the empire united in it. Augustus of Saxony was among its most important promoters. Its topics are—the Rule of Faith and the Creed, Original Sin, Free-Will, Justification, Good Works, the Law and the Gospel, Third Use of the Law, the Lord's Supper, the Person of Christ, the Descent into Hell, Ceremonies, the Adipphora, Predestination, various sects and heresies. "The war of the Formula was fought for great principles; it was bravely and uncompromisingly fought, but it was fought magnanimously under the old banner of the Cross. It was crowned with victory, and that victory brought peace." (See KRAUTH's "Conservative Reformation, and its Theology," art. vii.)

C. P. KRAUTH.

**Concordia**, a goddess of the Roman mythology, may be considered a personification of domestic concord and of harmony between several classes of the body politic. Several temples were erected to her in ancient Rome. The sessions of the senate were sometimes held in the Temple of Concord (*Aedes Concordiae*).

**Concordia**, a village, 35 miles N. E. of Venice, occupying the same site as the old city of Concordia, founded by Augustus after the pacification of the empire, and destroyed by Attila in 432. In 1873 the old Christian cemetery of the city was discovered, and 160 stone coffins, often of great archæological interest, were dug up.

**Concordia**, city, on R. R., capital of Cloud co., Kan. (see map of Kansas, ref. 4-G, for location of county), on the Republican River. It has a normal school. Pop. in 1880, 1853; in 1885, 3002.

**Concord River**, of Middlesex co., Mass., is formed by the junction of the Assabet and Sudbury Rivers, at the village of Concord. It flows northward, and enters the Merrimack near Lowell. The scenery of this river has been described by Thoreau in his work entitled "A Week on the Concord and Merrimack Rivers."

**Con'crete** [from the Lat. *concreresco*, *concretum*, to "grow together"], in philosophy, is a term applied to any quality which is considered in connection with the object to which it belongs; a quality not concrete is abstract. Thus "wisdom" is an abstract quality; but when we speak of a "wise man," the quality becomes concrete.

**Con'crete**, a compound of hydraulic cement or of mortar with gravel, which hardens into a stone-like mass. It is sometimes moulded into blocks and used as an artificial building-stone, but more often it constitutes the foundation of buildings which would otherwise have to rest upon sand or insecure earth. It is also used as a flooring for cellars, and is said to effectually prevent the rising of miasmata and vapors from the earth. The name concrete is often applied to a mixture of coal-tar or asphaltum with gravel, much employed for walks or pavements, and also used as a roofing-material. (See CEMENT, by GEN. Q. A. GILLMORE, U. S. Army.)

**Concretion** [Lat. *concretio*, from *con*, "together," and *creresco*, *cretum*, to "grow"], in medicine, an extraneous solid which accumulates within the body. Concretions may be chemical precipitates from the secretions, and as such occur in the bladder, the gall-cyst, or salivary ducts. These are called calculi, and are sometimes of organic and sometimes of non-organic matter. Again, concretions may be of phosphate or carbonate of lime, occurring in tubercular or other degenerate masses; while in the joints they are sometimes of urate of soda, as in "gouty concretions." Within the alimentary canal they are often composed of hair which has been swallowed, or of cholesterin, and sometimes of magnesia salts.

**Concu'binage** [Lat. *concubinatus*, from *con*, "together," and *cubo*, to "lie"], a term used to denote the relation of a man and woman who habitually cohabit without lawful marriage; or, more frequently, a kind of inferior marriage, which does not give the woman the legal position of a wife. Concubinage was lawful among the ancient Hebrews, as the cases of Abraham, Jacob, and many other

examples show. Concubinage in ancient Rome was often a union between persons who could not legally intermarry on account of difference in rank. It appears that in general the children of a concubine were illegitimate among the Romans, though many examples of their apparent legitimacy have been adduced. The Church of Rome never formally forbade concubinage until the Council of Trent. The Protestant churches have uniformly opposed it, as contrary to the spirit of Christianity. The only relic of legalized concubinage in enlightened countries is MORGANATIC MARRIAGE (which see).

**Concu'rent**, acting in conjunction; agreeing in the same act or opinion; contributing to the same event. Jurisdiction is said to be concurrent or cumulative when it may be exercised in the same cause by any one of two or more courts. To prevent the collision which might arise from each of the courts claiming to exercise the right, it has been established as a rule that the judge who first exercises jurisdiction in the cause acquires a right *jure preventionis* to judge in it, exclusive of the others. This right of prevention appears to be peculiar to criminal jurisdiction.

**Concus'sion** [from the Lat. *concussio*, *concussus*, to "shake violently" (from *con*, intensive, and *quatio*, *quassum*, to "shake")], in surgery, the disturbance caused by a fall or blow. In all severe injuries a concussion or shock is caused to the nervous system, which may require the assiduous care of a physician. (See SHOCK.)

**CONCUSSION OF THE BRAIN** [Lat. *commotio cerebri*] sometimes causes alarming symptoms, even to suppression of the functions of the brain, yet without any apparent organic disease. Slight concussion of the brain (popularly called "stunning") causes vertigo, loss of memory, tinnitus aurium, and stupefaction; but these are temporary. When more severe, there is loss of sensation and volition, with vomiting, the patient being apparently in a sound sleep, but without stertorous breathing. The pulse is variable, being more rapid and feeble than in compression of the brain; the extremities are cold. Little can be done until reaction occurs, when the case can be treated according to general principles. In some cases of concussion it is necessary to use local or general stimulants, but usually moderate heat applied to the surface, abundant supplies of air, and proper adjustment of the injured parts are all that are required until consciousness is partly restored, when a small portion of wine or other stimulant may be useful. The effect of these should be carefully noted, and the patient should be placed in a comfortable position in bed during the process. In all cases absolute rest is essential. If the concussion has been severe, the patient is often not secure until a long time after, even though apparently well, for serious nervous lesions may be slowly developed.

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**Concussion Fuse.** See FUSE.

**Condamine, La** (CHARLES MARIE), a French savant, born Jan. 28, 1701, accompanied Bouguer to Peru, 1736, in order to determine the figure of the earth. He published an "Account of a Journey to South America" (1745) and "The Figure of the Earth Determined" (1749). Died Feb. 4, 1774.

**Condé**, a town of France, department of Nord, at the confluence of the Haine and Scheldt, 7 miles N. N. E. of Valenciennes. It is well built, and has strong fortifications constructed by Vauban. It has a town-hall, an arsenal, and a military hospital; also manufactures of chicory, starch, cordage, and leather. It has been several times besieged, and was taken by the Austrians in 1793. The princes of Condé derived their title from this town. Pop. in 1881, 4621.

**Condé, de** (HENRI I. DE BOURBON), PRINCE, born Dec. 9, 1552, was a son of Louis I. (see below). He was a cousin of Henry of Navarre, and joined the Protestant army about 1584. He died Mar. 5, 1588, and it is supposed he was poisoned by his servant. He left a son, Henry II., prince de Condé, who was educated a Catholic, and was the father of the great Condé. Died in 1646.

**Condé, de** (LOUIS HENRI JOSEPH), PRINCE, styled also DUKE OF BOURBON, the last of the line of Condé, was born Apr. 13, 1756. He was the father of the duc d'Enghien, who was murdered in 1804. Condé fought against the French Republic (1792-1800), and was found dead in 1830, having died by violence, and perhaps by his own hand.

**Condé, de** (LOUIS I. DE BOURBON), PRINCE, an eminent French general, born at Vendôme May 7, 1530, a son of Charles de Bourbon, duc de Vendôme, brother of Antony of Bourbon, and uncle of Henry IV. As an adversary of the family of Guise he took a prominent part in the conspiracy of Amboise in 1559. He was the general-in-chief of the Huguenots in the civil war which began in 1562. He was defeated and taken prisoner at Dreux in that year.



In 1567 he commanded at the battle of Saint-Dénis. Having been defeated and wounded at the battle of Jarnac, Mar. 15, 1569, he was killed after he had surrendered. (See DESORMEAUX, "Histoire de la Maison de Condé.")

**Condé, de** (LOUIS II. DE BOURBON), PRINCE, styled THE GREAT CONDÉ, a celebrated French general, born in Paris Sept. 8, 1621, was a son of Henri II., prince of Condé, and was the first prince of the blood. In his youth he was called the duc d'Enghien. He married, in 1641, Clarie Clémence de Maillé-Brézé, a niece of Cardinal Richelieu. In May, 1643, he gained a signal victory over the Spaniards at Rocroi. He defeated the Bavarian general Mercy at Nordlingen in 1645, and inherited his father's title in 1646. He gained a decisive victory over the Spaniards at Lens in 1648. In the civil war of the Fronde, which began in 1649, he at first supported Mazarin and the royalist party. Early in 1650 he was arrested by Mazarin, whom he offended by his haughty conduct. After he had been confined nearly a year he was released, and raised an army to fight against the court. He marched in 1652 against Paris, which was defended with success by Turenne. In 1653 he was condemned to death, and entered the service of the king of Spain, who gave him command of an army in Flanders. He was there opposed to Turenne, over whom he could not gain much advantage. The war was ended by a treaty between France and Spain in 1659. The prince of Condé was then pardoned, and returned to the service of the French king. Having obtained the command of an army in Flanders, he fought an indecisive battle at Seneffe against William, prince of Orange, in 1674. Died Dec. 11, 1686. "The art of war," says Voltaire, "seemed in him a natural instinct." Bossuet pronounced a funeral oration on him. (See DESORMEAUX, "Histoire de Louis, Prince de Condé," 4 vols., 1768; LORD MAHON, "Life of the Prince of Condé," 1840; VOLTAIRE, "Siècle de Louis XIV.")

**Condé, de** (LOUIS JOSEPH DE BOURBON), PRINCE, the only son of the duke of Bourbon, was born Aug. 9, 1736. He served with distinction in the Seven Years' war (1755-62), and emigrated as a royalist in 1789. He led the French emigrants who in 1792 fought against the republic in co-operation with the Austrian army. He disbanded his corps of emigrants, 1801, returned to France, 1814, and died May 13, 1818.

**Condensa'tion** [Lat. *condensatio*, from *con*, and *densus*, "dense, compact"], the act of rendering a body more dense and compact by bringing its particles into closer proximity and increasing its specific gravity. The term is often applied to the conversion of a vapor or gas into a liquid or solid either by pressure or by the agency of cold.

**Condensed Milk.** See MILK, by PROF. C. F. CHANDLER, Ph. D., LL.D.

**Condensing Steam-Engine.** See STEAM-ENGINE, by PROF. W. P. TROWBRIDGE.

**Condé-sur-Noireau**, a town of France, department of Calvados, on the river Noireau, 23 miles S. S. W. of Caen. It has manufactures of muslin, linen, woollens, cutlery, and leather. Pop. 12,996.

**Con'dict** (JOHN), a surgeon in the Revolutionary war, born in 1755, was a member of Congress from New Jersey (1799-1803 and 1819-20), and U. S. Senator (1803-17). Died at Orange, N. J., May 4, 1834.

**Con'die** (D. FRANCIS), M. D., an American physician and author, was born in Philadelphia May 12, 1796, and graduated as M. D. at the University of Pennsylvania in 1818. He has published, besides other works, "Diseases of Children" (4th ed., 1854), edited Churchill's "Diseases of Women," and contributed much to the periodical literature of his profession. Died Mar. 31, 1875.

**Condillac, de** (ÉTIENNE BONNOT), ABBÉ DE MUREAUX, an eminent French philosopher, born at Grenoble in 1715, was a brother of the abbé de Mably. He associated in his youth with J. J. Rousseau and Diderot. In 1746 he published an ingenious "Essay on the Origin of Human Knowledge" ("Essai sur l'origine des connaissances humaines," 2 vols.), and in 1749 a "Treatise on Systems" ("Traité des Systèmes," 2 vols.). His reputation was widely extended by his admirable "Treatise on Sensations" ("Traité des Sensations," 3 vols., 1754). He was chosen a member of the French Academy in 1768. He adopted the theory that our knowledge and ideas are derived from the operations of the senses. Died Aug. 3, 1780. Among his works is "The Art of Thinking," forming part of a series entitled "Cours d'Études." He argues that man owes the development of his faculties to the use of signs. His complete works appeared in 1798 (23 vols.; new ed. 1824, 16 vols.). His "Origin of Human Knowledge" has been translated by TH. NUGENT (1756). (See ROBERT, "Les Théories logiques de Condillac," 1866.)

**Condi'tion** [Lat. *conditio*, from *condo*, *conditum*, to "build" or "found"], in logic, denotes that which must precede the operation of a cause, that which must exist as the ground or necessary adjunct of something else. For instance, when an impression is made on wax by a seal, the seal is said to be the cause of the impression, and the softness of the wax is a condition.

CONDITION, in law, has several significations. 1. *In the Civil Law.*—The principal case here is a clause in a contract, whereby a party, anticipating that an event may produce some change which he is desirous to guard against, provides what shall be done in case the event happens. For example, if it is provided that if a house that is sold is found to be subject to a certain burden or servitude the sale shall be void, the provision is a condition. Conditions were classified in an artificial manner (for which see POTHIER on "Obligations," DOMAT, and other text-writers). 2. In common law, it means the *status* of a person in respect to his legal rights, capacities, and disabilities. (The subject will be more fully considered under the word STATUS.) 3. In common law it further means a qualification or restriction annexed to an estate arising either upon a conveyance or under a will, whereby the estate is created or enlarged or defeated, or a like clause affecting the existence of an instrument or the operation of a contract. The leading instance to be considered is a qualification annexed to an estate. It is important, at the outset, to distinguish between a *condition* and a *covenant*. A condition either enlarges or defeats an estate; a covenant is a mere engagement under seal to do an act. If a condition be broken, the estate either does not exist at all, or, if vested, the grantor may by appropriate means defeat it. In case a covenant is broken, the remedy is to sue for damages, or to compel the covenantor to perform it, or to prevent him by injunction from breaking it. The same act may by suitable words have imparted to it both the character of a condition and a covenant, when a grantor will have his choice of remedies. Conditions as to their form are either express or implied; as to their relation to the estate, they are either precedent or subsequent. A condition is said to be precedent when it precedes the vesting or enlarging of the estate; it is subsequent when, the estate having vested, its regular effect is to defeat it. The distinction does not depend upon any form of words, but upon the intent of the parties. It will be observed that the regular effect of a condition subsequent is to lead to a forfeiture. As the spirit of the law is opposed to forfeiture, it is governed by technical rules that would not be applied in case of a mere action upon a promise or covenant. Great care must be taken not to confound rules which appertain to the one subject with those which prevail in the other. It is an elementary rule that a condition subsequent does not affect the nature of the estate; it only qualifies it to this extent, that in the happening of the specified event it may be made to terminate before its natural expiration. Thus, an estate in fee or for life or for years remains a member of its class, though it may be defeated by the happening of the event which is called a condition. It should also be stated that the happening of the prescribed event does not of itself defeat the estate. There must be an affirmative act on the part of the grantor whereby he repossesses himself of his estate. This is technically called a "re-entry." In well-drawn instruments a power of re-entry is expressly reserved. This rule is so rigidly adhered to that if a lease should prescribe that an estate of a tenant should, on the happening of an event, be null and void, a re-entry would still be necessary. This rule leads to an important principle, that the right to take advantage of the forfeiture may be waived expressly or by implication, as where rent upon a lease is accepted with knowledge of the cause of forfeiture. The technical rules of the common law do not apply to testamentary provisions or legacies of personal property, as that branch of jurisprudence was developed by the ecclesiastical courts from the Roman law. Much caution is accordingly necessary in discriminating between devises of land and legacies of personal property, for, though in the same instrument, they will be governed by different rules. The rule that the grantor must re-enter is to be confined to a strict case of condition. It does not apply to a *conditional limitation*. The distinction between the two should be pointed out. In a condition the estate on the happening of the prescribed event is to return to the grantor; in a conditional limitation it is to pass over to a third person. An illustration will show the difference between them. Thus, if a testator should give his daughter an estate to be defeated in case she entered a convent, there would be a condition; but if he had added that in the event supposed it should go to his brother, it would be a conditional limitation. The main importance of the distinction is, that in case of the conditional limitation no re-entry is necessary, and the estate

on the happening of the event passes at once to the person designated. (The law of conditions will be found in the works on real property, such as WASHBURN, CRUISE, and HILLIARD, and to a certain extent in works on landlord and tenant, such as TAYLOR.) T. W. DWIGHT.

**Conditioned, Philosophy of the**, a name given to the system of Sir William Hamilton. It is a development and application of the general principle of the Antinomies of Kant. It regards the judgment of causality as derived from an impotence of the mind—the principle of the conditioned—the law that the conceivable has always two opposite extremes, and that the extremes are equally inconceivable. We conceive of existence as conditioned in time, and thus expressing at once and in relation the three categories of thought which afford us in combination the principle of causality, the law of which is that when an object is presented phenomenally as commencing, we cannot but suppose that the complement of existence which it now contains has previously been. (See HAMILTON's "Metaphysics," lect. xxxviii., xxxix.) C. P. KRAUTH.

**Condom**, a town of France, department of Gers, on the Bayse, here crossed by two bridges, 24 miles N. N. W. of Auch. It has a noble Gothic church, two hospitals, and manufactures of cotton and mixed fabrics. It was founded in 721 A. D. Pop. in 1881, 8555.

**Condonation** [Lat. *condonatio*], in the law of divorce, means the conditional forgiveness of an offence for which, without such forgiveness, a divorce may be obtained. In form it may be either express or implied. It is sometimes difficult to decide whether the acts are of such a nature as to justify an implication of forgiveness. Cohabitation of the parties with knowledge that the offence has been committed, and with the means of establishing its commission in a court of justice, will lead to an implication of forgiveness. Condonation is conditional in this sense, that a repetition of the offence revives the original charge. According to some authorities, the original charge may be revived by the commission of an offence of an inferior grade. The forgiveness is said to imply that the innocent party shall in all respects be treated kindly. The point, however, is not fully settled. When an offence has been condoned and not repeated, it must be treated as though it had never existed. The original charge is blotted out conditionally. (The subject will be found fully treated in the treatises on divorce, such as BISHOP and POYNTER. The ecclesiastical reports in England and those of the court of divorce may be advantageously referred to.)

**Con'dor** [a Spanish word of Peruvian origin], the



Condor.

*Sarcorhamphus gryphus*, the great vulture of the Andes, one of the largest known birds of prey; it is four feet high. The average expanse of wing is about nine feet. The crop and the entire neck are bare; the head and neck of the male have fleshy caruncles. In North America it is represented by the California condor (*Pseudogryphus Californianus*), of the same size, but lacking the caruncles and having the crop feathered.

The condor is known to soar to the height of nearly six miles, far above ordinary clouds, and thence to survey the vast expanse in search of prey. This rarefied space is his native air, and he only descends to capture his prey. Condors rarely attack human beings. They pursue the deer, the llama, and young cattle, and devour them with great

voracity. After these meals they are almost unable to fly, and are easily caught by the Indians. The eggs are white, and three or four inches long; they are deposited on the bare rocks, as the condor makes no nest. The female guards the young for a year; they are for several months covered with down or soft frizzled hair, which causes them to appear almost as large as the adult. The condor is found in the Cordilleras of S. and Central America and Mex., and in the Pacific coast region from the Colorado to the Columbia, but lives chiefly in the highest peaks of the Andes.

**Condorcet, de** (MARIE JEAN ANTOINE NICOLAS CARITAT), MARQUIS, an eminent French philosopher and mathematician, born at Ribemont, in Picardy, Sept. 17, 1743, of an ancient family of Dauphiné. He studied in the college of Navarre, and became in 1762 a resident of Paris. Having written an "Essay on the Integral Calculus," he was admitted into the Academy of Sciences in 1769. He was an intimate friend of D'Alembert. In 1777 he was chosen perpetual secretary of the Academy of Sciences, and in 1782 was admitted into the French Academy. He had a large share in the "Encyclopédie." He favored the popular cause in 1789, wrote several able political treatises, and published the influential "Feuille villageoise," and was elected to the National Convention in 1792. He was a moderate republican, and voted generally with the Girondists. He married in 1786 Sophie, sister of Gen. Grouchy, noted for her beauty (born in 1764, died in 1822). Having been proscribed by the Jacobins in May, 1793, he remained secreted in the house of a friend in Paris for eight months. During this period he wrote a "Historical Sketch of the Progress of the Human Mind" ("Esquisse d'un Tableau historique des Progrès de l'Esprit Humain," 1795). This is regarded as his greatest work. He believed in human perfectibility, and had noble ideas of human destiny. He quitted his place of refuge early in 1794 in order to enjoy a rural excursion, was arrested, and confined in prison at Bourg-la-Reine, where he took poison and died Mar. 28, 1794. "Thus died," says Lamartine, "this Seneca of the modern school. The day of recognition has not come for him, but it will come and will exculpate his memory from reproach." A collection of his numerous works was published by O'Connor and Arago (12 vols., 1847-49). (See D. F. ARAGO, "Biographie de Condorcet," 1849.)

**Condottieri**, an Italian word signifying "conductors," was applied to the mercenaries who during the Italian wars in the fourteenth and fifteenth centuries took service under any prince or government that chose to engage them. They consisted principally of heavy-armed cavalry, and for a long period the wars of Italy were left entirely to them. There came to be an understanding between them to spare their troops as much as possible, until at length battles were fought with little more hazard than would be incurred in a tourney. Among the most celebrated were Lodrisio, about 1339; Fra Moreale, 1350; Guarneri, Lando, and Francisco di Carmagnola, about 1412; Francesco Sforza, about 1450; and the English Hawkwood.

**Conduction.** See HEAT, by PROF. W. P. TROWBRIDGE, and ELECTRICITY, by PRES. HENRY MORTON, PH. D.

**Conduc'tor** [from the Lat. *con*, intensive, and *duco*, ductum, to "lead"], a leader, a guide, a director, or commander. Conductor in music is the person placed at the head of a band of musicians to lead the performance and beat the time. The term is applied to a person who has charge of a train of railway cars and receives the fare. Also a metallic lightning-rod or other substance through which electricity will pass freely. (See ELECTRICITY.) The metals are the best conductors of electricity. Among the numerous non-conductors are glass, wax, silk, wool, resin, caoutchouc, amber, gems, sulphur, lime, and dry air.

**Cone** [Gr. *κωνος*; Lat. *conus*], in mathematics, the name of a solid whose surface is generated by a straight line moved in such a manner as to pass through a fixed point and to touch continually a given curve or directrix. The fixed point is called the *vertex*; the part of the cone on which the directrix lies is the *lower nappe*, and the other part is the *upper nappe*. There are many varieties of the cone, but the term is usually applied to those having circular bases. The most common kind is the right cone, which may be conceived as being generated by the revolution of a right-angled triangle round one of its legs. The line from the apex of a cone to the centre of the base is called the *axis*, and in the right cone it is perpendicular to the base. In the oblique cone the axis is inclined to the plane of the base at an angle other than a right angle. A truncated cone is the lower part of a cone cut by a plane parallel to the base. Four curves, called the *conic sections*, may be formed by a plane cutting the right cone. If the cone be cut by a plane parallel to the base, the section is a circle; if the plane cut the cone across, making any angle

other than a right angle with its axis, the section is an ellipse. If the cutting plane be parallel to the side, the section will be a parabola. In every other case than those stated the section will be a hyperbola, unless section is made through the apex, when a point is produced. Hence the point is one of the conic sections. If two cones were set one above the other, point to point, the one being a continuation of the other through the apex, or, more strictly, if a cone be regarded as consisting of two nappes, as in the definition given, the plane producing the hyperbolic section would cut the second as well as the first, though none of the other planes would. There are thus two equal branches of the hyperbola belonging to the two nappes of a cone.

**Conecte** (THOMAS), born at Rennes, France, toward the close of the fourteenth century, burnt at the stake in Rome in 1434. He was a Carmelite monk, and produced a deep impression by his preaching denouncing the vices of society at large, and more especially the corruption of the Church. From France he passed into Italy, where his success was still more pronounced. But, as he also preached against the secular power of the pope and the hierarchy, he was accused of heresy, seized, and burnt.

**Coneglia'no**, a town of Italy, in the province of Treviso, on a railway from Venice to Trieste, 30 miles N. of the former city. It has a cathedral and silk and woollen manufactures, a triumphal arch erected in honor of Francis I., emperor of Austria, and a number of fine frescos by Pordenone, who was born here. Pop. 8938.

**Conejos**, capital of Conejos co., Col. (see map of Colorado, ref. 6-C, for location of county), on one of the head-streams of the Rio Grande. Pop. in 1880, 339.

**Cones, Volcanic.** See VOLCANOES, by PROF ARNOLD GUYOT, Ph. D., LL.D.

**Co'ney Isl'and**, situated on the W. end of Long Island, in the township of Gravesend, Kings co., N. Y., is 5 miles long from E. to W., and averages less than 1 mile in width. It is separated from the main land by a narrow creek, which runs from Gravesend Bay to Sheepshead Bay. Some 60 acres are arable, but the land is mainly composed of white sand liable to be displaced by the winter storms. It is one of the most popular watering-places in the world. Until 1874 it was a comparatively neglected waste, only the W. end being used to any extent for bathing and recreative purposes. Its sudden rise and growth have been phenomenal, for in four years a few rude restaurants and bathing-houses on a desolate beach were replaced by splendid hotels, covering the shore for miles, the intervening spaces being filled with concert-halls, fine bathing-houses, and the minor amusements suited to great and varied congregations of people. Its great attraction is its fine beach, 5 miles long, fronting the Atlantic Ocean. The water deepens gradually, there is but little undertow, and the surf is rarely boisterous. It is considered the safest beach extensively used for bathing purposes upon the coast. Henry Hudson discovered this island on Sept. 3 or 4, 1609. A crew from his ship landed on the shore and trafficked with the Canasie Indians. Subsequently, there was a quarrel, and John Coleman, a sailor, was killed by the savages, while two of the seamen were severely wounded. Coleman was buried at what is now known as "Norton's Point." Coney Island therefore has an historical interest as the scene of the first landing of Europeans in the State of New York and as holding the grave of the first white man. To accommodate the travel to this place there are many steam railways and steamboat lines running from New York, Brooklyn, Jersey City, Newark, and other points. The larger part of the amusement-seeking population of the metropolis find their way to Coney Island during the summer season. This great pleasure resort has practically four divisions—Manhattan Beach, Brighton Beach, West Brighton, and the West End. These points are connected by railways and carriage lines. Manhattan Beach is at the extreme eastern end of the island. West Brighton was the first part of the shore to be improved and rendered popular, but it was Manhattan Beach which first gave it a fashionable character. The company controlling this property owns 500 acres of land, which has a frontage of over 2 miles on the Atlantic Ocean. Sheepshead Bay bounds it on the N. The Manhattan Hotel is one of the largest seaside resorts in the world. It is within 400 feet of the ocean at high tide, and has a frontage of 600 feet. Another very large hotel on Manhattan Beach was opened in 1880. Brighton Beach adjoins Manhattan on the W., and has a frontage on the ocean of 600 feet. The hotel is 525 feet wide. The "Concourse," which adjoins, is a wide asphalt drive and walk, a mile in length, and kept free from hotels and bathing-houses by the city of Brooklyn. A drive 150 feet wide connects Prospect Park, Brooklyn (a distance of 5 miles), with this Concourse. The next adjoining subdivision is

West Brighton Beach, a more democratic locality, renowned for its resources in the way of clam-roasts and chowder, and for the great variety of minor entertainments which it furnishes. It has an aquarium, an observatory, and a seaside home for children. The observatory, which is 300 feet high, is one of those used at the Centennial Exhibition, and affords extensive land and marine views. An iron pier was erected in 1879 at West Brighton. It extends 1200 feet into the ocean. It is 50 feet wide, but at the end of the pier it is enlarged to 100 and 120 feet, to accommodate bathers and persons who want to eat in the open air surrounded by water. This pier rests upon wrought-iron tubular piles, and has so far withstood the winter storms. It affords landing facilities for numerous steamboats. To the W. of the iron pier, and halfway to the W. end of the island is a wooden pier, 600 feet long, which is no longer fit for use, having been badly damaged by the waves. Another iron pier, similar to the first, has since been constructed a very short distance to the E. of it. West End proper is the last subdivision, and till 1874 was the only popular resort on the island. Its progress has been retarded by the subdivision of the property, the small holdings being occupied by bathing-houses and restaurants of an inferior character. New York is the only great city in the world which has an ocean beach available for popular watering-place purposes. London, Paris, Berlin, Vienna, and St. Petersburg have become populous because they are the capitals of powerful empires, but the multitudes which have settled around New York Bay and on the adjacent shores of the Hudson and East rivers are there because attracted by the commerce, and consequent wealth, which makes living in the metropolis of America pleasant and profitable. Coney Island, with its fine beach, low temperature, and unusual bathing facilities, is only 10 miles distant from New York and 5 miles from Brooklyn. Hence it is really marvellous that it was permitted to rest so long in obscurity, and there is every reason to believe that its prosperity will be permanent, notwithstanding the rapidity of its development. D. G. CROLY.

**Confederate States, or Southern Confederacy.** The earlier authentic assertions of a right (alleged therein to have been reserved by the States in ratifying the Federal Constitution) to resist the constituted authorities and subvert the laws of the Union when one or more of those States should adjudge any exercise of Federal authority unwarranted by the said Constitution, were made by the legislature of Kentucky in 1798, and by that of Virginia in 1799; the Kentucky resolves in which this doctrine was formulated having been prepared by Thomas Jefferson, as those of Virginia were by James Madison. In neither case did these resolves appear to contemplate disunion, but rather a *nullification* of the obnoxious Federal act by the sovereign power of a State. The first distinct avowal of disunion sentiment was made on the floor of the House of Representatives by Josiah Quincy (of Boston, Massachusetts), who, in opposing the purchase of Louisiana, asserted that this measure (which he agreed with its author, President Jefferson, in pronouncing unconstitutional) virtually dissolved the Union, so that the States were freed from its obligations and should prepare for peaceable or forcible separation. This avowal elicited little sympathy or approval. Again, during our last war with Great Britain (1814-15) some of the more ardent Federalists of New England, being intensely hostile to that war, openly advocated secession, and a convention held by them at Hartford, Connecticut, was popularly and not unreasonably regarded as impelled by a spirit inimical to the Union. Hence, the members of this convention were ever after under the ban of public opinion, and the Federal party never regained the public confidence. Again, when the North and South came into fierce collision respecting slavery on the question of admitting Missouri as a slave State, menaces of disunion if she were excluded were heard—this time from the South. When in 1828 Congress passed a stringently protective tariff, South Carolina, under the lead of John C. Calhoun, George McDuffie, and General James Hamilton, Jr., threatened to nullify the operation of that act within her own borders; and, though that tariff was modified in 1832, she adhered to her resolve and proceeded to call a convention whereby the existing tariff was pronounced null and void. General Jackson, then President, denied her right to do this with effect in a vigorous and masterly proclamation, whereof Edward Livingston, secretary of state, was understood to be the scribe, and, in some degree, the author. Congress proceeded to modify still further the tariff, and South Carolina thereupon waived the execution of her ordinance; so a collision was averted.

African slavery, which, though the slaves were few at the North, had been all but universal, became at length distinctively Southern, and was reprobated by an intelligent, conscientious, growing minority at the North. They agitated for the overthrow of human bondage, regardless of

the fact that the Federal Constitution conferred on Congress or the non-slaveholding States no power over the domestic institutions of the South. Prophecies and threats of disunion were now freely uttered in the slave States. The question of organizing new Territories from the public domain constantly inflamed this controversy; the South insisting that her people had a right to migrate to any Territory, and there hold their slaves as in their own States; the North denying this, and demanding the conservation of the national domain to free labor. Another compromise in 1850 essayed to end this dispute, but with poor success, the collisions between free and slave labor which followed the organization (in 1854) of Kansas as a Territory widening and deepening the agitation. An attempt to array the South under the banner of State Rights against the compromise of 1850 had broken down, even South Carolina refusing to sustain it; but when, in 1860, Abraham Lincoln had been chosen President, on a platform of resistance to slavery extension, by all the electoral votes of the free States except three of the seven cast from New Jersey, the long-meditated struggle for disunion was inaugurated by South Carolina, whose legislature was then holding a called session. A convention was summoned, which promptly met and by ordinance (December 20) declared the State no longer in the Union—Georgia, Alabama, Mississippi, Florida, Louisiana, and Texas following her example, making seven States in all which had declared themselves out of the Union before Mr. Lincoln was inaugurated (March 4, 1861). Some of these were barely carried for secession, and in none but South Carolina was the step taken with an approach to unanimity. The other eight slave States, though urged to unite in secession, refused to do so, mainly by overwhelming majorities. In pursuance of an invitation from South Carolina, the seceded States, forming an aggregate population of 2,656,948 free persons and 2,312,046 slaves, sent delegates to a convention which met at Montgomery, Alabama, February 4, 1861, and promptly formed a confederacy under a constitution modelled on that of the Union, except that it expressly asserted the right to take slaves into any State or Territory of said Confederacy, and there hold them as property. Of this Confederacy, Jefferson Davis of Mississippi was made President, and Alexander H. Stephens of Georgia Vice-President—at first *pro tem.*, but they were in due time chosen without opposition for a regular term of six years. Montgomery was continued as the capital of the Confederacy, and its first Congress there assembled.

Hostilities against the Union were inaugurated by Confederates while Mr. Buchanan (who offered no resistance) was still President. General David E. Twiggs had willingly surrendered (February 18) to them at Indianola, Texas, the largest Federal force anywhere embodied; the detachments guarding our Mexican and Indian frontiers were likewise captured, and their arms and munitions treated as spoils of war; the Federal sub-treasury at New Orleans, containing \$500,000, had been turned over to the new government, as had several national fortresses and vessels; so that when Mr. Lincoln assumed the duties of President the war had been fairly inaugurated on the side of the Confederacy, but not on that of the Union. Still, he forbore to initiate hostilities—unless the sending of food to the hungry garrisons of the Southern forts still held for the Union could be deemed such—until fire was opened (April 12), by express, repeated orders from the Confederate war department, upon Fort Sumter in Charleston harbor, South Carolina, on an islet which had been all but created by Federal effort and expenditure. Batteries had been erected without opposition so near it that this fort was reduced within thirty-six hours; its garrison of seventy men, under Major Robert Anderson, being allowed to march out, salute their flag, and be transported northward, not prisoners of war.

A tremendous excitement was produced throughout the country by tidings of this almost bloodless cannonade. At the South it was regarded as at once a general call to arms and an omen of easy, speedy triumph. At the North, where the hope of a peaceable solution had till this time been obstinately cherished, it was received with momentary amazement, followed by intense indignation. "It is an impeachment of our manhood—a challenge to fight!" was the general exclamation. Partisanship, hitherto rampant, of the South, as wronged and outraged by Northern abolitionism, was overawed and silenced; the national flag was everywhere displayed; President Lincoln called out for three months 75,000 militia to "repossess the forts, places, and property which had been seized from the Union." But part of the regiments called out were to be furnished by Virginia, North Carolina, Kentucky, Tennessee, Missouri, and Arkansas, whose Democratic governors spurned the call as a usurpation, and by Maryland and Delaware, whose authorities were little better inclined to the suppression of secession by force of arms. Virginia, whose convention,

then in session, had previously refused by two to one to secede, now passed an ordinance of secession, and North Carolina soon followed the example, as Tennessee and Arkansas did somewhat later. Governor Claiborne F. Jackson tried to lead Missouri the same road, but the convention called at his beck utterly refused, so that he was obliged to raise Confederate troops and inaugurate civil war by virtue solely of his executive authority. He was speedily arrested by the prompt, decisive action of Captain Nathaniel Lyon and Francis P. Blair, Jr., who raised a force which captured his "Camp Jackson," near St. Louis, and most of the men he had assembled; and he was soon forced to flee the State, which, though its people were pretty evenly divided, adhered to the Union, as did Kentucky under kindred auspices. These two last were for years ostensibly represented in the Confederate Congress, but not by their own choice. When the Confederacy was full grown it embraced the States of Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Florida, Tennessee, Arkansas, Louisiana, and Texas—eleven in all—covering nearly half of the inhabited area of the Union, with rather less than a third of its people. Considering, however, that Kentucky, Missouri, and Maryland contributed largely, persistently, to the Confederate armies, it is fair to estimate the practical Confederate strength at one-half that of the States which remained loyal to the Union.

The Confederate Congress, two days after Mr. Lincoln's inauguration, had authorized the raising of a military force of 100,000 men, to be under the chief command of President Davis. The States which had seized forts, arms, vessels, money, and other public property of the Union were requested to turn them over to the Confederacy, and generally did so. Commissioners were sent from Montgomery to Washington to negotiate for a peaceful adjustment of all questions arising between the Union and its new-born competitor. They were courteously received by Hon. William H. Seward, Mr. Lincoln's secretary of state, but no reconciliation of the antagonist pretensions was practicable, and they left, asserting that they had not been frankly, candidly met. The Confederacy had organized its revenue system, and commenced collecting duties on imports from the loyal States and elsewhere, before striking the blow at Sumter which was deemed necessary to draw Virginia and other hesitating States out of the Union. Two days after President Lincoln's call for militia, President Davis, by proclamation, accepted that as a declaration of war, and authorized (May 17) the issue of letters of marque and reprisal against the commerce of the United States. A loan of \$5,000,000 was advertised at Montgomery, to which \$8,000,000 were subscribed. Before the close of April the Confederacy had 35,000 men in arms, of whom 10,000 were being pushed rapidly northward, and the Confederate Congress, which organized at Montgomery on the 29th of April, adjourned on the 21st of May to meet at Richmond, Virginia (the newly-chosen capital), on the 20th of July. Treasury notes had already been authorized, and a heavy loan, based on a pledge of cotton by the planters to the Confederacy. All debts due from inhabitants of the Confederacy to those of the loyal States were impounded, and directed to be paid into the Confederate treasury. This act was obeyed to the extent of not paying the loyal creditors, but the Confederate treasury was but slightly replenished from this source. At length, when war had begun in earnest, all male citizens of the United States over fourteen years old were required by law and proclamation (August 14) either to swear allegiance to the Confederacy or leave its borders within forty days. The Confederate marshals were directed to apprehend and imprison all who disobeyed this edict. A Confederate privateer having been captured and her crew imprisoned in New York as criminals, President Davis, by proclamation (July 6), declared that he would retaliate upon Union prisoners of war any infliction upon those Confederates, and proceeded to make good his word. President Lincoln recoiled before this menace, and thenceforth treated privateersmen as prisoners of war. Regular exchanges of prisoners between the belligerents were initiated in the winter of 1861-62, and thenceforth accorded without objection. The Confederate authorities, however, did not scruple to treat belligerent Unionists resident within their borders, especially those of East Tennessee, as traitors. Jefferson Davis as President, and Alexander H. Stephens as Vice-President, were unanimously elected (November 6) for a term of six years ensuing; their previous election having hitherto been provisional only.

The civil war, formally initiated by the bombardment and reduction of Fort Sumter, was prosecuted thenceforth during 1861 with varying fortunes, but with a preponderance of success for the Confederacy. Its first signal triumph was the easy capture (April 20) of the Norfolk navy-yard, with three or four national vessels, including the frigate Merri-

mack (which months afterwards, having been transformed into the rebel iron-clad Virginia, wrought fearful havoc among the national vessels in Hampton Roads), with nearly two thousand cannon, besides small arms, munitions, etc. of immense value—all abandoned without firing a shot by the naval officers who should have defended and saved them. The Sixth regiment of Massachusetts militia, hastening to the relief of menaced Washington City, had just before been assailed (April 19) in the streets of Baltimore by a mob, which showered hardware, paving-stones, and other missiles upon it from housetops as it peacefully traversed their city, killing three and wounding fifteen of the Massachusetts men, while eleven of the mob were killed and four severely wounded. The militia passed on, but Baltimore was held by the mob, and communication by telegraph or otherwise between the Federal capital and the North arrested until General B. F. Butler recaptured it, unresisted, by an advance from Annapolis (May 5-13). That important city was henceforth firmly held for the Union. General Butler, being in command at Fortress Monroe, ordered an advance under Brigadier-General Pierce against a Confederate outpost at Big Bethel, Virginia, but the ill-directed attack was repulsed by General J. B. Magruder with considerable loss to the Unionists. That portion of Virginia westward of the Alleghany range having opposed secession and still adhering to the Union, a Confederate army was sent across the mountains to overbear this (alleged) disloyalty to the State, but was promptly met by a greater Union force under General George B. McClellan, and driven from Philippi (June 2), then beaten at Rich Mountain and also at Laurel Hill, and again at Carrick's Ford (July 12), and the remnant driven in disorderly flight over the dividing ridge. Hostilities were renewed on the Kanawha by the advance (Aug. 1) of a fresh Confederate force under General John B. Floyd, afterwards succeeded by General Robert E. Lee, but these were met and baffled by a stronger Union army under General Wm. S. Rosecrans, and indecisive actions ensued at Carnifex Ferry, on Cheat Mountain, and at Alleghany Summit, which left West Virginia almost wholly under the flag of the Union at the close of 1861. In Eastern (or old) Virginia hostile armies confronted each other near Harper's Ferry and Winchester under Generals Robert Patterson (Union) and Joseph E. Johnston (Confederate) for a month without fighting, until a stronger Union force under General Irwin McDowell was pushed forward by Scott from Washington and Alexandria to Centreville, menacing the Confederate force concentrated around Manassas Junction, and advancing (July 21) to attack its left near Sudley Church. The advance was gallantly made, and for a time promised success; but Johnston's army from Winchester arrived by rail at the critical moment, and was hurried forward to the support of the recoiling regiments, so that the fortunes of the day suddenly changed, and the Union troops, exhausted by twelve hours' marching and fighting under a July sun, had to give way before this unexpected effort, and retired in a disorder not uncommon on battle-fields, even among veteran troops. The Confederates, unaware of the completeness of their victory, did not pursue it, though their President Davis, had arrived on the field about the close of the battle. The Union loss in this affair was not less than 4000 men, mostly wounded and prisoners, with at least twenty cannon and large quantities of small arms; the Confederates lost about 2000, including two generals (Bee and Bartow) killed. The men who fought were not far from 25,000 on each side, but quite as many more Union soldiers listened to the sound of the guns at Centreville, Fairfax Courthouse, in Washington, and on the Potomac, who should have been on the bloody field.

General McClellan was now called from West Virginia, and soon made commander-in-chief, vice General Scott retired; but there was no more serious fighting on this line till October 20, when a Union force of 1900, pushed across the Potomac opposite Harrison's Island, was attacked near Ball's Bluff by General Evans's brigade, mainly Mississippians, and nearly destroyed; its commander, General E. D. Baker of Oregon, being killed, with 300 of his men, and more than 500 taken prisoners. Two months after, General E. O. C. Ord, with the Third Pennsylvania brigade, having advanced, also on General McClellan's right, to Dranesville, was there attacked by a rebel brigade under General J. E. B. Stuart, who was quickly repulsed, with a loss of 230 men. This closed the campaign on the Potomac. Meantime, General Butler, sailing from Fortress Monroe (August 20), had captured Forts Hatteras and Clark at the entrance to Pamlico Sound, taking 700 prisoners under Commodore Bowen, 25 guns, 1000 muskets, and some stores. A more formidable expedition, 10,000 strong, under General T. W. Sherman and Commodore S. F. Dupont, left Hampton Roads October 29, and steered for Port Royal, South Carolina, where it bombarded and reduced the Confederate forts on Hilton Head and Phillips' Island, driving out their

defenders and taking undisputed possession of the Sea Islands adjacent, which were thenceforth firmly held by a Union land and naval force which menaced both Charleston and Savannah, and repeatedly, though unsuccessfully, struck at the railroad connecting them.

In the West, Missouri was this year the arena of a violent though desultory conflict. Major-General John C. Fremont, who had been appointed to command here, was hastening westward to organize at St. Louis an army under the depressing influence of the Bull Run disaster in the East, when Governor C. F. Jackson returned from a two months' sojourn in the Confederacy and prepared to dispute possession of the State, though a convention of her people had declared (July 20) his office and those of his adherents vacated by treason, and all their disloyal acts null and void. He thereupon assumed to take Missouri out of the Union by proclamation (July 31), negotiated a close alliance with the Confederacy, and was raising a large army, in good part from Arkansas, when General Nathaniel Lyon, commanding 6000 Unionists at Springfield, took the field against Jackson's far more numerous but not so well-provided army, led by General Sterling Price, who suddenly resigned his command to General Ben McCulloch from Arkansas. Lyon, having advanced to Wilson's Creek, sent General Sigel with 1200 men to flank the enemy, whom he assailed in front, but his force was too small; Lyon fell mortally wounded, and the Union attacks in front and flank were repulsed; but the Unionists retired deliberately and unpursued to Springfield, insisting that they had fought quadruple their numbers and not been beaten. Major Sturgis, who succeeded General Lyon, soon afterward retreated to Rolla, abandoning all Southern Missouri to the Confederates. McCulloch returned to Arkansas, but Price advanced in large force to the Missouri River at Lexington, where he invested Colonel Mulligan and his Irish brigade, numbering 2780 men, and pressed them so vigorously that Mulligan was forced to surrender (September 20) before Fremont could relieve him. Fremont took the field directly afterwards, and pushed down to Springfield at the head of 30,000 men; but Price avoided him by retreating, and there was no fight, except that Colonel Zagonyi, with 300 Union cavalry, routed a far larger force which held Springfield, capturing that city. Fremont was still looking for Price when he was relieved (November 2), and ordered to turn over his command to General David Hunter, who, in pursuance of his orders, retreated to Rolla, again abandoning all Southern Missouri to the enemy. Brigadier-General U. S. Grant was at this time in command of the important post of Cairo at the junction of the Ohio with the Mississippi, watched by a Confederate force at Columbus, Kentucky. Grant, with 2850 men on four steamboats, dropped down the river to Columbus, landing at Belmont in Missouri, and attacked the Confederate camp on that side. The attack was spirited, and at first successful; but Major-General (Bishop) Polk, commanding at Columbus, crossed with five regiments, increasing the Confederate force to 5000, by which Grant was beaten off and driven to his boats with a loss of 500 men. The Confederate loss was rather more. One month later, Colonel Jefferson C. Davis, acting under General John Pope, commanding in Central Missouri, surprised a Confederate camp at Milford, and captured 1000 prisoners (including three colonels) and as many horses and muskets. General Pope reported 2500 prisoners taken this month, with a loss on his part of barely 100. So closed the campaign of 1861.

The battles of the bloody year 1862 were initiated at Mill Spring, near the Cumberland River, in Southern Kentucky, where General George B. Crittenden, having just supplanted General F. K. Zollicoffer in chief command of the Confederate force in that quarter, ordered an attack on the Unionists in their front, who, being in superior numbers and led by General George H. Thomas, repulsed them (January 19) after a hot struggle of two hours, and, following them to their camp, found it deserted—Crittenden having fled across the Cumberland, leaving ten guns, 1500 horses, etc. General Zollicoffer was killed while leading the attack. This blow was soon followed by one more serious, directed from St. Louis by General Halleck, who sent from Cairo Brigadier-General U. S. Grant with 15,000 men, and Commodore A. H. Foote with seven gunboats, to open a way into Tennessee. Fort Henry, 80 miles up the Tennessee River, was quickly reduced (February 6) by the gunboats, the garrison mainly escaping to Fort Donelson, 12 miles eastward, commanding the navigation of the Cumberland, leaving their chief, General Lloyd Tilghman, a prisoner. General Grant followed the fleeing Confederates, and nearly invested, with his force considerably increased, their stronghold, two miles below Dover, held by 15,000 men under the Virginian general John B. Floyd (late United States secretary of war). Commodore Foote, ascending the Cumberland, first attacked (February 14) the river-batteries, but



was repulsed with considerable loss. Floyd, seeing Grant proceeding leisurely to cut off his retreat, anticipated that result by an advance under General Simon B. Buckner on Grant's right towards Dover, commanded by General John A. McClelland of Illinois, who was overpowered and driven back after a protracted deadly struggle, losing a six-gun battery. The Union centre, under General Lew Wallace, sent two brigades to McClelland's support, by which the Confederate advance was arrested, and General Grant, arriving on the field at 3 p. m. from a conference with Commodore Foote, ordered a general attack, which was crowned with success. Wallace recovered by it the ground previously lost by McClelland, while General C. F. Smith led the Union left clear over the breastworks in their front, and the day closed with a decided Union victory. A cold night of suffering followed, during which General Floyd, despairing of cutting his way out, surrendered his command to General Gideon J. Pillow, who passed it to General Buckner, who, after some parley, surrendered next morning (February 16) not less than 6000 men, besides 2000 sick and wounded. General N. B. Forrest, with 800 cavalry, escaped up the bank of the swollen river, while Floyd, Buckner, and a remnant got across by boat before daylight and fled. One result of this success was the immediate evacuation of the Confederate camp at Bowling Green, Kentucky, as also of Nashville and all Northern Tennessee; Governor Isham G. Harris and his legislature being among the fugitives. Nashville was promptly occupied by the Unionists, while the main army of Tennessee, under General A. Sidney Johnston, retreated unmolested to Corinth, Mississippi, leisurely followed by General Don Carlos Buell, who had commanded the Union forces in Kentucky. General Grant's army, now confided to General C. F. Smith, was embarked and moved up the Tennessee to Savannah and Pittsburg Landing, nearly opposite Corinth. These Union successes compelled the evacuation of Paducah and Columbus, while General Pope, with 40,000 Unionists, marching down through Eastern Missouri, drove Major-General McCown, with 9000 Confederates, from New Madrid, taking thirty-three cannon and many thousand muskets, also tents, wagons, etc., without a serious contest. Brigadier-General Makall, with 6700 men, 123 cannon, and 7000 small arms, was now caught between Pope's army and Foote's fleet on Island No. 10 in the Mississippi, and compelled to surrender. Commodore Foote, dropping down the river, routed the Confederate flotilla in a brief engagement before Memphis, which thereupon surrendered without a blow. By July 1st the Mississippi River saw none but the Union flag floating above Vicksburg, which successfully resisted successive attempts at its reduction by Commodore Foote from above and Commodore Farragut from below.

General C. F. Smith was soon disabled by sickness and died, and the command of his army again devolved upon General Grant, who, while awaiting the arrival of General Buell from the North, was attacked at Pittsburg Landing by an advance in force of the Confederates from Corinth, 50,000 strong, under General A. S. Johnston, while General Grant was still at Savannah, eight miles below. The Unionists, about 40,000 strong, were completely surprised without intrenchments or even abatis, and were driven with heavy loss from Shiloh Church, three miles inland, to the brink of the river, having lost heavily in guns, killed, wounded, and prisoners. Meantime, General A. S. Johnston had been shot dead, the Union gunboats on the Tennessee had come into play, General Grant had joined his shattered army, while the advance of General Buell's force was beginning to come to its relief. Night brought a cessation of hostilities, and General Beauregard had succeeded to the chief command of the Confederates. On the Union side, General W. H. L. Wallace had been killed at the head of his division. General Nelson's division of Buell's army had crossed the Tennessee in boats at 5 to 6 p. m., and taken position on the field by 7. Two more divisions were on hand by sunrise next morning, when the battle was reopened by an advance of the Union forces, of whom 25,000 (including General Lew Wallace's division of General Grant's army) were fresh, while only 3000 of the Confederates had not yet been engaged. The fighting throughout the forenoon was spirited, but the forces were unequal, and the Confederates had lost by 4 p. m. all the ground they had gained the day before, and were soon afterwards in full retreat. There was but a faint show of pursuit. The reported Union loss in the two days' fighting was 1735 killed, 7882 wounded, 3956 missing; total, 13,573. Beauregard reported the Confederate loss at 1728 killed, 8012 wounded, 957 missing; total, 10,697.

General Grant was soon superseded by General Halleck, who, taking command of the combined army, advanced by approaches to Corinth, which was evacuated by General Beauregard, who retreated with little loss into the heart of Mississippi. Meantime, General O. M. Mitchell, with part of Buell's army, had advanced eastward up the Tennessee,

taking Huntsville and other towns on the river, but failing to carry Chattanooga. Mitchell was now transferred to the command on the coast of South Carolina, where he sickened and died.

The war in the Territories was early initiated by an effort of Colonels Loring and G. B. Crittenden to carry over the 1200 regulars stationed in New Mexico to the Confederacy; but their intrigues were repulsed on every hand, and they were constrained to flee to El Paso, where Major Lynde, who had 700 men, made a pretence of resistance, advancing twenty miles to meet a much smaller Texan force, then retreating, and surrendering his entire command, which was paroled and marched northward for exchange, suffering terribly from heat and thirst. General H. F. Sibley, commanding a Confederate force of 2300 Texan volunteers, undertook the conquest of New Mexico in the fall of 1861; but his advance was retarded by lack of supplies till the opening of 1862, when he met Colonel E. R. S. Canby, commanding a much larger Union force, at Fort Craig. The Unionists were first drawn out of their stronghold, and then defeated by a brilliant charge on McRae's battery, which was taken. Canby's men fled precipitately to the fort, which Sibley could not reduce; so he turned it and pushed on to Apache Pass, where his farther advance was opposed by 1300 men, mainly Colorado volunteers, under Colonel John P. Slough, whom he defeated by another Texas charge, which routed Slough's motley crowd and cleared the road to Santa Fe, which Sibley soon entered in triumph. But his brilliant victories proved barren; he could not feed and clothe his little army from all the resources of New Mexico, while Canby was in the way of his receiving supplies from Texas, had any been sent. Forced to evacuate the capital of New Mexico for Albuquerque, whence (April 12, 1863) he moved down the Rio Grande, he encountered Canby at Peralta, but escaped him, after some fruitless long-range fighting, by destroying his train and dragging his guns over a desolate, waterless, mountainous region east of the river, and thus made his way down to Fort Bliss, Texas, having left half his force dead or prisoners, though never defeated; and returned to report his sage conclusion that New Mexico was not worth a quarter of the cost of taking and holding it.

Some of the largest of the semi-civilized tribes settled in the Indian Territory were incited by their old Democratic agents and other influential whites to link their fortunes with the Confederacy soon after the Union defeats at Bull Run and Wilson's Creek. Their aid proved, however, of little worth, and they were glad to return to the protection and alliance of the Union so soon as the progress of events had made it probable that this was the stronger side.

General Sterling Price, after Pope's successes in Missouri near the close of the campaign of 1861, unable to fight a pitched battle, retreated rapidly through Springfield and Cassville, closely pursued, and fighting when he must, till he had reached Arkansas and formed a junction near Boston Mountain with General Ben McCulloch, commanding a division of Texas and Arkansas volunteers, which raised his force to an equality with that of his pursuers. General Albert Pike now added to the ration-consuming power of the Confederates a brigade of Indians, swelling their total to nearly 20,000 men. Earl van Dorn, late a captain of Union regulars, now a Confederate major-general, assumed chief command, and resolved to fight the Unionists (now led by General Samuel R. Curtis of Iowa) before they could be concentrated. Advancing rapidly from his camp at Cross-Timber Hollows, Van Dorn fell upon General Franz Sigel, holding the extreme Union advance at Bentonville. Sigel retreated (March 3, 1862) fighting, and falling back coolly, until reinforced at 4 p. m., when he encamped at Leetown on Curtis's right. Curtis held a good position on Sugar Creek, which Van Dorn avoided by moving far to the left and attacking in overwhelming force the extreme Union right under Colonel Carr, holding a swell of ground known as Pea Ridge. Carr, fearfully overmatched, resisted stubbornly for seven hours, during which he was repeatedly wounded, lost a fourth of his men, and was driven back half a mile. Curtis, who had but scantily reinforced him up to 2 p. m., now ordered Generals Asboth and Sigel to the support of Carr, himself accompanying Asboth, whose batteries were soon engaged with the enemy's, and he severely wounded. Night closed the combat as Sigel was coming into position on Asboth's left. Next morning, General Curtis, having completed his dispositions, ordered his centre to advance, and the cannonade was reopened on both sides, but the Confederates soon desisted and disappeared, fleeing through Cross-Timber Hollows in their rear so rapidly as to defy pursuit. The Union loss in this battle was 1351 out of 10,500 men. Van Dorn's force was at least 16,000, including 5000 Indians. Among his killed were Generals Ben McCulloch and McIntosh; among his wounded, Generals Price and Slack. Lack of ammunition was the reason alleged for his hasty retreat.

General Curtis then advanced without resistance to Batesville, Arkansas, and thence marched to Helena on the Mississippi, but once resisted by 1500 cavalry under General Albert Rust, who were easily routed with a loss of 100 to 8 Unionists.

Curtis's movement south-eastward opened Missouri once more to Confederate incursions. Tidings of Union reverses in Virginia filled the invading ranks with volunteers from all quarters. Colonel Porter, commanding some 2000 of these raw levies, was attacked near Kirksville by Colonel John McNeil with 1000 cavalry and a battery, and after a desperate fight was defeated and his force virtually destroyed. Colonel Poindexter, with 1200 Confederates, was attacked by Colonel Odin Guitart while crossing the Chariton River, and his command likewise captured or destroyed. After several more petty conflicts the Confederates were again chased out of Missouri and compelled to take refuge in Arkansas, where General T. C. Hindman was now in chief command. General Blunt commanded the Unionists, who had again entered that State some 5000 strong; General F. J. Herron, encamped at Wilson's Creek with 7000 men, hastened to his aid when apprised of his danger, reaching Fayetteville, Arkansas, December 7. Hindman, deceiving Blunt by a threat of fighting, turned his left, and with 10,000 men fell upon Herron's 4000 infantry and artillery at Prairie Grove, his cavalry having been pushed forward to help Blunt. A spirited fight ensued, Herron, desperately charged, bravely holding his ground until 2 p. m., when the welcome sound of Blunt's batteries was heard opening on his left. The forces engaged were now nearly equal, and the battle raged till after dark, little ground being gained on either side. Next morning the Confederates had left the field. Hindman's loss was 1317, including General Stein, killed. The Union loss was 1148, of whom 953 were from Herron's 4000.

An expedition consisting of thirty-one steamboats and 11,500 men, led by General A. E. Burnside and Commodore L. M. Goldsborough, sailed from Fortress Monroe January 11, 1862, for Roanoke and Albemarle Sounds, North Carolina, landing (February 5) on Roanoke Island a force by which Fort Bartow, its main defence, was speedily taken by assault, with a Union loss of 300, while about 2500 Confederates were captured. The next point of attack was Newbern, which was likewise carried by assault (March 14). Among the captures were two steamboats, sixty-nine cannon, and 500 prisoners. The Union loss in the assault was 600. Fort Macon, on the coast, was next invested and taken, with its garrison of 500 men. This was the first of the regular Union fortresses retaken from the enemy. Washington, Plymouth, and other North Carolina ports fell without resistance, but General Reno was repulsed in a fight at South Mills, and General Foster in an attempt on the important railroad junction at Goldsboro'.

General Benjamin F. Butler, having raised in New England six regiments of 1000 men each for the purpose, and being aided by a fleet under Captain David G. Farragut, left Fortress Monroe (February 25, 1862) for his rendezvous on Ship Island, Mississippi, whither one of his brigades under General J. W. Phelps had preceded him, and where his troops were soon augmented to 15,000. His objective point was New Orleans, a city of 170,000 inhabitants, defended by 3000 men under General Mansfield Lovell, but the strong forts St. Philip and Jackson, half way between the city and the mouths of the Mississippi, were Lovell's main reliance. Earnest efforts to strengthen them by a raft or boom across the river were all but thwarted by the high stage of the heavily-swelling current. Captain Farragut, with his fleet of forty-seven armed vessels and 310 guns, appeared before the forts April 17, opened fire next morning, and destroyed or evaded three fire-rafts sent down to annoy him. After three days' ineffective bombardment, the Itasca, Captain Caldwell, steamed up to the great boom or chain, and cut it with sledge and chisel, when another fire-raft was sent down to no purpose, and two more days were wasted in fruitless cannonading; then Farragut, with his fleet in three divisions, resolved to fight his way by the forts against the sweeping current; which he successfully did, fighting and capturing or scattering the Confederate gunboats above, with a net loss of the Varuna steamship sunk and some 200 men. The forts, thus rendered useless, were soon surrendered. Captain Farragut, with nine of his vessels, steamed directly up to the city, whence a thick black smoke apprised him that the Confederates were burning ships, steamboats, etc. laden with cotton, sugar, flour, etc. Lovell drew off his men, and the city ungraciously signified that she could make no resistance. Passing up to Carrollton, eight miles above, Farragut found its works abandoned and in flames. General Butler, having reduced the forts, soon came up and took possession, which was not thenceforth disputed.

All the towns on the Mississippi below Vicksburg were

easily captured by Farragut, and an attempt to retake Baton Rouge (August 5), by a force of 2500 Confederates under Major-General John C. Breckenridge, was repulsed by an equal Union force under General Thomas Williams, who was killed. The Confederates lost 300 men, including General Clarke and six colonels. The Union loss was 250. The lower parishes of Louisiana hereupon fell to the Unionists without serious resistance. Butler was relieved by General N. P. Banks December 16, having just before been outlawed as a felon by Jefferson Davis.

General George B. McClellan had been called from West Virginia to the command of the Army of the Potomac soon after the Union disaster at Bull Run, and on the retirement of General Scott made commander-in-chief of the Union armies. A very large force, fully 200,000 strong, was rapidly gathered around him and drilled into the coherence of a regular army. The far weaker Confederate force confronting him gradually recoiled to Centreville and Manassas Junction, where they spent the winter of 1861-62. General McClellan remained quiet till expressly ordered (February 22) by President Lincoln to advance, when he moved out to Manassas Junction, to find it evacuated by the Confederates, who, under General Joseph E. Johnston, had quietly retired behind the Rapidan. General McClellan now transferred the bulk of his army by water to Fortress Monroe, preparatory to an advance on Richmond up the peninsula between the James and York Rivers. Meantime, General Banks was left in command in the Valley of Virginia, and had just left for Washington, when his 7000 men, now under General James Shields, well posted near Kernstown, were attacked by Stonewall Jackson with but 4000 men, who were defeated with a loss of at least 1000. General Shields's loss was about 600.

Just before McClellan reached the James, the Confederate iron-clad Virginia (late the United States steam-frigate Merrimack) had sailed out of Norfolk (March 8), and, attended by two gunboats, made directly for the Union frigates Congress and Cumberland, lying near Newport News, and disdaining to reply to their rapid cannonade, of which the balls rebounded from her sloping roof of iron as though they were peas, struck the Cumberland with her iron beak, smashing in the frigate's bow, so that she filled and sank in half an hour, carrying down a part of her crew. The Congress, seeing the fate of her consort, set sail and ran aground under the batteries of Newport News, where she was raked by the ram until her commander, Lieutenant Joseph B. Smith, and most of her officers and men, were either killed or wounded, when her flag was hauled down; but her captors were prevented from burning her by a fire from the Union batteries on shore. The Merrimack afterwards returned and bombarded her until she was set on fire and blown up; half her crew of 434 men having fallen. The steam-frigate Minnesota and frigate Lawrence, hurrying to the aid of the Cumberland and Congress, had severally grounded in the harbor. The Lawrence soon got off and returned to port, but the Minnesota, still aground, was cannonaded for hours by the entire Confederate flotilla, the Merrimack being unable to approach nearer than a mile, owing to the shallowness of the water. At 7 p. m. all three desisted and steamed towards Norfolk. At 10 the new Union iron-clad Monitor, Lieutenant John L. Worden, steamed into the roadstead on her trial-trip from New York. At 6 a. m. the hostile fleet reappeared and made for the Minnesota, but the little Monitor interposed, and the strange combat was renewed and continued with varying fortunes until the Confederate fleet sheered off and stood for Norfolk. The Merrimack was badly crippled, her commander, Buchanan, having been wounded in the fight with the wooden ships. She never fought again, and was blown up when Norfolk was evacuated by the Confederates not long afterwards. The little Monitor (styled a "cheese-box on a raft") remained master of the situation, but was lost, months afterwards, in passing Cape Hatteras.

General McClellan reached Fortress Monroe April 2d. Of his army, 58,000 had preceded him, and as many more soon followed. Advancing up the peninsula, he was soon arrested by Confederate batteries on Warwick Creek (which nearly crosses the peninsula abreast of Yorktown), manned by General J. B. Magruder, who had some 11,000 men in all wherewith to hold a line thirteen miles long. Thirty days were spent here; when McClellan had planted his breaching-batteries, and was nearly ready to open fire, it was found that Magruder had retreated. On reaching Williamsburg, McClellan's advance was stopped by works known as Fort Magruder, where Hooker's division fought nine hours and lost heavily. At length the Confederate position was flanked by General Hancock of Sumner's division, and Magruder retreated during the night, leaving 700 of his severely wounded. The total Union loss was 2228, that of the Confederates probably less. West Point, at the head of York River, was occupied May 6, with a

Union loss of 200. This movement up the peninsula, coupled with Burnside's successes in North Carolina, compelled the Confederates to evacuate Norfolk, with its navy-yard, about 200 guns, and some worthless vessels. That city they never recovered. General McClellan, no longer resisted, advanced to the Chickahominy on the 20th.

Here he halted and fortified with over 100,000 effective men, believing the Confederate army in his front nearly if not quite equal in numbers to his own. Meantime, General Fremont, to whom Western Virginia had been assigned as a department, advanced into the Alleghanies and threatened Staunton from the direction of Monterey. Jackson sent General Edward Johnson to oppose Fremont's advance under Milroy, who retreated and was joined by General Robert C. Schenck near McDowell, where a battle was fought, with a Union loss of 461, the Unionists retreating after nightfall. Jackson recrossed Shenandoah Mountain, and marched rapidly down the Valley to Front Royal, where he surprised and routed Colonel John R. Kenly, taking 700 prisoners. Pushing on to Strasburg, Jackson compelled Banks to retreat rapidly to Winchester, where he fought five hours, and then, being greatly outnumbered, retreated hurriedly to Martinsburg and Williamsport, where he crossed the Potomac, having lost about 1000 men, besides the sick and wounded in his hospitals. Jackson's cavalry pursued to Martinsburg, but most of his infantry were halted not far beyond Winchester, and soon retreated rapidly to confront Fremont and McDowell, who were hastening to bar his way. Fremont, crossing the Alleghanies by a rugged route, reached Strasburg June 1, a few hours after Jackson had passed that point. Jackson, still retreating, destroyed the numerous bridges behind him, and turned to fight (June 8) at Cross Keys, where he checked Fremont; then, again retreating, he crossed the South Fork at Port Republic, falling with a superior force upon General Tyler, who, with a part of Shields's division of McDowell's army, was forced back with loss. Jackson thus balked all his foes, having lost but 1167 men since he left Winchester. His baffled pursuers were now recalled, and he, triumphant, was soon ordered to join General Robert E. Lee, now in chief command at Richmond. The rebel general Heth had attacked Colonel Crook at Lewisburg, West Virginia, and been routed on the same day with Jackson's demolition of Kenly.

An unsuccessful attack (May 15) on Drewry's Bluff, eight miles below Richmond, by a Union fleet under Commander John Rodgers, was followed, May 27, by a fight near Hanover Court-house between the Union Fifth corps, General Fitz-John Porter, and General L. O'Brien Branch's North Carolina division, which was driven off with a loss of 700, to 400 on the Union side.

Keyes's Fourth corps having been thrown forward across the Chickahominy to Seven Pines on its right and Fair Oaks on its left, was attacked (May 28) by the Confederates under General Jos. Johnston, who judged that Keyes might be overwhelmed before he could be sufficiently supported. Four divisions, under Longstreet, D. H. Hill, Huger, and G. W. Smith, were designated to make the attack, supported by all the rest of the Confederate army. Hill, at 1 p. m., first attacked Casey's division at Fair Oaks, surprising it while its defences were still uncompleted, and pushing it back on Couch's division near Fair Oaks, with a loss of six guns, two of its colonels killed, and many men. Keyes barely held his ground at Fair Oaks till Sumner's corps, rapidly thrown across the Chickahominy, came to its aid. Heintzelman's corps, though nearer, came into the fight later, and our right was now attacked by Smith's corps, directed by Jos. Johnston as commander-in-chief, till he was struck by a shell, and so badly wounded that he was disabled for months. Lee succeeded him. McClellan was at New Bridge, several miles up the Chickahominy, with the corps of Fitz-John Porter and Franklin, which were not brought into action. The battle raged without much advantage to either side till dark, when the Confederates drew off. They made a pretence of attacking next morning, to cover their removal of arms and stores from the camp of Keyes's corps, but the fighting amounted to little. Hooker, by Heintzelman's order, made a reconnaissance in force to within four miles of Richmond, meeting no resistance, but was recalled to Fair Oaks by McClellan. The Union loss in this affair was 5739, including five colonels killed and seven generals wounded. Of Keyes's 12,000 men, 4000 fell or were captured. General McCall's division of McDowell's corps now joined McClellan, raising his total to 156,828, and his effective force to 115,102.

No further offensive movement was made by him until Jackson, whose movements had been studiously concealed, came in on Lee's left, and was pushed forward to assail and turn McClellan's extreme right at Mechanicsville, being supported by Branch, D. H. Hill, Longstreet, and A. P. Hill, with the bulk of the Confederate army.

A. P. Hill, on Jackson's arrival, crossed the Chickahominy and attacked Fitz-John Porter's corps of 27,000 strong, which, recoiling from Mechanicsville, took up a strong position behind it across Beaver Dam Creek, but was repulsed (June 26), Jackson having not yet got into position. Porter now retreated by order to Gaines's Mill, where he was at once reinforced by Slocum's division of Sumner's corps, raising his force to 35,000 men. But opposed to them were 50,000 veterans, led by their ablest commanders, including Longstreet and Jackson. After fighting gallantly for several hours, he telegraphed for aid to McClellan, who sent two brigades of Sumner's corps to his assistance, but the field was lost before their arrival. Porter lost nineteen guns, but halted just off the field, and was not pursued. The Union loss that day was 8000, that of the Confederates about 5000. But McClellan's base of supplies, West Point, had been captured by Stuart's cavalry, and he decided to retreat by his left flank through White-Oak Swamp to the James. This movement puzzled Lee, who did not pursue with vigor, and the first attacks upon the Union rear were easily repulsed. Finally, McCall's division, serving as rear-guard, was assailed (June 30) in great force at Glendale, and after hard fighting defeated and driven; McCall himself being captured, with most of his guns. The struggle ended at 9 p. m., Hooker's and two brigades of Slocum's division having arrived too late to win the battle, but in time to check pursuit. The loss of men in this action was about 3000 on either side.

The Union forces were now concentrated at Malvern Hill on James River, where they were attacked by the entire Confederate army, which was signally defeated in one of the most desperate actions of the war. The first attack was made at 3 p. m.; the most desperate charge was made at 6, and repulsed with great slaughter. The Confederate loss in this struggle must have been nearly or quite 10,000, that of the Unionists perhaps half as many. McClellan during the evening moved down the James to Harrison's Landing, where Lee did not choose to assail him. He claimed 10,000 prisoners, 52 guns, and 35,000 small arms as captured during the seven days' fighting, from Mechanicsville to Malvern inclusive. The Union loss during those days is reported by McClellan at 1582 killed, 7709 wounded, and 5958 missing; total, 15,249. Jackson's and A. P. Hill's losses during those days were reported by them as 1585 killed, 7688 wounded; total, 9336. This is probably about half the total Confederate loss, which included General Griffith and three colonels, killed. General Hooker soon afterwards reoccupied Malvern Hill without resistance, taking 100 prisoners, but the Union army was soon withdrawn by the President's order to the Potomac. Its retreat and embarkation were unmolested. General McClellan and his staff reached Aquia Creek August 23.

Major-General John Pope had been called from the West to Washington, and given the chief command of Fremont's, Banks's, and McDowell's forces, aggregating 50,000 men. Major-General Halleck was also called from the West to Washington, and made general-in-chief. Pope concentrated his forces near Culpeper Court-house, and sent Banks forward with 8000 men to Cedar Mountain, where he was confronted by Stonewall Jackson, from Richmond, with 25,000 men. Banks attacked (August 9) under every disadvantage of position, and was steadily repulsed, losing 2000 men; Jackson's loss was 1314. Pope arrived at nightfall with Ricketts' division and part of Sigel's (late Fremont's) corps, but Jackson, seeing that Pope was about to move against him in superior force, soon retreated across the Rapidan.

Pope, continuing to act on the offensive, soon found the whole army of Virginia concentrating upon him, and retreated across the Rappahannock. Lee did not choose to force a passage on his front, and sent Jackson around by a long flank march up that river. Encamping at Salem, and emerging through Thoroughfare Gap, he struck the Alexandria Railroad at Bristow Station, in Pope's rear, and captured two trains of cars running westward from Warrenton. He now sent Stuart with two regiments to Manassas Junction, seven miles farther north, which he surprised, taking eight guns, 300 prisoners, and seven trains laden with provisions, etc. Colonel Scammon, with two Ohio regiments, now crossed Bull Run and assailed Jackson, but was easily beaten off, and General F. G. W. Taylor, with four New Jersey regiments, renewed the experiment with like result; all of Jackson's and A. P. Hill's divisions being by this time at the Junction.

Pope, by this time aware that something was wrong in his rear, began to fall back on Bristow Station, where Hooker drove Ewell, capturing part of his train. Ewell fell back on Manassas, which Pope's gathering force compelled Jackson to abandon, moving westward, leaving the captured provisions, which he could not remove. Moving towards Thoroughfare Gap, he encountered Rufus King's

division of McDowell's corps, which fought him stoutly, but did not bar his way. The loss on either side was heavy, Major-General Ewell being among the Confederate wounded.

Pope, now at Centreville, still hoped to envelop and crush Jackson, but was baffled by the non-arrival of Fitz-John Porter at Manassas Junction, and by the emerging of Longstreet's corps through Thoroughfare Gap, driving off Ricketts' division, which attempted to push it back. Before noon (August 29) Longstreet had come in near Gainesville, on the right of Jackson's hotly-engaged corps at Groveton, and the battle raged furiously till night, when Pope claimed advantage, and expected to crush the enemy next day. But the reinforcements he reasonably expected from McClellan's army did not come up; and Pope, unsupported, was beaten and retreated on Centreville, near which Franklin's corps, 8000 strong, had stood idle all that day (August 30). Here Pope was reinforced by Sumner, as well as by Franklin; and Lee, now in command, did not choose to attack him in front, but sent Jackson to gain his rear again by a flank march to the northward. Gaining Pope's rear, Jackson attacked his flank near Chantilly, where Reno's two divisions and Phil Kearney's confronted him. General Kearney was killed, as was General Isaac I. Stevens, commanding one of Reno's divisions; but Jackson gained no victory. Pope quietly retreated to the Potomac unassailed, and resigned his command, which was given to General McClellan. The Union loss in this brief and bloody campaign was hardly less than 25,000, including 9000 prisoners; the Confederate loss was hardly less than 15,000. Colonels Fletcher Webster (son of Daniel) of Massachusetts, Roberts of Michigan, O'Connor of Wisconsin, Koltes of Pennsylvania, Cantwell of Ohio, and Brown of Indiana, were among the Union killed. Major-General R. C. Schenck was wounded.

General Lee, reinforced from Richmond by D. H. Hill's fresh division, crossed the Potomac, unopposed, opposite Leesburg, and advanced to Frederick, whence he issued (September 8) an address to the people of Maryland, implying that he came as a liberator, but obtained few recruits. Intent on capturing a Union force of 12,000 men holding Harper's Ferry, he divided his army. McClellan followed Lee's right wing, moving west towards Hagerstown, overtaking it at Turner's Gap of South Mountain, and driving it westward, after a fight (September 14) in which he lost 1568 men and took 1500 prisoners. Franklin simultaneously cleared Crampton's Gap on the left. Harper's Ferry was surrounded by the Confederates in great force under Stonewall Jackson, and after a brief cannonade was surrendered (September 15) by General D. S. Miles, who was killed by a ball just as he had raised the white flag. Colonel Davis had escaped with 2000 cavalry during the night, but 11,583 men and seventy-three guns were the trophies of this triumph.

Lee rapidly concentrated his army around Sharpsburg, along a ridge facing Antietam Creek. McClellan soon confronted and attacked him (September 17), and a bloody, determined battle was fought there between 87,000 Unionists and 70,000 Confederates, of whom but 40,000 were in position at the outset. McClellan's loss was 2010 killed, 9416 wounded, and 1043 missing; total, 12,469; Lee's, 1842 killed (including Generals Branch of North Carolina, Starke of Mississippi, and G. B. Anderson of Georgia), 9399 wounded, and 2292 missing; total, 13,533. That was the bloodiest day America has known. Many regiments lost more than half their men. It was in one sense a drawn battle, yet when McClellan, after a day's rest, advanced to renew it, he found that Lee had recrossed the Potomac into Virginia. An irrisolute attempt by General Porter to follow was repulsed by Lee's artillery, with a Union loss of 200 prisoners. Lee retreated at leisure by Bunker Hill and Winchester, while Stuart, with 1500 cavalry, made a raid to Chambersburg, Pennsylvania, where he paroled 275 sick and wounded Unionists and destroyed valuable stores, passing around McClellan's army and recrossing the Potomac below Harper's Ferry. McClellan, facing Lee, had moved down to Warrenton, Virginia, where he was relieved of his command (November 7). General Burnside succeeded him, and, still moving to the left as Lee faced him, at length threw a bridge across the Rappahannock at Fredericksburg, and assailed (December 13) Lee's army, holding the heights south of that river, attempting also to flank his right; but the attack in front, 60,000 strong, led by Hooker and Sumner, was repulsed with great slaughter, while that by 40,000 men under Franklin, in flank, was unsuccessful. The Union loss in this disastrous affair was 1152 (including Major-General G. D. Bayard) killed, 9101 wounded, and 3234 missing; total, 13,771. The Confederate loss was about 5000, including General Maxey Gregg (just chosen governor of South Carolina) and General T. R. R. Cobb of Georgia. Burnside purposed to renew the attack next day, but was

dissuaded, and recrossed the Rappahannock unassailed during the night of the 15th-16th. Burnside attempted (January 20, 1863) to cross the Rappahannock by fords above Fredericksburg, but was baffled by a terrible storm, and desisted. Eight days later he was relieved from the command.

General Halleck had taken command of Grant's and Buell's combined forces, now swelled to 100,000 men, directly after the battle of Pittsburg Landing, and by slow and regular approaches had forced Beauregard to retreat with little loss from his fortified position at Corinth. Beauregard was pursued by Pope as far as Baldwin and Guntown, Mississippi, but to little purpose. Meantime, General O. M. Mitchell, with a division of Buell's army, had struck eastward up the Tennessee, occupying Huntsville, Bridgeport, Tusculum, etc., and making considerable captures of munitions, railroad cars, etc., with little loss. An attempt on Chattanooga under General Negley was repulsed by Kirby Smith. Subsequent to this the war in that quarter languished under Buell's command, while daring raids were made in all directions by Confederate guerillas and cavalry under Generals N. B. Forrest and John Morgan. Clarksville (Tennessee), Henderson, and Cynthia (Kentucky) were among the towns thus pounced upon, while at Murfreesboro', Tennessee, Forrest captured some 1500 Union troops. The general result of these partisan conflicts was adverse to the Union cause.

General Bragg, having succeeded Beauregard in chief command in this quarter, advanced in June with 45,000 men from the heart of Mississippi into Tennessee, crossing the Tennessee just below Chattanooga, and striking boldly northward through a rugged, mountainous, thinly-peopled region. At Richmond, Kentucky, his advance, under Kirby Smith, fought (August 29) and routed in detail a Union division under General M. D. Manson of Indiana, who was taken prisoner with nearly 5000 of his men. Smith boasted that his prisoners equaled in number his entire force. Smith entered Lexington in triumph. Munfordsville, Kentucky, was captured (September 16) by Bragg, who claimed 4000 prisoners. Thence Bragg advanced unopposed through Bardstown to Frankfort, where he inaugurated (October 1) Richard Haines as Confederate governor of Kentucky. Cincinnati, in great alarm, fortified the Kentucky approaches to the Ohio, and Louisville seemed in imminent peril.

General Buell, leaving Nashville strongly garrisoned, had of late been marching northward on Bragg's left with an army finally swelled by raw levies to 100,000, or at least twice the number of Bragg's much better disciplined force. Still, Buell hesitated to attack, distrusting the effectiveness of his men, but at length moved (October 1) from Louisville to Bardstown and Springfield; Bragg retiring and concentrating before him. Moving thence on Harrodsburg, his left was struck (October 9) near Perryville by five divisions of Bragg's army under General L. Polk, which outnumbered and drove the inferior force directly opposed to it, killing Major-General James S. Jackson, a Kentucky member of Congress. The fight was maintained from 2 p. m. till dark, with advantage at last on the Union side, but Buell's total loss this day was 4348, and Bragg's but 2500. Buell had 58,000 men under his command, but not half of them were engaged, as he did not know his left wing was in action until 4 p. m. Advancing at sunrise next morning to renew the battle, he learned that Bragg had decamped, and he did not stop till he was behind the Cumberland Mountains in East Tennessee.

General Grant, left in command of West Tennessee, with Rosecrans in Northern Mississippi, the two attempted a combined movement on General Stirling Price at Iuka, Mississippi. Rosecrans alone attacked (September 19), but Price held his ground firmly, abandoning it during the ensuing night. His loss was at least 1000; Rosecrans' was 782. Price retreated to Ripley, Mississippi, where he was succeeded by Van Dorn, who now, with at least 30,000 men, undertook to drive or capture Rosecrans and his 20,000, holding the former Confederate fortifications at Corinth. One of the great charges of the war was made by Price, but failed, because Van Dorn was seven minutes too late on his side. The rebel loss in this repulse was at least 5000, including 1423 killed and 2248 prisoners. On the Union side 315 were killed, including General P. A. Hackett of Indiana, 1812 wounded, and 232 missing; total, 2359. Van Dorn and Price retreated precipitately.

General Rosecrans was hereupon given command of the Army of the Ohio (renamed the Army of the Cumberland), in place of General Buell. He had 65,000 effective men, mainly clustered around Bowling Green, Kentucky, whence he soon transferred his head-quarters to Nashville, and prepared to advance. Meantime, the brigade of Colonel A. B. Moore of Illinois, at Hartsville, nearly 2000 strong, was surprised and captured by John Morgan with 1500 cavalry.

Rosecrans, with 46,910 men in three divisions, led by Generals Thomas, McCook, and Crittenden, left Nashville December 26, advancing slowly, with some desultory fighting, to Stone River, opposite Murfreesboro', where his right under McCook was surprised and crushed by Hardee at 7 A. M., December 31st; McCook losing twenty-eight guns and nearly half his men. But when Rosecrans' centre was assailed in turn by the triumphant Confederates, his firmness and soldierlyship, with those of General Thomas, saved the day. Heavy fighting continued throughout the day, with little to boast of on either side since McCook's disaster. But the Confederates had assailed him at all points without success, losing heavily, having been so roughly handled that they did not care to try again. Next day (January 1, 1863) there was a little desultory fighting, mainly at long range. On the day following (January 2) a heavy cannonade was begun by the Confederates, and replied to with spirit; and at 3 P. M. a great charge was made on the Union left by Breckenridge's corps, aided by a heavy enfilading fire from Polk's artillery, but was repulsed after a bloody struggle by the divisions of Negley and Jefferson C. Davis, supporting the fire of Crittenden's batteries, and charging in turn. The Confederates lost four guns and some prisoners, and were pursued across Stone River, where the victors intrenched and rested for the night. The next day passed with little fighting. Bragg at 11 P. M. began to evacuate Murfreesboro', where Rosecrans, on advancing next morning, found only the desperately wounded. Rosecrans reported his losses in this protracted struggle at 1533 killed, 7245 wounded, and 2800 prisoners; total, 11,578 out of 43,400. Bragg reported his loss at over 10,000, including 9000 killed and wounded, out of 35,000. Cavalry raids by Forrest in West Tennessee, John Morgan in the heart of Kentucky, and Wheeler on the Cumberland, were made this winter to little purpose. Colonel A. D. Streight of Indiana was sent by Rosecrans (April 10) with 1800 cavalry to operate on Bragg's rear, but was surrounded near Rome, Georgia, by Forrest and Reddy, and compelled to surrender. Sundry minor conflicts in this quarter inflicted in the aggregate about equal losses on either belligerent.

Commodore Foote had triumphantly swept down the Mississippi from Cairo to Vicksburg, co-operating with General Pope on the Missouri and General W. T. Sherman on the Kentucky side. Columbus, Kentucky, was abandoned on his approach; New Madrid, Missouri, and Island No. 10 in the Mississippi, were successively taken by Pope, compelling General Makall to surrender 123 guns and 6700 men; then Forts Pillow and Randolph, which opened the river to Memphis, where a Confederate fleet of steamboats undertook to bar the way, but was soon demolished (June 4), when Memphis was quietly surrendered. An expedition thence up White River, to open communications with General Curtis, did not find him, but lost the steamboat Mound City, with 150 men, by a ball through her boiler in an attack on St. Charles, which was taken. Commodore Davis steamed down to Vicksburg, and communicated with Farragut below it from New Orleans; but a combined naval attack (July 1) on that stronghold was repulsed, and the siege raised July 24.

General Grant, now at Jackson, Tennessee, after the battles at Iuka and Corinth had his department enlarged so as to include Mississippi, while 11,500 men were sent him under McPherson. He had advanced as far as Oxford, Mississippi, on the way to Vicksburg, when Van Dorn struck (December 20) with cavalry at Holly Springs in his rear, where Grant's stores were awaiting a further reopening of the railroad. The place was occupied by Colonel R. C. Murphy of Wisconsin, who surrendered nearly 2000 men, nearly half of them in hospital. Grant at once cashiered Murphy in a stinging order, but meantime his stores, worth \$4,000,000, had been destroyed or carried off, and he was compelled to turn back into Tennessee.

General W. T. Sherman, with 30,000 men, left Memphis on steamboats December 21, and fell down the Mississippi to co-operate in the reduction of Vicksburg. Ascending the Yazoo, he made (December 22) a resolute attack on the rebel batteries commanding Chickasaw Bayou, but the ground was difficult, the banks strong and well manned, and he was repulsed with a loss of 2000, while General Pemberton reports the Confederate loss at 267.

General John A. McClernand now superseded General Sherman, and at once resolved on the reduction of Fort Hindman (known as Arkansas Post), 50 miles up the Arkansas River. His force was so large, and his dispositions so well made, that his first assault compelled its surrender, with 5000 prisoners and seventeen guns. The Union loss in the assault was 977. General Grant arrived from Memphis and assumed chief command February 2, 1863.

Attempts to cut a channel across the narrow isthmus opposite Vicksburg on which the Union army was encamped proved failures, and a boat-expedition under General L. F.

Ross from the Mississippi, through Yazoo Pass, into the Coldwater and Tallahatchie Rivers, was stopped and turned back by Confederate works at the head of the Yazoo, returning to the Mississippi unmolested; and one or more kindred attempts to circumvent the defences of Vicksburg were likewise baffled. At length General Grant decided to gain their rear by the south rather than the north, and, defying high water and other impediments, marched his army 70 miles to Hard Times, nearly opposite Grand Gulf. Commodore Porter, commanding the Union fleet above Vicksburg, ran the batteries of that city with eight gunboats and eight barges, whereof but two were destroyed by their fire, the rest appearing before Grand Gulf in season to bombard its defences, but to no purpose. Grant thereupon crossed (April 30) at Bruinsburg, some miles below, and, taking them in reverse, easily took possession of Port Gibson and Grand Gulf, defeating General Bowen, who had been sent from Vicksburg to resist him, with a loss of nearly 1000 on each side. Moving up the Big Black, General Grant's advance easily crushed at Raymond two rebel brigades under Gregg; Union loss, 443; Confederate, 723. Advancing to Jackson, the capital of the State, McPherson was there resisted by General W. H. T. Walker, who was promptly defeated, with a Confederate loss of 845 to 265 Union. Here seventeen guns were taken and much material destroyed.

By this time General Jos. Johnston had arrived with reinforcements, and assumed chief command of the Confederates, directing Pemberton to join him with the defenders of Vicksburg. Grant of course moved rapidly westward to bar such junction, and at Champion Hills encountered (May 16) Pemberton, who attempted too late to move northward and join Johnston, but was compelled to fight thrice his force, and was beaten with a loss of General Tilghman among the killed, 2000 prisoners, and fifteen guns. General Loring's division was cut off from Pemberton's, and escaped southward to Jackson. At the crossing of the Big Black, Pemberton fought again, but was soon put to flight, with a loss of eighteen guns and 1500 prisoners. Pemberton, with whatever he still had left, fled into Vicksburg, necessarily abandoning his strong defences on the Yazoo, with a number of heavy guns. The Confederate navy-yard and hospital at Yazoo City, with 1500 sick and wounded, were among the fruits of these successes. Grant followed Pemberton closely, and tried to carry his stronghold by assault, but was repulsed with heavy loss. He then sat down to patient sapping and mining, fortifying his rear against Johnston, who was threatening him from Clinton and Jackson, and worked away until Pemberton was starved into a surrender (July 3), having still 1500 men fit for duty, besides 10,000 in hospitals. Grant reports his total loss from his landing at Bruinsburg to his triumphant entry (July 4) into Vicksburg at 943 killed, 7095 wounded, and 537 missing; total, 8515, of whom 4236 fell before Vicksburg; and claims 37,000 prisoners, of whom a large part were sick or wounded, with arms and munitions for 60,000 men. Among the Confederates killed were Generals Tracy, Tilghman, and Green. Grant now turned, with a force raised to 50,000, upon Johnston, who had but 24,000, pushed him back to Jackson, and there besieged him, with a loss of 600 on either side, until he decided to decamp, retreating by Brandon to Morton.

During these momentous operations Colonel B. H. Grierson, with 1700 cavalry, raided northward from Lagrange, Tennessee, through Pontotoc, by Jackson and Natchez, to the Mississippi at Baton Rouge, taking 500 prisoners and 3000 small arms, having traversed 600 miles of mainly horrible roads in sixteen days, losing but twenty-seven men. Milliken's Bend, on the Mississippi, held by General E. A. Dennis with 1400 men, was attacked by the Confederate general Henry McCulloch with a superior force, which was repelled with a loss of some 500 to either side. Helena, Arkansas, held by General B. M. Prentiss with 4000 men, was likewise attacked (June 30) by the Confederate general Holmes with 7646, losing 1636, whereof 1000 were captured. Helena was thereafter let alone.

General Banks, commanding at New Orleans, found Galveston already surrendered (October 8, 1862), without resistance, to a Union fleet of four gunboats, and thence quietly held till he sent down a regiment, of which part was debarked (December 28), when General Magruder, just appointed to command in Texas, organized a fleet of mercantile steamers, shielded by cotton-bales and manned in good part by volunteers, with which he came down the bayou in the night (December 31) and boldly attacked the Union fleet in the harbor, captured the Harriet Lane, sunk the Westfield, and compelled the troops ashore to surrender. And the Confederate corsair Alabama, arriving off the bar soon after, silenced and took the Union gunboat Hatteras, Captain Blake, which sunk six minutes afterwards. Major



O. M. Watkins, blockading the mouth of the Sabine with two gunboats, was attacked by two Confederate gunboats from up-river, and easily captured.

General Banks had 30,000 men, which sickness, desertion, and detachments soon reduced to 14,000. Having pushed these westward, so as to clear the country of all enemies to the Atchafalaya by an easy fight at Carney's Bridge, he at once returned and laid siege to Port Hudson on the Mississippi, where the Confederates had established batteries to dispute the passage of the river. Commodore Farragut, with four frigates and five gunboats, passed the batteries, losing one of his best vessels in so doing. Banks, deeming the garrison too strong to be successfully assaulted by his force, again moved westward to Alexandria, driving General R. Taylor and taking 2000 prisoners, several steamboats, and twenty-two guns. Again Banks returned to the Mississippi at Port Hudson, which he invested and soon tried to carry by assault, but was beaten off with a loss of 2000 against 300. He now besieged in due form, and at length made (June 14) a second assault, which likewise failed. But no relieving army appeared, supplies were very short, and the garrison were on short allowance, with little to eat left, when a tremendous salute from the investing Union batteries and gunboats gave notice (July 6) that Vicksburg had fallen. Upon being convinced of this fact, General Gardner surrendered the fort with its garrison of 6408 men, of whom many were sick or wounded. Banks's effective force was that day about 10,000; his total captures during the campaign, 10,584 men, seventy-three guns, and 6000 small arms.

Brashear City, on the Atchafalaya, was surprised and captured by the Confederate general R. Taylor (June 22), with a Union loss of 1000 men and ten guns. The Union camp of General Dudley near Donaldsonville was in like manner surprised (July 12) by 1200 Texans, and 300 prisoners taken. Banks returned to New Orleans, and sent General Franklin with a fleet and 4000 men to take the fort at Sabine Pass; but the naval attack was repulsed with a loss of two gunboats, fifteen guns, and 250 men, which exceeded the whole number opposed to them.

General Banks pushed out a part of his command, under General C. C. Washburne, to Opelousas, to make his own movement on Texas. On his retreat to the Teche, General Washburne's right was attacked (November 1) by General R. Taylor, and roughly handled, the Sixty-seventh Indiana being captured entire. Reinforcements being brought up, Taylor drew off, having inflicted a loss of 716, and suffered but 425.

General Banks, with 6000 men, steamed from New Orleans to the Rio Grande, thence capturing Brazos Santiago, Brownsville, Aransas Pass, Fort Esperanza (commanding Matagorda Bay) with little opposition and hardly any loss, there being no considerable force to oppose him. He then returned to New Orleans, leaving General N. J. T. Dana in command, but the latter found no hostile force in that part of Texas, and accomplished very little.

When the spring of 1864 had fairly opened, General A. J. Smith's corps from Sherman's army, supported by Commodore Porter with a powerful steam-fleet, advanced up Red River, menacing Shreveport, while General Steele was to co-operate by a movement from Little Rock, which had been taken by an advance with 12,000 men from Helena six months before. General Price, who was in command there, was far outnumbered and easily routed. He burned six steamboats and some stores, falling back to the vicinity of Red River. Steele lost but 100 killed and wounded in this advance, and took 1000 prisoners.

Banks's advance, which should have passed Alexandria before March 1st, only reached that point on the 16th, and he was not ready to advance farther till about April 1st, at which time the river was rapidly falling, and barely navigable for gunboats. By this time his 40,000 men had been reduced by details and sickness to 20,000, whereof the van had reached Sabine Cross-roads, near Mansfield, when, as it moved carelessly through a pine-woods region, it was attacked in great force, outflanked and routed, and an attempt to re-form was baffled by the presence of a supply-train which should have been elsewhere. Retreating, or rather fleeing, three miles to Pleasant Grove, the routed van re-formed upon General Emory's division, and was again charged headlong by the flushed Confederates, and brisk fighting ensued, in which the Confederate general Mouton was killed. Every attack was repulsed, and darkness closed the combat. General Banks retreated during the night fifteen miles to Pleasant Hill, where General Smith's corps was awaiting him, raising his entire force to 15,000. At 11 A. M. the Confederates appeared, and skirmished continuously till 4 P. M., when they made a grand attack, and were again beaten off, losing 400 prisoners. General M. Parsons (Confederate) and Colonel Lewis Benedict (Union) were among the killed. Banks's loss in these fights was

3969, mainly taken prisoners at the first collision. Though successful in the last struggle, he did not again advance, but marched to the Red River at Grand Grove, thence conveying the fleet, which was often hard aground, back to Alexandria. His rear and his vessels were repeatedly and sharply assailed; in one attack, General Thomas Green of Texas was killed. The Eastport, one of the gunboats, being hard aground, was blown up. The rest of the fleet was saved, and taken down to the Mississippi, passing Alexandria with great difficulty by the help of dams. Having now to spare A. J. Smith's corps, Banks continued his retreat, forced to fight and push aside General Bee with 8000 men, with a loss of 250 on either side. One steamboat was burned and three captured by Confederates near Dean's Bayou, 30 miles below Alexandria, some 500 Unionists being made prisoners. Part of them were retaken in repulsing (May 6) a Confederate attack on Banks's advance near Mansura, and an attack on his rear (May 19) at Yellow Bayou on the Atchafalaya.

General Steele's advance from Little Rock to co-operate with Banks was, by the retreat of the latter, exposed to great peril. The Confederates under General Fagan turned upon him in great force, drove in or captured his foraging parties, and at length struck his advance a heavy blow (April 25) at Marks's Mill, taking some 1500 prisoners. Steele thereupon retreated, and was attacked (April 30) by Kirby Smith at Jenkins's Ferry on the Sabine; but the Unionists, though inferior in numbers, had the advantage in position, and repulsed their assailants after a sharp contest, in which the Union loss was 700; the Confederate, 2300, including three generals. Steele's retreat to Little Rock was thenceforth unmolested. Several spirited contests were afterwards had in different parts of Arkansas with varying results, but the north-eastern half of its area was generally held by the Unionists, the other half by the Confederates nearly to the last.

In 1864, General Rosecrans being now in command in Missouri, General Price entered it from Batesville, Arkansas, first resisted at Pilot Knob by General Hugh S. Ewing, who held his post throughout a day's fighting, and then retreated. Price advanced to Jefferson City, but, finding it too strong to attack, pushed westward to Lexington, and thence to the Little Blue, sharply followed by General Pleasanton with a superior force, and overtaken at the Big Blue, where he made a stand, but was soon driven westward. Sharply pursued, Price was again overtaken at the Little Osage, where he was again routed with the loss of eight guns and 1000 prisoners, including Major-General Marmaduke, a brigadier, and five colonels. The residue were chased to Fayetteville, Arkansas, but without much fighting.

General Hooker, on succeeding, Jan., 1863, to command of Army of the Potomac, had found it exceedingly demoralized by its disaster at Fredericksburg, the desertions averaging 200 per day. After devoting two months to reorganizing and reinspiring it, during which its force had been gradually raised to 100,000 infantry, 13,000 cavalry, and 10,000 artillery, he judged himself ready to assume the offensive. Despatching most of his cavalry under Stoneman to destroy railroads, dépôts, etc. in Lee's rear, his van forded the Rappahannock at Kelly's Ford, above Fredericksburg, advancing rapidly to Chancellorsville, where he established his headquarters and paused. General Anderson, who had been watching the fords, being too weak to resist, fell back quietly before him to within five miles of Fredericksburg, where Lee met him with two divisions. Meanwhile, Stonewall Jackson with two more moved rapidly from Lee's right below Fredericksburg, and passed silently around Hooker's right, several miles west of Chancellorsville. Suddenly, just before sunset (May 2), Howard's corps, holding the Union right, was struck in flank and rear while ignorant of danger, and in part at supper with arms stacked, by Stonewall Jackson's corps, 25,000 strong, which burst from the thick woods of that region and literally demolished it. Ten minutes after the first shot its men were rushing in wild consternation towards Chancellorsville and the river beyond; thousands of them were unarmed, while very many of them were made prisoners. Two or three regiments were sacrificed in unsuccessful attempts to stay Jackson's impetuous rush. Finally, General Pleasanton got his battery of horse artillery into position, and arrested the advance by murderous discharges of grape at short range. Here fell Stonewall Jackson, mortally wounded: it was said by a volley from some of his own men. It was dark, and they were in the woods; all that is certain is that he died of his wounds eight days afterwards. The flight was here stopped, and some of the lost ground regained, but the Eleventh corps was temporarily extinct; so Hooker drew back his right towards Chancellorsville.

The Confederates next morning followed up their decided success by charge after charge in great force on General Sickles's corps, now holding the Union right, and caused it

to give some ground during the day. The carnage of that day was frightful, Sickles having 4000 out of 18,000 killed or wounded. Hooker had been stunned by a cannon-ball striking a pillar of the Chancellorsville House against which he leaned, and hence failed to support Sickles when support was needed.

Sedgwick, with 22,000 men, had been left in front of Fredericksburg. He crossed the river early this morning, just below that city, and was reinforced by Gibbon, who crossed on a pontoon bridge, raising his troops to 30,000. By noon he had stormed and carried Marye's Heights, taking some guns and prisoners, thence pushing out four miles to Salem Church. But this brought him full upon Lee's army, which, having crossed to assail Hooker, now turned upon him, fighting him till darkness interposed. Next morning (May 4) Hooker remained passive, and Sedgwick, finding himself overpowered, retreated across Banks's Ford, having lost nearly 5000 men. Lee might now have turned in full force upon Hooker, but his men had been overworked, and he hesitated. Hooker recrossed the Rappahannock unassailed during the ensuing night, claiming that he brought back one more gun than he took over, and that he had inflicted greater loss than he suffered, though his own (including Sedgwick's) was no less than 17,197 men. Lee's loss must have been heavy, but was not made public. Stoneman's cavalry returned May 3, having inflicted little loss and suffered little.

Lee soon after recalled Longstreet from a fruitless demonstration against Suffolk, Virginia, and while Hooker was planning to flank him by crossing the Rappahannock below Fredericksburg, was himself executing a more extensive and daring flank movement by Culpeper Court-house and Sperryville into the Shenandoah Valley, and down that across the Potomac. This movement was first fully developed to Hooker by an advance in great force under General Early on Winchester, held by General Milroy of Indiana, who evacuated it when too late, and lost twenty-nine guns and 4000 men in his hurried flight across the Potomac. Ewell pursued unresisted to Chambersburg, Pennsylvania, which Jenkins, with his cavalry, had reached some days before (June 17). Early's division of Ewell's corps moved forward to York, Pennsylvania, while Johnson's division pressed northward to Carlisle, and Imboden's brigade swept the valley of the Potomac westward to Cumberland, Maryland. By June 25th all of Lee's army had forded the Potomac, and was advancing into Pennsylvania. Ewell's van reached Kingston, but 13 miles from Harrisburg. Ascounted by two Unionists as it passed through Hagerstown, Lee had 91,000 infantry, 280 guns and 6000 cavalry, while 5000 cavalry under Stuart entered Pennsylvania without traversing Hagerstown.

General Hooker had waited long below and around Washington, incredulous that Lee would invade the free States. At length he too crossed the Potomac with 100,000 men, of whom 15,000 were spared him from the defences of Washington. He wished to draw 10,000 more from Maryland Heights, opposite Harper's Ferry, but was forbidden to do so by General Halleck. Hooker thereupon asked (by telegraph) to be relieved from the command, and was promptly directed by Halleck to turn it over to General Meade, which he did, and was no more seen in the Army of the Potomac.

A cavalry fight (June 23), inaugurated by Stuart and repelled by Kilpatrick, was the first notice that the two great armies were nearing each other. They casually encountered near Gettysburg, Pennsylvania, where General Buford's division of Unionists met the Confederate van under Heth, and drove it back upon its corps (Hill's), by which they were driven in turn. The sound of guns brought up General Wadsworth's division of Reynolds' (First) corps, Reynolds himself going forward to reconnoitre, and being shot dead as he did so. General Doubleday assumed command, but his force, being too weak, was driven back, capturing 800 prisoners as they retreated. Doubleday halted on Seminary Ridge, just west of the village, where the residue of Reynolds' and all the Eleventh corps soon came up, Howard assuming command. Ewell's (Confederate) corps next came up from York, and again gave the ascendancy to their side, driving the Unionists through Gettysburg, with the loss of their wounded in hospital and several guns. Howard took position on Cemetery Hill, just south of the village, and despatched couriers to Meade and Sickles for aid. Sickles was at Emmitsburg, ten miles away, but hastened to the scene of conflict; Meade, who was at Taneytown, expecting and preparing to fight on Pike Creek, sent Hancock at once to take command at Gettysburg, directing his corps under Gibbon to follow. Slocum arrived at 7 p. m., and took command, Hancock returning to report to Meade. Before morning (July 2) each army had been concentrated around Gettysburg, save that Sedgwick's (Sixth) corps, which was 30 miles distant at 7 p. m., did not arrive until 2 p. m. of that eventful day. One hour later, Sickles, who held an

advanced position on the Union left, was attacked in overwhelming force by Longstreet just as he was about to recede, and was crushed back with heavy loss, losing a leg by a cannon-shot. Meantime, Sykes's (Fifth) corps had seized Round Top, the highest point on that wing, and firmly held it. Hancock rushed to Sickles's relief, and Longstreet's advance was arrested, but he held the ground from which Sickles had been driven. Ewell also had assailed and driven the weakened Union right, and the second day's fighting closed with the advantage still on the side of the Confederates.

The third day (July 3) opened with an advance of the Union right under Slocum, who had now been rejoined by a division sent over the day before to support the imperilled left. Slocum retook the ground he had lost, and rested upon it. Then there was a lull of an hour or more.

At 1 p. m. the roar of 115 heavy guns from Hill's and Longstreet's front, crossing their fire over the Union centre at Cemetery Hill, announced the crisis of the struggle. For two hours they ploughed the Union lines, being less effectively replied to by the less numerous Union artillery. At length the Union guns stopped firing in order to cool their pieces, and now the grand Confederate column of assault emerged from behind their suddenly silent batteries and pressed swiftly towards the Union lines. Pickett's and Heth's (now Pettigrew's) divisions led, charging up to the mouths of the Union guns, but were repulsed with terrible carnage. Pettigrew's brigade, having lost 2000 out of 2800 men, retreated under the command of a major. When the remnant regained their own lines the battle of Gettysburg had been lost and won, though a charge was afterwards made by Crawford's division of Sykes's corps on the Union left, capturing a battery with 260 men, and retaking 7000 small arms, with Sickles's wounded, who had lain for twenty-four summer hours unguarded within the Confederate lines.

General Meade reports his total loss in these three bloody days at 2834 killed, 13,709 wounded, and 6643 missing (mainly taken prisoners on the 1st). He claims as trophies three guns, 24,978 small arms, and 13,621 prisoners, including wounded. He estimates the Confederate loss as much greater, which is probable, as about 7000 of them were buried at Gettysburg, with 4000 Unionists. Among the Confederate killed or mortally wounded were Generals Pender, Barksdale, Garnett, Armistead, and Semmes. Had Meade known how badly the Confederates were beaten, he might probably have crushed them; but he doubted and hesitated while Lee retreated to the Potomac, sorely annoyed by the way. Lee says his rear remained near Gettysburg till after daylight of the 5th. He might have been assailed at the Potomac, as his bridge had been burned by General French in his absence, and the river was swollen by heavy rains; yet he rebuilt his bridge, and crossed (July 12-13) his infantry and guns without loss; but a cavalry charge by General Kilpatrick on his rear-guard drove it across with a loss of 125 killed (including General Pettigrew) and 1500 prisoners. Lee retreated the length of the Shenandoah, and resumed his position behind the Rappahannock, General Meade following and facing him on the north bank.

General Keyes, with 3000 men, was ordered from Fortress Monroe to capture Richmond during Lee's absence in the North, but though few troops had been left to defend it, he desisted without a serious effort.

A series of partisan affairs ensued on either bank of the Rappahannock, the most important of which was the capture by storm of Rappahannock Station with 1000 men by the Union brigades under General David A. Russell. The Confederate rifle-pits at Kelly's Ford were in like manner taken, with 400 prisoners.

Meade, aware that Longstreet had been detached for service in Georgia and Tennessee, now advanced to attack Lee's depleted army at Mine Run, but finally concluding that its position was too strong, desisted and retreated across the Rapidan, and thus closed the campaign of the Army of the Potomac in 1863.

General Morgan made a fresh raid clear through Kentucky, striking and crossing the Ohio (July 7) at Brandenburg, 40 miles below Louisville, with a mounted force said to number 4000. He then made his way through Indiana and Southern Ohio to Buffing Island, not far below Parkersburg, but found the river patrolled by armed steamboats, while a considerable land force was pressing in his rear. Ultimately, less than 400 of his men escaped; all the rest were made prisoners with little fighting. Morgan himself was taken prisoner and confined in the State prison at Columbus, Ohio, whence he escaped and regained the Confederate lines, but was surprised and shot in East Tennessee not long afterwards.

General Burnside had been sent from the East to the Ohio, taking his (Ninth) corps with him. Having despatched a

cavalry force under Colonel H. S. Saunders across the Cumberland Mountains to burn railroad bridges and destroy stores, in which it was quite successful with little loss, he crossed those mountains with 20,000 men, and suddenly appeared (September 3) at Knoxville, where he was hailed by the long-suffering Unionists as a deliverer. He next moved on Cumberland Gap, where he captured General Frazier with fourteen guns and 2000 men. But his activity was here arrested by the reverse encountered by Rosecrans at Chickamauga.

Rosecrans had stood idle at Murfreesboro' since January 1, 1863, awaiting reinforcements and supplies, till June 24, when he advanced, taking three guns and 500 prisoners at Shelbyville, and soon cleared all Middle Tennessee of armed Confederates; Bragg retreated before him with little loss. Crossing the Tennessee at several points, Rosecrans compelled him to evacuate Chattanooga without fighting, retreating down the railroad that led into Georgia. Rosecrans, misled by his easy success, was pursuing in hot haste, when Bragg, having been reinforced by Longstreet's corps from Virginia, turned suddenly on his widely-scattered divisions, compelling him to concentrate hastily behind the Chickamauga Creek. He had 55,000 men; Bragg had scarcely more, and the first day's fighting (September 19) was indecisive. Next morning, Rosecrans' right, while attempting to close down on his centre, was struck heavily by Longstreet and torn to fragments, the *débris* flying in impotent dismay to Chattanooga, and sweeping Rosecrans along with it. But General Thomas, farther to the left, stood firm, gaining ground somewhat, but maintaining a bold front, and, resting on a wooded ridge, repulsed all attacks until night closed the bloody encounter, when the Confederates drew off, and Thomas stood still through the following day (September 21). At night, still unassailed, he retired to the position assigned him by Rosecrans in front of Chattanooga.

The Union loss in this bloody, protracted struggle was 1644 killed (including General W. H. Lytle of Ohio), 9262 wounded, 4945 missing; total, 15,581. Bragg's admitted loss was 18,000, but he claims to have taken 8000 prisoners (including wounded) and fifty-one guns. But he failed to take Chattanooga, which Rosecrans firmly held, though suffering badly for forage, owing to the barring in of the Tennessee River below him and the raids of Wheeler's Confederate cavalry on the trains coming to supply his rear, until he was directed to turn over his command to General Thomas.

General Longstreet, with his corps, was now detached from Bragg's army, and sent to drive Burnside out of East Tennessee. Longstreet drove the Union forces west of Knoxville, but here Burnside was found too strong, and an assault made (November 28) on an outpost known as Fort Sanders was repulsed with a loss of 800 Confederates, including two colonels killed. The Union loss was but 100. Longstreet thereupon raised the siege, and returned to the army of Virginia.

General Grant succeeded to the command of Rosecrans' army, while Sherman was ordered from Vicksburg still further to reinforce it, General Hooker having already been sent in haste with the Eleventh and Twelfth corps from the Army of the Potomac. Meantime, Wheeler had burned a supply-train of 1000 wagons in the Sequatchie Valley, and another at McMinnville, fighting several cavalry commands sent against him, burning many railroad bridges, and escaping into Alabama with but little loss.

Grant found Hooker at Bridgeport, below Chattanooga, and directed him to clear the river, so that supplies could reach the hungry army around Chattanooga. Hooker crossed the Tennessee unmolested, and advanced to Wauhatchie, overlooked by Law's division from Lookout Mountain. At 1 A. M., October 29, Geary, in Hooker's front, was attacked with great impetuosity, but easily beat off his assailants, with a loss of about 400 on each side.

Sherman arrived November 15, soon followed by his army, which was diverted to Grant's left, up the Tennessee. All being at length ready, Grant advanced against Bragg, who was still looking down into Chattanooga from the west of Lookout Mountain. General Grant's Fourth corps first moved out (November 22), directly in front of Chattanooga, seizing the Confederate outposts before they could be supported, and taking 200 prisoners; then Hooker's command, during a heavy mist, mounted (November 24) the south and west sides of Lookout Mountain, climbing, fighting, and at length entrenching themselves on the ground they had won. Meantime, Sherman crossed the Tennessee in his front, and having firmly intrenched himself, assaulted the north end of Mission Ridge, Thomas's cavalry raiding and burning stores in Bragg's rear, while his infantry felt their way up the river till they clasped hands with Sherman's left; and now Hooker crossed the Chattanooga Valley from Lookout Mountain to Mission Ridge, pushing the

enemy before him and taking 2000 prisoners. Meanwhile, Sherman, stubbornly opposed, was making little progress on the left, until Grant at 2 P. M. gave Hooker orders to advance in the centre. His men obeyed with alacrity, charging right up the long, steep ascent, and reaching the west on six points at once, when the Confederates were seized with panic and fled, abandoning forty guns and losing many prisoners. Darkness alone prevented the destruction of the beaten army, which retreated rapidly to Dalton, Georgia, Cleburne in their rear repulsing with ease an attempt to drive his men through a narrow gap in White Oak Ridge, inflicting a loss of 439 to 130. Pursuit was maintained to Ringgold, Georgia.

General Grant states his losses in the above battles at 757 killed, 4529 wounded, and 330 missing; total, 5616; and claims 6142 prisoners. The Confederate loss in killed and wounded was undoubtedly the smaller.

Charleston, South Carolina, and the railroad connecting it with Savannah, Georgia, were often menaced, and sometimes struck at, by the Union forces at Port Royal and the adjacent Sea Islands, but nothing decisive was effected, save the reduction (April 11, 1862), by General Q. A. Gillmore, of Fort Pulaski, commanding the main entrance to Savannah, until Commodore Dupont, having easily taken possession of the islands and most of the coast-towns of Georgia, steamed down to Jacksonville, which, with Pensacola and other Florida ports, were conceded to him without a struggle. Attempting upon his return to Port Royal to advance upon Charleston off Stono Inlet and river, he was stopped by batteries, and an attack (June 16) by General H. G. Wright with 6000 Unionists on Secessionville was repulsed with a loss of 574 men. Several kindred but feeble attempts to reach Charleston were baffled, as was one by Commodore Dupont to reduce Fort McAllister on the Ogeechee. The Confederates made a sally in the dark of rams and gunboats (January 31, 1863) out of Charleston, disabling two of the blockading gunboats and alarming the residue, but taking refuge behind Fort Sumter when daylight appeared. The blockade was not interrupted.

Dupont, with nine iron-clads, next (April 6) bombarded that port at close quarters, but found his way to Charleston impeded by all manner of piles, chains, etc., and was compelled to retire with little loss on either side. The Atlanta, a Confederate gunboat, steaming down from Savannah, was met by the Weehawken, Captain John Rodgers, as she emerged from Wilmington River, and torn to pieces in fifteen minutes. She surrendered four large guns and 165 men.

General Quincy A. Gillmore having succeeded General Hunter in command, and being considerably reinforced, commenced operations by seizing the north end of Morris Island, south of Charleston, and thence besieging Fort Wagner, near its north end, which was regularly assaulted after bombardment July 18, but the storming-party was quickly repulsed with a loss of 1500, including General Strong and Colonels Shaw and Chatfield, killed. The Confederate loss was but 100.

Gillmore, undismayed, next established a battery of great guns on a platform in a marsh west of Morris Island, whence he could shell Charleston, five miles distant. Eleven batteries rained shot and shell on Forts Wagner and Sumter and the batteries on Cummings' Point. Pushing steadily his approaches to Wagner, he had ordered General Terry to assault (September 7), when he found that the Confederates had evacuated both fort and island, leaving eighteen guns in Wagner and seven in Battery Gregg. Next night, Rear-Admiral Dahlgren, now commanding the besieging fleet, sent a large force in row-boats to scale the walls of Fort Sumter, but it was repulsed with a loss of three boats and 200 men.

General Gillmore early in 1864 despatched General Truman Seymour with a fleet and 6000 troops to Florida, where he easily took possession of Jacksonville and Baldwin, capturing valuable stores, but advancing rashly westward to Olustee, he was there suddenly attacked by General Finnegan, and beaten with a loss of 2000 to 730 Confederates. Seymour retreated to Jacksonville, burning \$1,000,000 worth of stores.

In North Carolina the Confederate general M. Hoke besieged and captured (April 20, 1863) Plymouth, held by General Wessels with 2000 men. Among the spoils were twenty-five guns, 7000 small arms, and 1600 effective men. Hoke's loss was but 300.

General Grant, having been made (March 1, 1864) lieutenant-general of the Union armies, repaired to Washington and assumed the more immediate direction of the Army of the Potomac, which had been largely reinforced. General Kilpatrick had just led his cavalry on a raid to within six miles of Richmond, whence, after some indecisive fighting, he made his way unharmed to Fortress Monroe. But Colonel Ulric Dahlgren, with 400 of his men, having ad-

vanced by a separate route on Kilpatrick's right, reached Richmond a day later, and striking thence by a more northerly route, was stopped and killed by a regiment of militia at Dabney's Ferry on the Mattapony, his men dispersed, and most of them captured.

General Grant, with Meade's army, crossed the Rapidan unresisted (May 4-5) at Germania and Ely's Fords, striking due south into the Wilderness. Lee, though looking for him at a higher crossing, at once turned to the right, and attacked in full force. The ground, thickly covered for the most part with small trees, and thoroughly familiar to the Confederates, while strange to the Unionists, was especially favorable to the army which must match its superior knowledge and determination against superior numbers. Two days of desperate fighting, with great slaughter and little advantage to either side, were closed at dark on the 6th with a dashing attack on the Union right by General Gordon, who took 4000 prisoners, including General Truman Seymour.

Next morning, General Lee awaiting an attack behind his intrenchments, General Grant put his army in motion southward, and was unmolested save by Stuart's cavalry during his march to Spottsylvania Court-house. He had lost in the Wilderness no less than 20,000 men, including General James S. Wadsworth of New York, killed, and seven generals wounded. General Sedgwick of Connecticut was killed two days afterwards. The Confederate loss was 8000, including Generals Samuel Jones, wounded, Stafford, killed, and A. G. Jenkins, wounded, and Longstreet was disabled for months.

There was heavy fighting around Spottsylvania Court-house for two or three days. On the 11th, at daybreak, Hancock's corps carried by assault a part of the Confederate works, capturing Generals Edward Johnson and George H. Stewart, with 3000 men. General Lee narrowly escaped. Hancock captured thirty guns, but after holding them for hours only brought off twenty of them. But he was unable to advance, and days of desperate fighting, which cost the Unionists at least 20,000 men at this point, proved Lee's position impregnable. Acting on the defensive and behind strong works, his loss was much less than Grant's, but it included Generals Daniels, Perrin, and J. M. Jones, killed.

Grant again moved southward, transferring his right to his left, while his cavalry under Sheridan made a fresh raid towards Richmond, fighting (May 11) and killing General J. E. B. Stuart a few miles north of that city. Crossing the Chickahominy at Meadow Bridge, Sheridan returned with little loss to Grant's army.

General Butler, with 30,000 men, embarking all but his cavalry, moved up the James and occupied City Point, below Richmond. He was to have seized Petersburg, but missed it, General Beauregard being hastily summoned from Charleston to aid D. H. Hill in defending it. Butler even failed to cut the railroad between that city and Richmond, and was rather worsted by Beauregard in a fight near Procter's Creek, which cost the Unionists 4000 and the Confederates 3000 men. Butler was further assailed on several succeeding days, but held his ground with little loss.

General Grant, moving by poorer and more circuitous roads than the direct one held by Lee, on approaching the North Anna (May 17) found his enemy strongly posted, well intrenched, and ready to receive him. There was more fighting here, generally with results favoring the Unionists, but Lee's position could only be stormed at an immense cost of life, and Grant, again moving by his flank, pressed on to Cold Harbor, where he ordered a general assault on the Confederate lines, here, as before, confronting him. Those lines were defended by deep and strong *abatis* of slashed timber, the limbs so intertwined with each other as to defy speedy untying. The assault was deployed at sunrise (June 3), and in a few minutes was repulsed with great slaughter. The Union loss was 1705 killed, 9072 wounded, and 2406 missing. Generals P. A. Porter, L. O. Morris, and F. F. Wood (all of New York) were among the killed, with six colonels.

General Grant, unable to interpose between Lee's army and Richmond, now decided to pass the James below that city, while Sheridan was sent on a fresh raid around Lee's left, to tear up railroads and burn stores in his rear. Disappointed in his expectation of finding Hunter in possession of Gordonsville, he was soon surrounded by enemies, with whom he fought an indecisive battle at Trevilian's, returning to Grant with 370 prisoners, having lost in all 735 men.

Grant appeared south of Richmond in time to have seized Petersburg, but the precious moment was squandered by uninformed or timid subordinates until Lee's army was in good part behind its defenses. Assault after assault was now made (June 16-18) on those defenses with heavy loss, and no result but the knowledge that they could not be

thus carried. Then abortive attempts were made (June 21-24) to turn them by the south, which A. P. Hill resisted and baffled, taking in all at least 5000 prisoners. Then Wilson, with 8000 cavalry, raided down the Weldon and Danville Railroad, but was fought and beaten at Stony Creek and Reams's Station, losing thirteen guns and 1000 prisoners.

Grant now moved the Second corps from his extreme left to his extreme right, and threw it across the James, as if about to attack Richmond from the east. And now (July 30) a mine which had been skillfully run from the centre of the Union lines under one of the forts or bastions of Petersburg, was exploded, blowing 300 Confederates into the air and opening a gap in their lines. Hereupon the cannon thundered all along the Union front; but the column of assault, which should have rushed forward on the instant, did not move for several minutes, and then advanced bravely into the chasm made by the explosion, and there halted. The Confederates of course rallied from every side, and poured volley after volley upon the helpless crowd huddled together in the "crater," inflicting on the Unionists a loss of 4400 men, mostly prisoners, while the entire Confederate loss was but 1000.

Again (August 12) Hancock assailed Lee's extreme left below Richmond, but with little advantage, the Union loss in operating on this flank aggregating 5000, while the Confederate was much less, but included Generals Chambliss and Gherardie, killed.

Lee having necessarily sent several divisions from his right to his left, Grant ordered General Warren southward to seize and hold the Weldon Railroad; but Warren's divisions were struck in flank by A. P. Hill at the critical moment, and twice rolled up on themselves, with an aggregate loss of 4455 men, mainly prisoners. The Confederates had lost but 1200, but Warren had seized the Weldon Railroad, and he thenceforth held it.

Hancock was sent to seize this road also at Reams's Station, farther down, which he did, but was in turn attacked and driven off by Hill, with a loss of five guns and 2400 men. Hill lost but half so many.

Again, after a pause, Warren advanced (October 1) by order, with four divisions, to the Squirrel Level road in his front, fighting for two days and losing 2500 men, but holding his ground, and intrenching it so firmly that it could not be taken from him. To cover this advance, General Butler on the Union side had assaulted Fort Harrison with the Tenth and Eighteenth corps, taking the fort with fifteen guns. He next attempted Fort Gilmer, but was repulsed with a loss of 300, including General Dunnovan, killed. General Field attempted next morning to retake Fort Harrison, but was beaten off with heavy loss. A few days later General Kautz, whose Union cavalry had been pushed up the Charles City road to within five miles of Richmond, was there surprised and driven, with a loss of nine guns and 500 men. The Confederate general Gregg of Texas was killed in the ensuing fight, which had no result.

Hancock was next ordered farther to the Union left to find and turn the Confederate flank, and in a fight with Hill's corps, which attempted to interpose between his divisions, took 1000 prisoners. Darkness arrested the fighting, but Hancock drew off in the night, having lost 1500 men and inflicted equal loss upon the enemy. Thus closed on this point the campaign of 1864, with Warren holding the Weldon Railroad, and Butler threatening Richmond; the losses of the Army of the Potomac during the year having aggregated 88,387 men.

When Virginia separated from the Union her western counties, including most of those lying beyond the Alleghanies, strongly protested against the ordinance, voted "No," when it was submitted to the ordeal of popular suffrage, and refused to be bound by it. Calling a convention at Wheeling, they decreed a separation from the old State and the formation of a new one, first named Kanawha, but since known as West Virginia. They had previously organized a loyal State government for Old Virginia, which (hardly an eastern county being represented in it) readily agreed to the organization of the new State. Meantime, the Confederates had seized Harper's Ferry and destroyed the Baltimore and Ohio Railroad for some distance west of it, and they soon sent a force over the Alleghanies to secure obedience to the Confederate authorities at Richmond. It was promptly confronted by General McClellan with a far larger army, organized in Ohio, but largely composed of West Virginians. A part of it routed (June 3, 1861) the enemy at Philippi, another detachment at Rich Mountain (July 12), and the main body under General Garnett, who, in full retreat, was overtaken and routed at Carrick's Ford on the Cheat River, where Garnett was killed and some prisoners were taken. The residue escaped over the Alleghanies.

General J. D. Cox, advancing up the Kanawha, drove the Confederates under General Wise before him; Wise burning (July 28) Gauley Bridge to arrest the pursuit.

General John B. Floyd now assumed command of the Confederates, inspired by their triumph at Bull Run, and had an indecisive conflict (August 10) with General Rosecrans at Carnifex Ferry. Floyd held his ground, but retreated during the ensuing night.

General R. E. Lee now assumed command in this quarter, and there was much marching with little serious fighting till winter closed the campaign, and little of consequence occurred here the next year, when General J. C. Fremont succeeded to the command of the Union forces, but was hurried over the mountains to resist Stonewall Jackson's raid down the Valley. Thereupon the Confederate general Heth raided across the mountains and attacked (May 23, 1862) Colonel George Crook at Lewisburg, but was beaten off with loss. Thenceforward the operations on either side in this quarter were limited to inconsiderable raids and surprises.

General Franz Sigel was assigned chief command (Union) in the Valley in the spring of 1864, when, with 10,000 men, he advanced to New Market, where he was met by General John C. Breckenridge with an equal force, and routed with a loss of six guns and 700 men.

Breckenridge was unable to follow up his victory, being obliged to send much of his force over the mountains to oppose Crook, who, with 6000 men, had beaten McCausland's far inferior but well-posted force near Dublin Station, and had broken the Virginia and Tennessee Railroad at that point. General Averell, with 2000 cavalry, raiding farther west, had tried to destroy the Confederate salt-works near Wytheville, but had been beaten off by John Morgan. Both Crook and Averell thereupon retreated.

General David Hunter was now assigned to the command of Sigel's beaten army, which was strengthened, while Breckenridge had been called off to reinforce Lee at Richmond. Hunter advanced to Piedmont, near Staunton, where he was confronted by General W. E. Jones with a hastily collected army, which was beaten (June 8) in a spirited action, wherein Jones was killed and 1500 of his men captured.

Hunter thereupon occupied Staunton, where he was joined by Crook and Averell, and then, with 20,000 men, pressed on to Lynchburg and fiercely assailed it, but was met and beaten off by a superior Confederate force under Early, hastily despatched by rail from Lee's army. Outnumbered and short of ammunition, he retreated over the Alleghenies into West Virginia, whence he regained the Potomac by a long and toilsome circuit. Meanwhile, the Valley was left without any considerable Union force, and Early hurried down it with 20,000 triumphant veterans, Sigel retreating and burning stores till he had crossed the Potomac and took post on Maryland Heights, where Early did not choose to assail him, but crossed into Maryland, scouring the country for cattle, horses, and provisions of all kinds, threatened Pennsylvania, and then turned upon Baltimore. General Lew Wallace could hardly muster 5000 men to oppose him, but fought him (July 9) at the passage of the Monocacy, near Frederick, and was of course defeated, losing 2000 men (mainly prisoners), while the victors lost but 600. Early now turned upon Baltimore, and menaced Washington, skirmishing (July 12) with its outpost defences, but made off rapidly into Virginia with 2500 captured horses and 5000 cattle.

General Wright's Sixth corps had just been sent from Grant's army to the relief of Washington, as had Emory's Nineteenth corps, just arrived by sea from New Orleans. Wright followed Early to the Shenandoah, where his rear was sharply turned upon and repulsed (July 19), with a loss of 500. Wright recoiled to Leesburg, and turned over his command to Crook, while Averell had (July 20) a cavalry fight near Winchester, and took four guns and 200 prisoners.

Wright's and Emory's corps being now recalled to the James, Crook, supposing Early gone likewise, advanced to Winchester, and was there beaten (July 24), and driven to Martinsburg and across the Potomac, with a loss of 1200, including General Mulligan, killed.

Early now sent B. T. Johnson with 3000 cavalry on a raid into Pennsylvania, where they burned without resistance Chambersburg and the barracks at Carlisle. Averell, with an equal cavalry force, soon encountered the raiders, but they escaped with little loss into Virginia. Pursuing to Moorefield, Averell at last struck the raiders (August 4) and worsted them, with a loss of their guns, wagons, and 500 prisoners.

General Grant now sent Sheridan to command in this department, where Hunter's army, just arriving from the West, the Sixth and Nineteenth corps (whose recall to the James had been countermanded), and Torbert's and Wil-

son's divisions of cavalry from Grant's, had raised his effective force to 30,000 men.

Sheridan, after taking time to reorganize his army, advanced to Winchester, and found Early strongly posted and fortified on Opequan Creek, whence he dislodged him (September 19) after an obstinate fight, in which his loss was fully 3000 prisoners, including wounded, while among his killed were Generals Rhodes and Godwin.

Early rallied his beaten army at Fisher's Hill, a very strong position south of Winchester, where his flanks were guarded by two mountains. Here Sheridan again attacked and routed him (September 25), taking sixteen guns and 1100 prisoners. Pursuing the remnant to Port Republic, he sent his cavalry to Staunton and to Waynesboro', destroying provisions and munitions, then retired down the Valley to Winchester, burning all the grain and forage as he passed, so that the enemy should find no subsistence there. This devastation was made an excuse for the attempts to burn New York and other cities by incendiaries soon afterwards.

Sheridan had encamped on Cedar Creek, and apprehending no danger had gone on a visit to Washington, when Early, reinforced, having stealthily followed down the Valley, determined to surprise the unsuspecting army before him. In this he succeeded perfectly, flanking Crook's force on both sides in the dense darkness, and rushing into the camps with a fearful yell just before daylight, and in fifteen minutes Crook's army was a fleeing, panic-stricken mob, having lost twenty-four guns and 1200 prisoners. Sheridan was at Winchester on his return when the disastrous tidings met him, and, riding at full speed, reached his beaten army at 10 A. M. He spent two hours in reviving the spirits of his men, and after repulsing one fresh attack on his left, ordered at 3 P. M. a general advance, which was successfully made, followed by a second charge, which was still more successful—though the Confederates opposed to them nearly all the cannon of both armies—facing the foe to the rear, and driving them through Staunton, recovering the twenty-four guns lost in the morning, and taking twenty-three others, with 1500 prisoners. The total loss of men this day was about 3000 to each side, including the Confederate general Ramseur and the Union general Bidwell of New York, killed. This closed the campaign in that quarter.

There were various partisan conflicts in Alabama, Mississippi, and West Tennessee during 1864, but none of consequence, save at Fort Pillow, Tennessee, which was assailed and taken (April 13) by the Confederate general Forrest, killing Major L. F. Booth, who commanded, with most of his garrison of 557 men, of whom 262 were blacks, many of them after resistance had ceased. This was in accordance with the threats previously made by Confederate officers, that colored troops should in no case receive quarter.

General S. D. Sturgis with 12,000 men was sent from Memphis in quest of Forrest, whom he found at Guntown, Mississippi, where Sturgis was speedily routed and driven back to Memphis, with a loss of at least 4000, mainly prisoners. Forrest's entire force was not much greater than this. General A. J. Smith now assumed command, and pressed Forrest back to Tupelo, Mississippi, where the Confederates thrice assaulted his lines, and were repulsed with loss, but with no decisive result. Smith retreated, and again advanced to Holly Springs, not seriously opposed, while Forrest raided into Memphis with 3000 cavalry, and took a few prisoners, but failed to capture the Union generals of whom he was in quest, or to liberate the captured Confederates.

East Tennessee was this year the scene of several partisan conflicts to little purpose; and John Morgan raided through Pound Gap into Eastern Kentucky, capturing and paroling General Hobson with 1600 Unionists in a field at Licking River. General Burbridge struck the raider at Mount Sterling, and again near Cynthiana, capturing or dispersing at least half his force, and chasing the rest into South-western Virginia. Attempting here to destroy the salt-works near Abingdon, Burbridge was beaten off (October 3), with loss, by General Breckenridge.

General Sherman, on Grant's transfer to the East, was left in chief command at the West. Advancing with 100,000 men from Chattanooga early in May, 1864, he was confronted by Joseph E. Johnston, who, having but 54,000, declined a pitched battle, but availed himself of the broken country and fortified positions on the rugged road to Atlanta. He was stubbornly resisted (May 10) at Resaca, where the railroad crosses the Oostenaula River, and was at first repulsed with loss, but soon flanked the position and compelled its abandonment. Checking Sherman's advance at Adairsville and Cassville, Johnston made his next determined stand at the Allatoona Pass, and days were expended in fighting and flanking before he could again be driven. He next made a stand at Kenesaw Mountain,



flanked by Pine and Lost Mountains, connected by strong field-works, where he for several days resisted every effort to move him. In one assault (June 27) Sherman lost 3000 men, including Generals Harker and Dan McCook, killed; Confederate loss, 442. And now, by again advancing his right, Sherman forced Johnston out of his impregnable position, compelling him again to retreat, which brought him to Atlanta. Here he was relieved by General Hood, who condemned his cautious policy, which had only depleted his army by 14,700 men in two months' constant fighting. Reinforcements had nearly kept its ranks full, its present strength being 51,000. Sherman advancing his left under McPherson to break Hood's railroad connection with the East, Hood struck heavily (July 20) at his right under Thomas, but was repulsed after a bloody struggle, which cost the Confederates at least 4000 men, including Generals W. S. Featherston of Mississippi, Armistead of Georgia, and George M. Stevens of Maryland, killed. The Union loss was but 1500. Supposing that Atlanta had been silently evacuated, the Unionists thereupon rushed up to within two miles of the city, but found here strong works well manned, and were repelled with loss. Major-General McPherson of Ohio was killed, as was General Greathouse of Illinois, and another bloody struggle resulted, with advantage to the Unionists, though it cost them over 4000 men. The Confederate loss was nearly double, including General W. H. T. Walker of Georgia, killed.

A pause in the fighting now ensued, and General Stoneman with 5000 Union cavalry raided upon the railroads and stores in Hood's rear, but, scattering or dividing his forces too much, he was surrounded and captured with 1000 men, as Colonel Harrison, with 500 more, had just been.

Sherman now moved the Army of the Tennessee, led by Howard, from his extreme left to his extreme right, initiating a new flanking movement, when Hood assailed Logan's (Fifteenth) corps on the new Union right, but was repulsed with heavy loss. Hood now sent Wheeler's cavalry to raid on the Union rear, while Kilpatrick's Union cavalry pressed to the Confederate rear, breaking both the railroads leading southward from Atlanta, and returning to camp August 22. Sherman again threw forward his right till most of his army was behind Atlanta, holding firmly the railroad to Macon. Hood had already sent off part of his army to Jonesboro', whence Hardee with two corps attacked (August 31) Howard fiercely, but was beaten off with a loss of 2000 to Howard's 500. And now Jonesboro' was assailed in its turn by Jefferson C. Davis's corps, and carried, eight guns, General Govan, and many men being captured. Hood hereupon exploded his munitions and burned his stores in Atlanta, and escaped eastward. Slocum took quiet possession of what was left September 1. Sherman returned to the city, and gave his men a well-earned rest.

Wheeler's raid was prosecuted throughout Northern Georgia and East Tennessee, returning through the Sequatchie Valley, and being chased across the Tennessee near Florence. He destroyed much property, but with little influence on the fortunes of the war.

Hood, rejoined by Hardee, now passed Sherman's right, and sent French's division to capture the Union post at Allatoona, which General J. M. Corse held with 1944 men, but so gallantly that assault after assault by quadruple numbers was repulsed with fearful slaughter. General Cox at length relieved Corse, who was wounded, as were most of the higher officers. He had lost in all 707 men, while French left 231 dead, 411 prisoners, and 800 muskets. Hood, still marching northward, surrounded Resaca, but did not assault it, Sherman being too near. Sherman, at length learning that Hood had advanced into Middle Tennessee, gave up the pursuit, sending the Fourth and Twenty-third corps to Chattanooga, with orders to report to Thomas at Nashville, while he, facing about, returned to Atlanta, and reorganized and equipped his remaining forces for his march to the sea.

Hood, with 35,000 infantry and artillery, struck boldly for Nashville, preceded by Forrest with 10,000 cavalry. Of course there was immense destruction of stores, bridges, and dépôts—\$1,500,000 worth of boots and provisions having been burned at Johnsonville, Tennessee, to save them from capture.

Thomas concentrated 30,000 men at Pulaski, but was unable to cope with Hood's army, now swelled to 55,000 in all, which still clung to the Tennessee River till assured that Sherman had cut loose from Atlanta, marching southward, when he set his columns in motion northward. General Schofield, on his part, retreated from Pulaski to Columbia, and thence to Franklin, in a bend of the Harpeth, where he, with less than 20,000 men, but a good position, was assailed (November 30) with desperate resolve. The Confederates were repulsed with a loss of at least 4500, including Generals Cleburne, Gist, Adams, Trahl, and Granbury. The Union loss was 2320, but no guns. Schofield continued

his retreat that night. Hood followed, and soon sat down before Nashville.

The movement was audacious, as Thomas was at least his equal as a commander, and could soon concentrate a larger force than that which attempted to besiege him. But Thomas would not strike till he was ready, while severely cold weather impeded operations. At length Thomas struck out (December 15), and, after two days' skilful fighting, drove his besiegers at all points, heading them toward Alabama, and taking fifty-three guns and 4462 prisoners, including a major-general. Hood got across the Tennessee at Bainbridge with a few guns and barely the *débris* of an army. Thomas had taken in this brief campaign seventy-two guns and 11,857 prisoners, besides administering the amnesty oath to 2207 deserters from the Confederate service. The aggregate Union loss in this campaign was 10,000. And General Stoneman, moving eastward from Knoxville, had cleared East Tennessee of armed Confederates, captured Wytheville and the lead-mines and salt-works, driving Breckenridge's depleted force over the mountains into North Carolina.

General Sherman, after despatching Thomas with two corps to the defence of Tennessee, had still with him four corps, numbering in all 65,500 men. Concentrating these around Rome and Kingston, Georgia, he destroyed the railroads about him, cut the telegraph which still connected him with the North, and stood clear of all communications as he commenced his famous march to the sea. There being no considerable army in his front, he advanced rapidly through Atlanta, Macon, Milledgeville, and Millen to Savannah, slightly opposed at several river-crossings, while Kilpatrick with his cavalry covered his flanks and screened his movements, so that Augusta seemed to be his objective point. Fort McAllister on the Ogeechee was assaulted (December 13) by Hazen's division, and communication at once opened with Dahlgren's fleet, when Savannah was evacuated (December 20) by Hardee, after destroying his vessels and stores. Thus far, Sherman had on this march lost but 567 men, and had taken 167 guns with 1328 prisoners. He remained a month in Savannah, while Generals Dana, Davidson, and Grierson, who had been sent out from Vicksburg and Memphis to distract attention from his march, swept over large portions of Mississippi and Alabama, breaking up railroads, destroying stores, and taking prisoners. These raids were uniformly successful, but General Foster, who had ascended Broad River from the Sea Islands to break the railroad connection between Charleston and Savannah near Gordonsville, was beaten off, losing 746 men.

Sherman, leaving Savannah well garrisoned, set his column again in motion (February 1, 1865), traversing the heart of South Carolina with little resistance, except from its flooded swamps, and compelling Hardee to evacuate Charleston and its harbor-defences, retreating northward with 12,000 men. Columbia, the State capital, though undefended, was undesignedly burned. Kilpatrick, who, with 5000 cavalry, still covered the advance on the left, was surprised and routed by Wade Hampton near the north line of the State, but soon rallied his men and beat off his assailants. Reaching Fayetteville, North Carolina, March 11, Sherman found himself confronted by Joe Johnston with 40,000 men, collected by Hardee, Beauregard, Cheatham, and Bragg, and including Wheeler's and Hampton's cavalry. After halting three days, Sherman once more advanced, when his left wing was attacked (March 15) in a narrow pass by Hardee, who was soon driven; but Slocum on the right was next assailed (March 18), when approaching Bentonville, by Johnston with his main body. The Confederates withdrew after a sharp action, in which Sherman lost 1643 men and took 1625 prisoners, including wounded, burying 267 Confederate dead. Next day, Sherman advanced to Goldsboro', and halted his troops while he made a hasty visit to General Grant at City Point.

Wilmington, North Carolina, had long been the principal port through which blockade-runners found access to the Confederacy. General Butler, with Commodore Porter, led an army and fleet to reduce it (November 16, 1864), but returned to Fortress Monroe unsuccessful. General A. H. Terry was next despatched with a stronger force, which, after a heavy bombardment by Porter's fleet, carried Fort Fisher by assault (January 16, 1865), killing Major-General Whiting, its commander, and taking 169 guns and 2083 prisoners, with a Union loss of 110 killed and 536 wounded; but 300 more were lost by the explosion next day of the fort's chief magazine.

General Schofield was now sent to Terry's aid, ranking him, and raising his force to 20,000, with which Schofield entered Wilmington, February 22; Hoke retreating after a sharp fight, burning two privateers and other vessels, with heavy stores, but leaving sixty-five guns. Schofield now advanced inland, losing 700 men by a surprise, but beating

off (March 10) an attack on his left by Hoke, who here lost heavily and retreated, enabling Schofield to communicate and co-operate with Sherman on his arrival at Goldsboro'.

General Canby, commanding at New Orleans, moved eastward in the spring to menace Mobile, while General James H. Wilson, with Grant's and Thomas's cavalry, 15,000 strong, pushed southward from Eastport, Mississippi, the head of steamboat navigation on the Tennessee, confronted only by Forrest with but 5000, whom Wilson easily defeated near Maplesville and routed (April 2) at Selma, Alabama, which he took, with thirty-two guns and 2700 prisoners. Crossing the Alabama, Wilson entered Montgomery, which Adams had just left, burning 125,000 bales of Confederate cotton. Turning eastward, Wilson soon appeared at Columbus, Georgia, where he took fifty-two guns and 1200 prisoners, burning a gunboat, 250 cars, and 115,000 bales of cotton. Taking by assault Fort Tyler on the Chatahoochee, Wilson pushed on to Macon, Georgia, where he learned that the war was virtually at an end.

General Canby, with nearly 30,000 men, aided by Porter's powerful fleet, invested Mobile, which was held by Dick Taylor with some 15,000. Investing Spanish Fort, he reduced it by bombardment, taking 652 prisoners, and then assaulted Blakely, which was carried by assault, with a Union loss of 1000 to 500 Confederate killed and wounded, with 3000 prisoners. Mobile was then evacuated by General Maury, who, with 9000 men, escaped up the river, abandoning 150 guns.

General Grant, still before Petersburg, had bloodlessly (December 7, 1864) extended his left twenty miles down the Weldon Railroad to Hicksford, which he fortified and held. He next essayed to advance his left to Dabney's Mill, but was resisted and driven back to Hatcher's Run, where the Confederates were in turn repulsed (February 6, 1865), and the ground up to this point held and fortified. The Union loss in this operation was 2000; the Confederate, 1000, including General Pegram, killed.

General Sheridan moved up the Valley from Winchester with 10,000 mounted men, drove Early (March 2, 1865) from his intrenched camp at Waynesboro', taking eleven guns and 1600 prisoners, thence rode into Charlottesville, where he destroyed immense stores and miles of the Richmond and Lynchburg Railroad, and, passing behind Lee's army, reported to Grant at Petersburg March 27.

Lee, assuming the offensive, sent Gordon with two divisions against the centre of the Union line before Petersburg. Charging at daybreak (March 25), Gordon surprised and took Fort Stedman in his front, capturing three batteries and some prisoners, but not being properly supported, he was attacked and routed in turn by the Ninth corps, losing 2000 prisoners; besides which the loss to either side was about 2500. Grant interpreted this rash assault as premonitory to a Confederate evacuation of Richmond and Petersburg, which he resolved to harass if not intercept. Again throwing forward his left (March 29) to seize the Boynton plank-road, while Sheridan's cavalry on its flank advanced to Dinwiddie Court-house, he was opposed by Lee with most of his army, who suddenly struck Warren's corps in flank and rear, with intent to repeat the lesson of Chancellorsville. Two divisions were then broken, but Griffin's, behind them, stood firm while the fugitives were rallied, and Warren was thus enabled to repel his assailants with heavy loss; but an attempt to carry their works was defeated in turn. Meantime, Sheridan had gained Dinwiddie Court-house, but, attempting to advance thence to the Boynton plank-road, was foiled, but advanced again next morning (April 1) to Five Forks, where he connected with Warren, advancing on his right, and ordered a general charge on the Confederate works in their front, held by two divisions, who were fearfully overpowered and routed, with a loss of 5000, mainly prisoners. The Union loss was but 1000, including General Frederick Winthrop, killed. And now, sending two divisions eastward to Gravelly Church, Sheridan again connected with the Union lines before Petersburg, whence a general cannonade preluded the assault, which was delivered at daylight next morning (April 2), Wright's Sixth corps gaining the rear of these works by the south, and taking many prisoners, while Ord's corps carried Forts Gregg and Alexander by storm, losing 500 men. A. P. Hill, in attempting to retake some of the captured works, was shot dead, and his corps utterly defeated.

Lee now, at 10½ A. M., telegraphed to Davis that Richmond must be evacuated at once, and it was evacuated between that time and next morning, while its immense warehouses, filled with provisions, munitions, and stores of all kinds, were fired by the departing Confederates, burning out the heart of the city. Flames and explosions notified the Unionists in front that the Confederate capital was abandoned, and General Weitzel at 4 A. M. (April 3) was assured by a negro from the city that Davis and all his official or military adherents had departed. Picking his

way through the abatis, earthworks, rifle-pits, torpedoes, etc. which encircled the burning city, Weitzel at 6 A. M. led his men into the city, soon followed by President Lincoln, who was at City Point. Petersburg was simultaneously abandoned, Lee retreating up the railroad towards Danville, while ringing of bells and immense gatherings all over the North and West hailed the relinquishment of Richmond as the downfall of the Confederacy.

Davis escaped by train to Danville, while Lee halted two days at Amelia Court-house, vainly seeking provisions for his hopeless army, now reduced, mainly by prisoners, to 35,000 men. Grant was soon on his trail. The fleeing host was first seen from Deatonville, and was struck near Sailor's Creek by Custer's horse, supported by Crook's and Davis's divisions. Here sixteen guns, 400 wagons, and some prisoners were taken, while Ewell's thinned corps was cut off from Lee's rear, and so enveloped that it was obliged to surrender. Ewell himself was among this day's 6000 prisoners.

Lee crossed the Appomattox at Farmville, repelling General Theodore Read, who tried to stop his way with two regiments. But Humphrey's Second corps was again so close on his rear that he was obliged to turn and fight a few miles beyond Farmville, repulsing his assailants with a loss of 600. But this lost a day, which was wasted by attempts to bar the Danville road, while Lee was really making for Lynchburg. Undeceived on this point, pursuit was resumed on the morning of the 8th, Grant having meantime sent Lee a courteous note inviting a surrender. Sheridan pushed his troops twenty-eight miles on the 28th, reaching Appomattox Court-house, heading Lee's army, intercepting its sorely-needed supplies from Lynchburg, and planting himself across the road whereon it must move on the morrow, and sending word to Grant, who ordered a forced march of Griffin's and Ord's corps to Appomattox Station during the night. Lee had meantime sent a note to Grant inviting a meeting, with a view to peace, at 10 A. M. In the morning (April 9) Grant replied, saying he had no authority to make peace, but urging a surrender. Lee's weary, famished army set forth as usual this morning, and, seeing cavalry in their front, advanced to push it aside, when it was withdrawn to the flanks, disclosing solid regiments of infantry behind it. Lee, seeing that further fighting would be a useless slaughter of his men, at once called a parley, which resulted in a surrender, "each officer and man to be allowed to return to his home, not to be disturbed by United States authority so long as they observe their paroles and the laws in force where they may reside." The number thus paroled at this point was 27,000. Johnston's army in North Carolina surrendered on the same terms to Sherman at Raleigh, April 26, and Dick Taylor's to Canby at Citronelle, Alabama, May 4. E. Kirby Smith, commanding the Confederates west of the Mississippi, attempted to make a stand after the surrender of Lee, but his men all deserted him, and, taking whatever Confederate property they could lay hands on, dispersed to their several homes.

Jefferson Davis halted at Danville, anxiously awaiting advices from Lee, until astounded (April 10) by tidings of his surrender. He then fled southward to Greensboro', North Carolina, and again halted till it was evident that Johnston would soon capitulate, when he flitted again to Washington, Georgia, with a cavalry scout, which at first numbered 2000, but rapidly wasted. Here he abjured the state of a ruler, and was making his way to the coast with his family and a few faithful followers when he was surprised and captured (May 10) while encamped near Irwinsville by two detachments of cavalry sent out from Macon by General Wilson to look for him. His family was liberated at Savannah, but he was held a close prisoner in Fortress Monroe for two years, then released on bail and never brought to trial. So ended the Southern Confederacy.

HORACE GREELEY.

**Confederat'ion** [from Lat. *con*, "with," and *foedus*, "a league"], a league, a federal compact, an alliance of princes, states, or nations; nearly synonymous with confederacy. The republic of Mexico is called the *Mexican Confederation*. The numerous states of Germany were united in 1815 by the Congress of Vienna, and formed the Germanic confederation (*der Deutsche Bund* in German). Before the adoption of the Federal Constitution of the United States in 1788, the government of this country was a weak confederation of thirteen independent States, which recognized no superior or central authority.

**Confederation, Articles of**, a document drawn up by the Congress of the U. S., Nov. 15, 1777, and adopted finally July 9, 1778, but not ratified by the States until Mar. 1, 1781, by which the several States united in a league of perpetual friendship "for the common defence, the security of their liberties, and their mutual and general welfare." These articles, 13 in number, proved al-

most an utter failure, because Congress had very limited powers; there was no executive authority. For these reasons a convention called by Congress met at Phila. May 14, 1787, with Washington as its president, and on Sept. 14 of that year the convention closed its labors and reported the CONSTITUTION OF THE UNITED STATES (which see). (See also CONFEDERATION, ARTICLES OF, in APPENDIX.)

**Confederation of the Rhine** [Ger. *Rheinbund*], the name of a league formed in July, 1806, by sixteen German states under the protection of Napoleon. The princes of these states signed an act of confederation, dissolving their connection with the Germanic empire and forming an alliance with the French emperor. They were the kings of Bavaria and Württemberg, the arch-chancellor, the elector of Baden, Murat, duke of Berg, the landgrave of Hesse-Darmstadt, the princes of Nassau-Usingen, Nassau-Weilburg, Hohenzollern-Hechingen, Hohenzollern-Sigmaringen, Salm-Salm, Salm-Kyrburg, the duke of Arenberg, the count of Leyen, and the princes of Isenburg-Birstein and Liechtenstein. In September, 1806, the confederation was joined by the elector of Würzburg; in December, 1806, by the elector (subsequently king) of Saxony, and the Saxon dukes of Weimar, Gotha, Coburg, Meiningen, and Hildburghausen; in 1807, by three dukes of Anhalt, two princes of Lippe, three princes of Reuss, the prince of Waldeck, and the new kingdom of Westphalia; in 1808, by the dukes of Mecklenburg-Strelitz, Mecklenburg-Schwerin, and Oldenburg. The confederation had an area of 126,075 square miles, and a pop. of 14,608,877. In 1810 a part of the confederation was incorporated with France, and its territory reduced to 114,467 square miles, with 13,475,000 inhabitants. In consequence of the downfall of Napoleon the confederation was dissolved in 1813, and its members united with the other German states to form the Germanic Confederation.

**Conference** [from the Lat. *con'fero*, to "confer" (from *con*, "together," and *fer'o*, to "bring"), alluding to the different parties bringing together or comparing their thoughts], the act of conversing on a serious subject; an oral discussion; a formal discourse; a meeting for consultation or instruction; a meeting of two branches of a legislature by their committee when they disagree respecting the passage of a bill. In such cases each house appoints a committee of conference, in order to settle the difference by a compromise. In English law, conference signifies also the interview of an attorney or solicitor with a counsel when consulting him.

In a political sense, conference denotes the meeting of plenipotentiary ministers of several states for the peaceable settlement of international complications. Of special importance in modern history are the conferences of Vienna, held in 1820 and 1834, the Paris conference of 1856, and the London conferences of 1864, 1867, and 1871. "International conferences" have also of late been held on many non-political questions. Among the most important of these are the conferences of Geneva, August, 1864, for the organization of the sanitary commission, and of Paris, June and July, 1867, for the examination of the monetary question.

CONFERENCE is also an ecclesiastical term used in various senses. In the Roman Catholic Church the term was formerly applied to certain assemblies of priests or canons presided over by an arch-priest or dean. They originated in the eleventh century, but are now seldom convened.

PASTORAL CONFERENCES are meetings held annually, quarterly, or monthly by pastors of various Protestant churches for the discussion of pastoral duties and for other similar purposes. They are held in the French Protestant churches, also among English dissenters, and in many churches of the United States, etc.

The Wesleyan Church in England has an annual meeting of its preachers called the "Conference," which has administrative and other powers, defined by Wesley's "Deed of Declaration" (1784). A similar conference is held in Ireland. (See STEVENS, "History of Methodism.") In the Methodist Episcopal Church and the Methodist Episcopal Church South, a "General Conference" meets every four years. It has full power to make "rules and regulations," subject to certain restrictions found in the "Discipline," part II, chapter 1. It is presided over by the bishops. In the same churches the territory where preachers are stationed is divided into "conferences," which are again divided into "districts." The preachers and certain lay delegates of each conference meet in an "annual conference," where preachers receive their appointment for the year from the presiding bishop. There are "quarterly conferences" held in each circuit or station.

"General" (triennial) and "annual" conferences are also held by the Free-will Baptists, and "yearly conferences" by the Six-Principle Baptists, the minor Methodist bodies, and others.

The "Conference of Hampton Court," in 1604, was a meeting of King James I., nine bishops, and nine other divines of the Anglican Church, and four Puritan theologians, held with reference to the differences between the Anglicans and the Puritans. This meeting led to some slight changes in the Anglican Liturgy.

The "Savoy Conference" at the palace of the bishop of London in the Savoy, in 1661, consisted of thirteen Anglican bishops and eleven non-conformist divines, with a number of other theologians on each side as counsellors. Instead of healing the breach, the SAVOY CONFERENCE (which see) increased the differences between the two parties.

The "Evangelical Church Conference" ("Evangelische Kirchenconferenz") is the name given to the regular (annual or biennial) meetings of delegates of the governments of the German states and Austria for the discussion of important church questions.

**Confer'va**, a genus of plants of the division Algæ, order Confervaceæ. The plants consist of simple or branching jointed filaments, which are filled with green, purple, or red endochrome, and are found, some in fresh, some in salt water, and some on moist earth. The name Conferva is not strictly limited to the genus or the order, but is often extended to its near allies. Among the Confervaceæ are included many plants which have flat fronds. Many also consist of cells immersed in a slimy matter. Reproduction takes place by *spores* formed in the interior of the cells, and which at last are discharged through the walls of the mother-cell. Confervaceæ are found plentifully in many mineral waters. Their abundance often gives a color to the water of tanks, marshes, etc. The etymology of this word is doubtful, and the limits of the genus and order are unsettled. Most British and American Confervæ are now referred to *Cladophora* and other genera. (See HARVEY's "Nereis Boreali-Americana," part iii. (1858), in vol. x. of the "Smithsonian Contributions;" also S. O. GRAY's "British Sea-weeds," 1867; WOOD, "The Fresh-water Algæ of the U. S.," 1872.)

**Confes'sion** [Lat. *confessio*, from *confiteor*, *confessus*, to "confess;" Ger. *Beichtl*], one of the seven sacraments of the Roman Catholic Church; a disburdening of the conscience in the hearing of an authorized priest with a view of obtaining absolution. Most Protestants assert that such confession is not enjoined in the New Testament, and that auricular confession was established as an essential part of church discipline at the fourth Lateran Council (1215 A. D.), though the practice may have been older. By a canon of the above council, confession must be made orally at least once a year, but frequent confession is recommended by the Church, and generally practised. The custom of making a money-offering with confession is optional, though formerly regarded as obligatory. The Greek Catholic Church, as well as the Catholic Maronites and the Armenians, holds that special confession is wholesome in cases of mortal sin, but does not consider it binding. The Greek Church regards this discipline as necessary for the reception of the Eucharist. The Lutheran Church professes that private confession may be retained in the Church, but that particular statement of sins is not necessary. The Church of England employs a general form of confession in its services, but retains private confession in the rubric for visitation of the sick. The Scottish and most of the other Protestant churches do not recognize it at all.

The SIGILLUM CONFESSIONIS ("seal of confession") both in the Roman Catholic and the German Protestant churches means the obligation of a confessor or priest not to divulge the secrets of the confessional. This custom of secrecy was made binding by the fourth Lateran Council, and its violation by a priest makes him subject to the severest ecclesiastical penalties.

**Confession**, in criminal law, an admission by a person that he has committed or participated in a crime. It is either judicial or extra-judicial. It is said to be judicial when made in the course of legal proceedings. An instance is the plea of guilty. An extra-judicial confession does not have the same weight as one that is judicial, and is insufficient for conviction unless corroborated by proof of the actual commission of the offence (*corpus delicti*). A confession must be voluntary—that is, not the result of hopes or fears held out or caused to the prisoner by one having authority, such as a public official or the party against whom the act was committed (prosecutor). It is not necessary that it should be spontaneous. The question of the admissibility of a confession in evidence is decided by the judge; its effect after its admission is determined by the jury. Questions concerning the admissibility of confessions frequently arise when taken by magistrates making an examination of a prisoner charged with crime.

**Confes'sional** [Ger. *Beichtstuhl*], the seat in which the priest sits to hear confession in a Roman Catholic

church. Confessionals are closed cells, having a door in front for the priest to enter by, and an opening on one or both sides, like a small window, for the penitents to speak through. By the ancient canons confessionals were required to be so built that priest and penitent could both be seen by all present.

**Confession of Faith.** See CREED.

**Confirmation** [Lat. *confirmatio*, from *con*, intensive, and *firma*, *firmatus*, to "make firm" or "strong"], literally, corroboration or strengthening; a ceremony of the Christian Church which is not practised by most denominations of Protestants, though retained by the Anglican and Lutheran churches. In the ancient Church the rite was administered immediately after baptism, if the bishop happened to be present at the solemnity, which is still the custom in the Greek and African churches. In the Roman Catholic Church there is interposed a delay of not less than seven years after infant baptism; in the Lutheran Church the rite is usually delayed for from thirteen to sixteen years, and in the Anglican Church, from fourteen to eighteen years. There is, however, no established limit to the period. The ceremony consists in the imposition of hands by the bishop, accompanied by an invocation of the Holy Ghost as the Comforter and Strengtheners. But both in the Lutheran and Anglican churches the ceremony is made the occasion of requiring from those who have been baptized in infancy a renewal of the baptismal vow made for them by their godfathers and godmothers, who are thereby released from responsibility. In the Roman Catholic Church confirmation is held to be one of the seven sacraments. It can be received only once, as it is counted among the three sacraments which impress upon the soul an ineffaceable character.

**Confiscation** [Lat. *confiscatio*, from *fiscus*, a "treasury"], the forfeiture of land or other property to the public treasury as a part of the punishment of certain crimes. During the French Revolution a large quantity of land owned by the Church was confiscated—i. e. was taken from the Church in order to convert it into a source of national revenue.

**Conflict of Laws.** See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

**Conformable**, a geological term applied to strata which lie parallel to each other. In some cases a bed is disturbed from its original position before another bed is deposited on it. If the new bed or stratum is not parallel to the former, it is said to be *unconformable*. Conformable in general signifies agreeable, suitable, consistent, compliant.

**Confucianism**, the state religion of China; a religious, or rather philosophical, system, which has greatly modified the destinies of China. It is professed at present chiefly by the learned classes, though it has much influence upon the Buddhism of the common people. (See CONFUCIUS.)

**Confucius**, the Latinized form of **Kong-Foo-Tse**, or **Khoong-Foo-Tse**, the greatest of Chinese philosophers, was born, according to the best authorities, in 551 B. C., in Loo, a kingdom or state which now forms part of the modern province of Shang-Toong. He was of illustrious descent, and his father, Shuh-Liang-Heih, was a soldier remarkable for strength and courage. After the death of his first wife, Shuh-Liang-Heih, then in advanced age, married a young lady of remarkable virtues, who became the mother of an only son, the subject of this notice. Confucius was often called Kew or K'ew, because his mother went to a certain hill called Ne-Kew (i. e. "hill Ne") and offered her prayers that Heaven might bless her with children. From this circumstance he was also called Ne, and after his death "The venerable Ne."

In childhood, Confucius was, we are told, remarkable for his exemplary obedience to his mother, for his respectful treatment of those older than himself, and for his observance of all the ceremonies with which the Chinese honor the dead and living. To go through the different forms of politeness usual among persons of great culture formed his favorite pastime. He was at school singularly obedient, gentle, and modest, and possessed, it is said, wonderful intellectual quickness. He married when at the age of nineteen, and was made a mandarin of an inferior grade at about the same period. In discharging the duties of his office he showed great intelligence and faithfulness. He took care that nothing should be sold in the markets that could endanger the health of the people, and that unreasonable prices should not be charged for the necessities of life. The charge of the public lands and of the sheep and cattle was afterwards given to him, and through his industry and sagacity the greatest improvements were introduced into agriculture, and abundance and affluence were made to replace dearth and poverty among the tillers of the earth.

At the age of about twenty-two Confucius first appeared

as a public teacher, giving his instructions, however small the fee offered him, to all who had the ability and a true desire to learn. Having once shown them how to acquire wisdom, he expected his pupils to be able to pursue their studies alone and without further assistance from him. He said, "When I have presented one corner of a subject to any one, and he cannot from it learn the other three, I do not repeat my lesson." His mother died when he was twenty-four, and, following the custom of his country, he mourned for her three years, filling no public office during that time. He is said to have studied music when twelve years old, and to have acquired wonderful skill in that art.

In 499 B. C. we find Confucius one of the ministers of the king of Loo. A dispute having occurred between this prince and the neighboring king of Tsi (or Ts'e), it had been arranged that the two rulers should meet on the common frontier and settle their differences in a friendly interview. It was the design of the king of Tsi to seize the person of the king of Loo during this interview, but Confucius (who is said to have possessed in a wonderful degree the gift of reading human character) suspected his treacherous scheme, and by his foresight and resolute courage baffled all his plans, and obtained for his sovereign the secure enjoyment of his rightful possessions. Confucius filled for a while the position of minister of crime. At length, the king of Loo having found the precepts of his minister too high and difficult to be conveniently practised, Confucius perceived that his services were no longer desired, and retired from public life. From this date he appears to have passed most of his time in travelling from place to place, spreading his doctrines as he went, and always accompanied by his disciples. He spent the last five years of his life in his native state of Loo, teaching and completing the work which he had before begun.

Several of the disciples of Confucius gave promise of attaining eminence in philosophy, but the sage himself seems to have centred all his most earnest hopes and warmest affections on his favorite and most gifted pupil Yen-Hoei (or -Hwuy). To him he looked as his successor in those labors for the promotion of wisdom and virtue in which his own life had been passed. But he was destined to disappointment, for the early death of the beloved pupil crushed all these brilliant hopes and plunged Confucius into the deepest sorrow. Confucius, though very observant of the outward forms of propriety and politeness, was not wanting in spontaneous and heartfelt affection. He appears to have looked upon the observance of those forms as directly advantageous to society, besides exerting an indirectly useful influence through their effect upon the minds of those who followed them. He died 478 B. C.

Confucius had one son, Pé-Yu (or Pih-Yu), who died before his father, leaving a son named K'ung Keih, also called Tse-Sse (or Tsze-Sze), who was distinguished as a philosopher, and who wrote a famous work called "Chung-Yung."

Confucius has enjoyed a renown more extended than that of any other of the human race. Through all the changes of the Chinese dynasties, by whatever causes brought about, his descendants have received peculiar honors. At this day they number more than eleven thousand males, and are said to constitute the only hereditary nobility in China. From his own time to the present his writings have been the principal objects of study in all the schools of that vast empire. It has, however, been justly observed that the aim and scope of the Confucian philosophy were limited to this present life, and none of his sayings indicate that he had any definite belief in a continued existence after death. His life and teachings tended to the promotion of the useful and practical only. "There is a total difference in kind between the philosophy of Confucius and the philosophies of Plato, Aristotle, Bacon, and Locke. The Chinese sage did not aim to investigate the mysteries of the universe, or even the hidden laws of nature or of the human mind. His great object was to lay down such rules as would best promote the happiness and virtue of the community at large. And it must be acknowledged that in the practical wisdom of his precepts, both to rulers and subjects, he has never been surpassed by any philosopher of any age or nation. That wise and beautiful thought which is the basis of Chinese government—that the ruler or officer should be as a father, and the people as children—dates, there is reason to believe, from a very remote antiquity. Confucius did not originate this idea, but he did everything in his power to give it practical efficacy."

In the "Analects" (in Chinese *Lun-Yu*, i. e. "Digested Conversations") of Confucius are to be found the best and most trustworthy indications of his genius and character. They are well worthy to be read by whoever would rightly understand his philosophy. It is doubtful whether among any of the pagan writers of the West anything surpassing these sayings in practical sagacity and lofty morality can be found. Indeed, they seem amply to justify the enco-

miums they have called forth upon the wisdom of the Chinese sage.

The following will serve as illustrations of the character of his sayings: "Learning without thought is labor lost; thought without learning (or knowledge) is perilous." "When we see men of worth, we should think of equalling them; when we see men of a contrary character, we should turn inward and examine ourselves." "He who exercises government by means of his virtue may be compared to the north polar star, which keeps its place, and all the [other] stars turn towards it." "Good government obtains when those who are near are made happy, and those who are far off are attracted." When asked what were the necessary conditions of a government, he answered, "Sufficiency of food, military equipment, and confidence of the people in their ruler." Being asked which could be most easily dispensed with, he replied, "The military equipment." And when pressed to say which of those yet remaining might be most easily dispensed with, he said, "Part with the food; from old death has been the lot of all men, but if the people have no faith in their rulers, there is no standing for the state." In one place he gives us the negative form of the golden rule: "What you do not like," he says, "when done to yourself, do not do to others." Again he says, "I am not concerned that I have no place (or office); I am concerned how I may fit myself for one. I am not concerned that I am not known; I seek to be worthy to be known." "The superior man is affable, but not adulatory; the mean man is adulatory, but not affable."

One of his disciples said of Confucius, "There were four things from which the master was entirely free: he had no foregone conclusions, no arbitrary predeterminations, no obstinacy, and no egotism." (See Legge's "Life and Teachings of Confucius," 1867, and "Religions of China," 1880; PLATT's "Confucius und Seiner Schüler Leben und Lehre," 1867; and the "Edinburgh Review" for April, 1869.) J. THOMAS.

**Congaree'**, a river of South Carolina, is formed by the Broad and Saluda rivers, which unite at Columbia. It flows south-eastward, and joins the Wateree to form the Santee River. Steamboats ascend the Santee and Congaree rivers to Columbia.

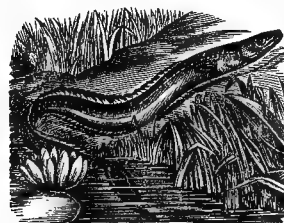
**Congé d'Élire**, kò'zhá' dà'leer, a French phrase signifying "permission to choose," is the name given in England to the king's warrant or license to the dean and chapter in the older dioceses to elect a bishop for a vacant see. The king's warrant, however, always contains the name of the person whom the dean and the chapter are to elect, and they have, according to 25 Henry VIII. c. 20, no means whatever of asserting a wish of their own.

**Congenital Diseases.** These must be distinguished from hereditary diseases, which may show themselves either soon after birth or at some later period, and from malformations of the infant, resulting from either an arrest of development or a disease of the fœtus contracted during its intra-uterine life. Both of these classes will be discussed in future. Congenital diseases proper are—1st, transmitted from the diseased mother either before or during birth; 2d, acquired during birth, without a direct maternal influence; 3d, acquired shortly before birth. To the first class belong puerperal fever and primary syphilitic and gonorrhœal infection; to the second, asphyxia, atelectasis (unexpanded condition) of the lungs, and cephalæmatoma (sanguineous tumor upon the head); to the third, acute fatty degeneration of the fœtus and newly born. *Puerperal fever* is transmitted from the mother; the blood of the babe is infected. The principal symptoms are high fever, abscesses in the subcutaneous tissue, particularly around the joints, erysipelas, and a severe form of jaundice. It terminates fatally within a limited number of days, rarely weeks. When the vagina of the mother is infected with syphilitic ulceration, the child is subject to be attacked with a *primary ulceration*. When it is the seat of gonorrhœal discharge, it gives rise to the most dangerous forms of *purulent inflammation of the eyelids*, which, unless treated at once, is apt to result in blindness. The treatment consists in absolute cleanliness; the eyes must be opened frequently and washed out with water. Ice is applied constantly to the outside, and a solution of nitrate of silver to the inside of the eyelids. *Asphyxia* is mostly seen after protracted labor or abnormal presentation of the child, the breech or the feet being born before the head. In such cases the umbilical cord is apt to be compressed, circulation thereby permanently or temporarily stopped, and premature respiratory movements brought on. The child is born almost or apparently lifeless, blue or pale, with no respiration and no pulsation of the heart. Artificial respiration is brought on by Marshall Hall's, Sylvester's, or Howard's method, by slapping the buttock of

the babe, by alternately placing it in warm and cold water, by slapping its breast with a wet cloth, by swinging it forcibly in the air, by the application of an electro-magnetic current to its chest. When the surface is very blue a few drachms of blood may be allowed to flow from the untied umbilical cord. *Atelectasis* depends on an absence of the normal expansion of the lungs which follows the entrance of the air. The muscles of the chest may not be sufficiently developed, or their innervation may not be satisfactory from some disease of the brain, or the lungs may be inflamed or filled with mucus or some foreign substance introduced into them during birth (blood, mucus, amniotic liquor, etc.). Emetics will empty the lungs (tickling of the fauces is sometimes sufficient), mustard plasters and the electrical current excite the nerves, and the above-mentioned methods of inducing respiration will restore the normal action. *Cephalæmatoma* results from two causes: the external layer of the cranial bones of the new-born is but little developed; thus the blood-vessels located in it are but little protected. Now but little violence, sometimes none at all, is required to burst them. A hæmorrhage takes place between the bone (usually one of the parietal) and its enveloping membrane (periosteum), which from a small size may increase to that of a walnut or small apple in the course of four or six days. It is not dangerous, will always get well in from four to ten weeks when left alone, but is apt to undergo suppuration or putrefaction when interfered with; for instance, by lancing. *Acute fatty degeneration* of more or less of the organs is not frequent. The covering epithelium of the lungs and bronchial tubes, of the uriferous tubes of the kidneys, of the intestines, also the cells of the liver and blood-vessels, sometimes even the whole body, are affected. Thus, the physical functions are not rightly performed. One of the most fearful symptoms is uncontrollable hæmorrhage from the stomach, the bowels, and particularly from the umbilical cord. It is almost always fatal.

ABRAHAM JACOB.

**Con'ger Eel (or Cong'er)**, a genus of marine fishes of the eel family, having the tail longer and more pointed than the fresh-water eels, the dorsal fin commencing nearer the head, and the teeth of the upper jaw placed together, so as to form a cutting edge. The species are not at all numerous. The American conger (*Conger Americanus*) is from three to five feet long, and is occasionally seen in fish-markets. It has a very disagreeable taste. The *Conger vulgaris* is a native of British seas. In form the conger much resembles the fresh-water eel; its color is brown above, shading into dull white beneath; the fins whitish edged with black, and the lateral line almost white. The English conger attains a large size, often five to ten feet long and eighteen inches in circumference, weighing more than 100 pounds. It is very strong, and is a formidable antagonist when hauled into a boat by the fisherman's line. Great numbers are consumed as food by the poorer classes. The principal conger-fishery of Great Britain is on the Cornish coast.



European Conger Eel.

**Conges'tion** [Lat. *congestio*, from *con*, "together," *gero*, *gestum*, to "carry" or "heap"], in pathology, a term indicating fulness of blood, or hyperæmia, a condition to which much importance has been attached by medical writers. Congestions are either active or passive. Active congestions are always essential parts of a further morbid process, such as inflammation. Passive congestions are often determined by some mechanical cause of obstructed or retarded circulation. Active congestions of the brain or lungs are in themselves very alarming symptoms of disease; while the passive congestions, resulting from cirrhosis of the liver or from organic disease of the heart, are fruitful causes of local or general dropsies.

REVISED BY WILLARD PARKER.

**Con'gleton**, a market-town of England, in Cheshire, is in a deep valley on the river Dane, 22 miles S. of Manchester. It has manufactures of silk ribbons and other silk fabrics. Pop. in 1881, 11,116.

**Congleton** (HENRY BROOKE PARNELL), LORD, a British statesman, born July 3, 1776, was for many years a Liberal member of Parliament. He became secretary at war in 1830, and paymaster of the forces in 1835. He was well versed in financial affairs, and wrote several works, one of which was "On Financial Reform" (1830). Committed suicide June 8, 1842.

**Conglom'erate** [Lat. *conglomeratus*, from *con*, "to-



gether," *glomero, glomeratum*, to "wind," as on a ball, to "gather"), or **Pudding-Stone**, the name of a rock consisting of rounded, water-worn pebbles cemented and compacted together. These pebbles are fragments of quartz and other hard rocks, the rubbing and polishing of which must have required a long period of time. They are united by a silicious, calcareous, or ferruginous cement, sometimes so loosely that they are easily separated by a blow with a hammer. In other cases they are very firmly united, so that the rock breaks as if it were a homogeneous mass. Conglomerates occur in various formations and ages.

**Congo, or Zaire**, a large river in the S. W. part of Africa, forms the boundary between Loango and the kingdom of Congo. It flows nearly westward, and enters the Atlantic in lat. 6° S., and near lon. 13° E. Its source has been explored by Stanley (1877), and its length is 2900 miles. According to Behm, whose opinion is fully endorsed by Sir Henry Rawlinson, the Lualaba, discovered by Dr. Livingstone, is the upper course of the Congo, and not of the Nile. The mouth is 10 miles wide. About 140 to 180 miles from the sea this river is confined by high rocks in a channel from 300 to 500 yards wide, and here occur several great cataracts. The Congo is said to be three or four miles wide above these cataracts. According to Petermann, its annual discharge of water is much greater than that of the Mississippi. (See Congo, or Zaire, in APPENDIX.)

**Congo**, a large country of Western Africa, in Lower Guinea, is bounded on the N. by Loango, on the S. by Angola, and on the W. by the Atlantic Ocean. The coast-region is level, and has a very hot climate. In the central portion are fertile uplands, which produce the palm tree, sugar-cane, the yam, the orange, etc. The soil yields maize, manioc, pulse, plantains, oranges, pineapples, tamarinds, etc. The oil-palm yields palm wine. Among the animals found here are lions, leopards, elephants, buffaloes, hogs, and monkeys. The capital is Banza, which the Portuguese call São Salvador. The inhabitants are divided into innumerable petty tribes, each with a chief, and all subject to the Lindy N'Congo, who resides at Banza Congo. It was discovered by the Portuguese in 1486.

**Congo, The New Free State of.** See APPENDIX.

**Congoon'**, a maritime town of Persia, province of Fars, on the Persian Gulf, 130 miles S. W. of Shiraz. It has a good roadstead. Pop. about 6000.

**Congregationalism** is a system of administering church affairs which secures to each congregation the right of regulating, without external interference, the details of its worship and discipline according to its own understanding of the principles of the New Testament, while it inculcates the duty of maintaining the fraternal communion of believers, especially of such as profess the same faith and accept the same order.

According to the fundamental principle of congregationalism, any association of believers, united by formal covenant for mutual watchfulness and help, the maintenance of divine worship, the observance of Christian rites, and combined efforts to promote the kingdom of God, is a church of Christ; and as such is competent to elect and ordain its own officers, admit or reject applicants for membership, exclude unworthy members, control its own property, and transact its own business. The orderly prosecution of church-work calls for the appointment of various officers, on whom is laid the special responsibility of oversight and direction; and long usage, based upon the instructions of the New Testament, recognizes the office of pastor and that of deacon as needing to be perpetuated in the Church. The pastor holds the office of a bishop or elder. By virtue of his ordination he becomes a minister, whose function is not only to preach, but to officiate in the administration of sacraments, as well as at the marriage service and the burial of the dead; and this rank as a minister he retains, even though his position as a pastor of a particular church may have been resigned. Ordinarily, each church has but one pastor, and for his support provision is made in the form of a stipulated salary, voluntarily contributed by the congregation. Among ministers, whether installed as pastors or not, there is no disparity of rank. The deacons are not salaried officers, nor technically ministers, but they are helpers of the pastor, and have special charge of receiving the charities of the church and making distribution for the relief of the poor.

The congregational system holds to the Holy Scriptures as the sufficient and exclusive rule of ecclesiastical polity, recognizes no organized and visible Church apart from local and particular assemblies of believers, and repudiates all claims of superior bodies to exercise legislative or judicial authority over the brotherhood.

Nevertheless, the relation of neighboring churches is most intimate and friendly, and is manifested in various ways; especially by mutual consultations and co-operation, the

occasional transfer of members, and formal or informal associations for common work. Thus congregationalism differs from independency in maintaining the fellowship of distinct churches, and from presbyterianism in denying the right of a presbytery or synod to exercise authority over the churches.

In its principles this system is remarkably unsectarian and liberal, and its development during the last two hundred and fifty years has been closely identified with increased liberty of religious thought, and with the practical union of men holding different tenets in common works of philanthropy and beneficence.

As a system of church order, congregationalism is not necessarily connected with any school of theology or any class of doctrine. Its methods of administering church-affairs may be adopted alike by Calvinists, Arminians, Socinians, and Arians. The church government of the different denominations of Baptists is, for the most part, simply congregational. Some Methodists have followed the same order. The churches in this country known as Unitarian are built upon the same platform. This is true also of Christians and Universalists. All these denominations are to be grouped together as occupying common ground in opposition to the idea of a Church comprising many congregations, and of a government administered by a priesthood.

At the same time, the churches which are generally known as Congregational hold firmly to positive and evangelical views of truth, being Calvinistic rather than Arminian, Trinitarian rather than Socinian or Arian, accepting the doctrine of a future state of endless retribution, recognizing the families of believers as fit subjects of baptism, and regarding the mode of administering baptism as of comparatively small importance. Each church has its own articles of belief, which with greater or less fulness indicate the system of doctrine taught from the pulpit and accepted by the members. Some churches have taken as their standards the Confession and Catechisms of the divines who met at Westminster, London, in 1648; but the creeds in common use are much briefer, and being intended for use as formulas for the reception of members, are for the most part so framed as to be acceptable to Christians generally.

The Congregationalists, when assembled in a national council at Boston in 1865, declared in general terms their "adherence to the faith and order of the apostolic and primitive churches held by their fathers," but "extended to all believers the hand of Christian fellowship upon the basis of those great fundamental truths in which all Christians should agree." So also at Oberlin in 1871 the elders and messengers of the Congregational churches of the U. S., in forming a permanent national organization, thought it sufficient to define their doctrinal position by these words: "They agree in the belief that the Holy Scriptures are the sufficient and only infallible rule of religious faith and practice; their interpretation thereof being in substantial accordance with the great doctrines of the Christian faith commonly called evangelical, held in our churches from early times, and sufficiently set forth by former general councils." In 1884 a new creed was put forth, prepared by a commission of representative men, which marks an epoch in the history of the denomination.

The early home of congregationalism was New England, to which it was brought at the earliest settlement of the colonies; but as the population has moved westward, this form of church order has spread extensively through the West and North-west, till more than half of the 3200 churches designated as Congregational are W. of the Hudson River, while in the South and South-west this denomination is but little known. Recognizing the importance of culture and an educated ministry, the Congregationalists have been distinguished as the founders and liberal supporters of schools, colleges, and theological seminaries. Their theological schools are at Bangor, Andover, Hartford, New Haven, Oberlin, Chicago, and Oakland (California). The Congregationalists have earnestly co-operated with other denominations in missionary and benevolent organizations which, like the American Bible Society, have invited to united effort. Among the societies which are now chiefly under their direction are the American Board of Commissioners for Foreign Missions, the American Home Missionary Society, the American Congregational Union, the Education Society, the American Missionary Association, the Congregational Publication Society, the Congregational Library Association, and the Western College Society. These, however, are not strictly ecclesiastical organizations, but associations of individuals over which the churches, as such, have no control. Indeed, the congregational theory of administration hardly permits such widespread and far-reaching activities to be included within the province of a particular Church.

The theory and practice of congregationalism have been much discussed in the present generation. (A valuable repository of essays may be found in the "Congregational Quarterly," established in Boston in 1859, of which fourteen volumes have been published. Other authorities are "Debates and Proceedings of the National Council of Congregational Churches" at Boston, 1865; DEXTER's "Congregationalism;" POND's "Manual;" BACON's "Congregational Order;" UPHAM's "Ratio Discipline;" PUNCHARD on "Congregationalism;" CUMMINGS's "Dictionary of Congregational Usages and Principles;" BUCK's "Massachusetts Ecclesiastical Law;" "Contributions to the Ecclesiastical History of Connecticut," and numerous local histories and church manuals.)

Statistical summaries of the Congregational churches may be found each year in the January number of the "Congregational Quarterly," representing the numerical strength of the denomination and its changes during the preceding statistical year.

The returns thus published in 1886 for U. S. showed 4170 churches, 3143 with ministers, 418,564 church members, and 510,339 in Sabbath schools; 21,729 members had been received during the year on profession of faith, and 15,184 by letter from other churches; 6592 had died, and 12,291 had taken letters of dismission. In 1862, twenty-four years before, the aggregate returns showed 2555 churches, 2678 ministers, 255,034 members, and 246,178 in Sabbath schools. (For Congregationalism in England, see INDEPENDENTS.) (For further details concerning Congregationalism in America, see I. PUNCHARD, "Congregationalism in America," Boston, 1880—81, 2 vols.; H. M. DEXTER, "Congregationalism as seen in its literature," New York, 1880, containing a bibliographical appendix of 7250 titles.)

E. W. GILMAN.

**Con'gress** [Lat. *congressus*, from *congređior*, *congressus*, to "go together," to "meet;" Fr. *congrès*], in politics, a meeting of the sovereigns of states or their representatives for the purpose of arranging international matters. The first general European congress was after the conclusion of the Thirty Years' war in Germany, at Münster and Osnabrück, 1648. Remarkable general congresses have been—of the Pyrenees (1659); at Aix-la-Chapelle (1668); at Nimeguen (1676); at Ryswick (1697); at Utrecht (1713); at Aix-la-Chapelle (1748); at Teschen (1779); at Paris (1782); at Versailles (1785); at the Hague (1790); at Rastadt (1797); at Erfurt (1808); at Vienna (1814, concluded at Paris 1815); at Aix-la-Chapelle (1818); at Trop-pau (1820); at Laybach (1821); at Verona (1822). More recently the word CONFERENCE (which see) is commonly applied to international meetings of statesmen for the settlement of international complications. (See PHILLIMORE, "On International Law," ii., 45.)

CONGRESS also comes into use as a name for international meetings of scholars of a particular science, as statistical congress, archaeological congress, etc.

CONGRESS, the title of the national legislature of the U. S. of America. It consists of a House of Representatives and of a Senate. The former is composed of members chosen every second year. The qualification of electors is the same as that required in their respective States for electors to the lower house in the State legislature. The number of representatives is apportioned according to the population of each State, and a new apportionment is made every ten years after the census is taken by authority. The Senate is composed of two members from each State; the Senators are chosen for six years by the legislature of the State. The House of Representatives chooses its own Speaker; the Vice-President of the U. S. is *ex-officio* president of the Senate. Bills for revenue purposes must originate in the House of Representatives, but are subject to the proposal of amendments by the Senate. The Senate has the sole power of trying impeachments, but it can only convict by a majority of two-thirds of the members present, and its sentence extends only to removal from office and disqualification to hold any office of honor or profit under the U. S. The regular meeting of Congress is on the first Monday in December, annually. Every bill which passes the two houses is sent to the President for approval or disapproval; in the latter case he returns it, with his reasons, to the house in which it originated; if on reconsideration it is passed again by a majority of two-thirds in each house, it becomes law. The powers of Congress are limited, and separated from those of the State legislatures by the Constitution. Members of Congress cannot legally have any interest in any contract with or claim against the government; they are forbidden to prosecute cases before the court of claims, or to present claims to any of the departments. The Senate consists (in 1886) of 76 members, and the other house of 325 members. No person is eligible to the Senate under the age of thirty years, nor to the House of Representatives under the age of twenty-five.

(For a full statement of the origin, character, and powers of Congress, see CONSTITUTION OF THE UNITED STATES.)

**Congress Spring**, at Saratoga, N. Y., a saline mineral spring whose waters are highly charged with carbonic acid gas. (For analysis, see WATER.)

**Congressional Term, Limits of.** See APPENDIX.

**Congressman-at-Large.** See APPENDIX.

**Con'greve** (WILLIAM), a witty English dramatic poet, born near Leeds Feb., 1670. He was educated at the University of Dublin, and entered the Middle Temple as a student of law, but he never devoted much time to its study. His first literary attempt was a novel published under the pseudonym of Cloophil. Johnson said of it that he would rather praise it than read it. More effective was his first drama, "The Old Bachelor," performed with great success at Drury Lane when he was not yet nineteen years of age. The "Double Dealer," in the following year, did not succeed. He produced in 1695 a comedy called "Love for Love," which added much to his fame and fortune, and in 1697 "The Mourning Bride," a tragedy, which was greatly admired. He obtained several lucrative civil offices. His comedy called "The Way of the World" (1700) failed so completely that he renounced the drama in disgust. He affected to depreciate his dramatic triumphs, and was more ambitious to pass for a man of fashion than a poetical genius. When Voltaire visited him, he astonished and provoked him by speaking lightly of his literary fame and declining to be considered as anything else than a gentleman; "in which case," Voltaire answered, "I should not have visited you." Died Jan. 19, 1729. (CHARLES WILSON, "Memoirs of the Life of W. Congreve," 1730.)

**Congreve** (Sir WILLIAM), BART., F. R. S., an English officer and engineer, born in Middlesex May 20, 1772. He invented several improvements in canal-locks, and in 1804 the Congreve rocket. (See ROCKET.) He published several professional works. Died May 14, 1828.

**Co'ni**, or **Cu'neo**, a town of Italy, in Piedmont, capital of the province of Cuneo, is on the river Stura, 54 miles by railway S. by W. from Turin. It has a cathedral, a fine town-hall, a royal college, a theatre, several convents and palaces. It was a strong fortress before 1800, and was dismantled by the French after the battle of Marengo in that year. Here are manufactures of linen and hemp. Coni has an extensive trade. Pop. in 1881, 24,563.

**Con'ic Sections**, in mathematics, the sections of a right cone by a plane. If the cutting plane is perpendicular to the axis, the section is a *circle*; if it is parallel to one side of the cone, the section is a *parabola*; if it makes a greater angle with the base than is made by the side of the cone, the section is a *hyperbola*; if it makes a less angle with the base than the side does, the section is an *ellipse*. The circle, the line, and the point may each be regarded as particular cases of the ellipse; the line as a particular case of the parabola; the triangle as a particular case of the hyperbola. The study of conic sections is specially interesting and important on account of its connection with the laws of moving bodies. The orbits of planets, the paths of projectiles, the undulations of light and sound, are all either circular, elliptic, parabolic, or hyperbolic.

**Coniferæ** [from the Lat. *conus*, a "cone," and *fero*, to "bear"], an important natural order of exogenous plants, comprising the pines, firs, etc. They agree with the other exogens in the structure of the stem and in the mode of vegetation, but differ remarkably from most of them in fructification. Their ovules are not enclosed in an ovary, but are fertilized by the direct application of the pollen to the *foramen*, with no style or stigma; and for this reason they, with the Cycadaceæ, are called gymnosperms. The flowers are unisexual, the male and female being sometimes on the same, sometimes on different plants. The male flowers have either one stamen or one bundle of stamens, the anthers often crested. The female flowers are in cones or solitary. The place of ovaries is supplied by the flat scales of the cones. The ovules are usually in pairs. The fruit is either a cone, a berry-like fruit, or a solitary naked seed. The seed has a hard, crustaceous integument. The embryo is surrounded by fleshy, oily albumen. The cotyledons are either two or numerous and whorled. The Coniferæ are trees or shrubs, mostly with resinous juice, and awl-shaped or needle-shaped leaves. Some of the Coniferæ attain a height almost unrivalled among other forest trees. The *Sequoia* of California affords the most striking example. The woody fibre is marked with circular disks, which, when highly magnified, exhibit a small internal circle surrounded by a larger one. This peculiarity of the wood of the Coniferæ is important, as enabling us to refer many fossils, particularly of the coal formation, to this order. Most of the Coniferæ have very narrow,

veinless, evergreen leaves, but some few are deciduous, and others have flat and wide leaves. By far the larger number of them belong to the northern hemisphere. They are very long-lived; some of them are supposed to be capable of enduring to the age of 2000 or 3000 years. Besides the valuable timber obtained from many of the *Coniferae*, they are remarkably productive of turpentine and resins. Astringent substances are also found in their bark, and fixed oil in their seeds. The seeds of some species are used as food. By some botanists this order is divided into two, three, or more orders.

**Co'niine**, also called **Conine**, **Conicine**, and **Cicutine**, a volatile alkaloid constituting the poisonous principle of the *Conium maculatum*, or poison hemlock. Formula,  $C_8H_{15}N$ . It exists in all parts of the plant, but in greatest quantities in the seeds just before maturity. Conine is stated by Walz to exist in the ripe seeds of the *Ethusa Cynapium*, or fool's parsley, and Wagner claims to have found it in the root of the *Imperatoria*. It is an oily liquid of specific gravity 0.89, boiling at about  $170^{\circ}C$ . ( $338^{\circ}F.$ ), with a penetrating repulsive and suffocating odor and a sharp taste. It is but slightly soluble in water, but very soluble in alcohol and ether. When exposed to the air it slowly decomposes, ammonia being evolved and a resinous substance being left. With acids it forms crystallizable salts which are soluble in water and alcohol, are odorless when dry, and are decomposed by heat. According to Geiger, the salts are less poisonous than the base itself. Other authorities assert that the reverse is the case. In any case, the action is that of an acrid narcotic poison. One of the tests in the laboratory for the presence of this alkaloid is the peculiar odor developed by setting it free from its combinations by means of caustic potash.

In 1872, Schiff obtained synthetically a substance identical in composition with coniine, and resembling it in odor, appearance, and general reactions. This product has, however, optically no rotatory power, and differs from the natural coniine in a few other details. The name *paraconiine* has therefore been proposed for the artificial product.

The alkaloid, as well as the leaves and seeds of the *Conium maculatum*, is used in pharmacy as a narcotic.

C. F. CHANDLER.

**Coninck, de** (DAVIN), a celebrated painter of the Flemish school, born at Antwerp in 1636, died in Rome in 1699. He painted animals, landscapes, flowers, and fruit, and is especially noted for his delicate manipulation of color.

**Con'ington** (JOHN), a distinguished classical scholar and literary writer, was born Aug. 10, 1825, in Boston, England, and educated first at Rugby under Dr. Arnold, and then at Oxford, where he became a fellow of University College in 1848. While still a B. A. he published an edition of the "Agamemnon" of Æschylus, with a poetical version, in which he inaugurated the double career, which he successfully followed up, of critical editor and translator. In 1852 he had begun, in conjunction with Mr. Goldwin Smith, an edition of the works of Virgil, the first volume of which was published in 1858. In 1854 he was appointed to the chair of Latin in the university, and from this time to his early death in 1869 his pen was constantly busy. His Æschylean studies were continued in the edition of the "Choëphore" in 1857, but after this he felt drawn more particularly to the studies connected with his chair. In 1863 appeared a version of the Odes of Horace, and the second volume of his Virgil. In 1866 he published a spirited translation of the "Æneid" in the ballad measure of Scott, which he followed up the next year by completing the version of the "Iliad" begun by his friend Mr. Worsley. He completed his translation of Horace, and prepared an edition of the "Satires" of Persius, with a translation, just before his death in 1869. The last volume of his edition of Virgil appeared after his death, under the supervision of his friend and fellow-worker, Mr. Nettleship, in 1871. Two volumes of miscellaneous writings, with a memoir prefixed, were issued in 1872, the second volume containing a prose translation of the "Eclogues," "Georgics," and "Æneid" of Virgil. HENRY DRISLER.

**Coni'ros'tres** [from the Lat. *conus*, a "cone," and *ros-trum*, a "bill"], a tribe of birds of the order Insesores (perchers), characterized by a strong conical bill without notches. It comprises numerous species, among which are crows, finches, larks, buntings, sparrows, starlings, and birds of paradise. Many recent systematists reject the term altogether, and group these birds in the section Oscines (singers), of the order Passeres and sub-class Insesores.

**Coni'um** [Gr. *κόνιον*], the leaves of the poisonous hemlock, *Conium maculatum*, an Old World umbelliferous plant naturalized in the U. S. It is in medicine a useful sedative, hypnotic, and anodyne. In over-dose it produces a dangerous paralysis. With this drug Socrates and Phocion were poisoned. Stimulants and emetics are the best antidotes.

**Conjeveram, or Cauchipoo'ra** ("golden city"), a town of Hindostan, on the railway, 62 miles S. W. of Madras, in the presidency of Madras. It consists mostly of mud cabins, extends over considerable ground, and contains large gardens and cocoa-groves. It is noted for two interesting pagodas with very fine sculptures. Pop. 20,000.

**Conju'gate** [Lat. *conjungatus*, part. of *conjugo*, to "yoke together"], an adjective frequently used in pure and applied mathematics with reference to two quantities, points, lines, axes, curves, etc., which present themselves simultaneously and have reciprocal properties.

**Conjuga'tion** [Lat. *conjungatio*, from *con*, "together," and *jugo*, *jugatum*, to "yoke"], in grammar, a regular distribution of the several inflections of verbs into their different voices, moods, tenses, numbers, and persons; a synopsis or statement of the changes of form or inflections to which a verb is subject. In Latin grammar there are four different forms of regular verbs, which are called the first, second, third, and fourth conjugations, and in some languages the number is even greater. (See GRAMMAR.)

CONJUGATION is also a process occurring among the lower forms of organic life, in which the substance of two distinct organisms, coming into contact, is passed into a single mass. In plants it is always attended with reproduction, sometimes also in animals. It has been observed in numerous algae and in some fungi.

**Conjunc'tion** [Lat. *conjunctio*, from *con*, "together," and *jungo*, *junctum*, to "join"], one of the aspects of the planets. Two or more heavenly bodies are in conjunction when they have the same longitude. The sun and moon are in conjunction at the time of new moon. In general, a heavenly body is in conjunction with the sun when it is on the same side of the earth and is in a line with him. An inferior planet has two kinds of conjunction with the sun: it is in *inferior* conjunction when it is between the earth and the sun, and in *superior* conjunction when the sun is between it and the earth.

**Conjunction**, in grammar, a part of speech used to connect words or sentences; that part of speech which expresses the relation of propositions to each other. Conjunctions are co-ordinate when they unite expressions of equal grammatical importance; subordinate when they unite a dependent clause to a principal one. With respect to origin, conjunctions are most closely related to pronouns: with respect to signification, to adverbs, thus, "that," "or" ("other"), "wherefore," etc., are evidently pronouns, but they may easily be changed into an adverbial phrase.

**Conk'ling** (ALFRED), the father of Roscoe C., born at East Hampton, N. Y., Oct. 12, 1879, graduated at Union College in 1810, became a lawyer, was member of Congress (1821-23), afterwards U. S. district judge for Northern New York, and was minister to Mexico in 1852. He published several legal works. Died Feb. 5, 1874.

**Conkling** (ROSCOE), LL. D., American statesman, b. at Albany, N. Y., Oct. 30, 1829, studied and practised law. In 1846 he removed to Utica, of which place he was elected mayor in 1858, and was elected to represent his district in the U. S. Congress four times, and in 1867, 1873, and 1879 to the U. S. Senate. Resigned May 16, 1881; confirmed as associate-justice of Supreme Court of U. S. Mar. 2, 1882, but declined the office.

**Conlie**, a French village, in the department of Sarthe, is situated 14 miles W. of Le Mans. Near it the French government established in Oct., 1870, a large fortified camp which could receive about 50,000 troops. After the battle of Le Mans the camp was, on Jan. 14, 1871, occupied by the Germans. Pop. of the village in 1881, 1672.

**Connara'ceæ** [from *Connarus*, one of the genera], a natural order of exogenous plants (trees or shrubs), natives of tropical countries, and nearly allied to the Leguminosæ. They have compound leaves destitute of stipules. They differ from the Leguminosæ by having the radicle remote from the hilum. Among the products of this order is the beautiful zebra-wood (the wood of *Omphalobium Lamberti*), a native of Guiana.

**Con'naught**, the most western province of Ireland, is bounded on the N. and W. by the Atlantic Ocean, on the E. by Ulster and Leinster, and on the S. by Munster. Area, 6863 square miles. It is divided into the counties of Galway, Leitrim, Mayo, Roscommon, and Sligo. The surface in the western part is mountainous. The coast is deeply indented, and affords good harbors. The river Shannon forms the eastern boundary of the province. Connaught was formerly a kingdom of the Irish pentarchy. Pop. in 1881, 821,657.

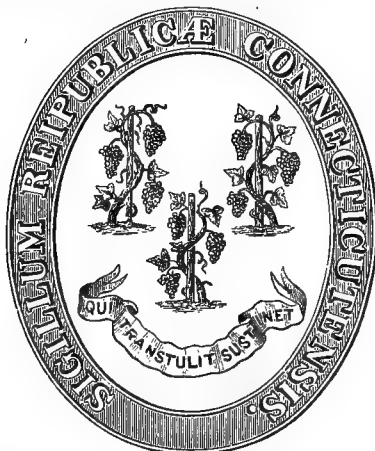
**Con'neaut'**, R. R. junction, Ashtabula co., O. (see map of Ohio, ref. 1-J, for location of county), on Conneaut

Creek, 68 miles E. N. E. of Cleveland and 2 miles from Lake Erie. It is a shipping-point for produce. Here the first settlers of Northern Ohio landed in 1796. The mouth of the creek makes a good harbor. Conneaut has a light-house. Pop. in 1870, 1163; in 1880, 1256.

**Conneautville, Pa.** See APPENDIX.

**Connecticut**, kon-net'e-küt, a river of the U. S., rises in the extreme northern part of New Hampshire, near the frontier of Canada. Its W. bank forms the entire boundary between New Hampshire and Vermont. (See NEW HAMPSHIRE.) It flows in a general S. S. W. direction until it enters Franklin co., Mass. It afterwards intersects Massachusetts and Connecticut, flowing nearly southward to Middletown (Connecticut), below which its course is S. E., and enters Long Island Sound at Saybrook. Length, about 450 miles. The valley of the Connecticut is celebrated for the beauty of its scenery, the fertility of its soil, and the luxuriant growth of the tobacco-plant known as the "Connecticut seed-leaf," which is used principally as "wrappers" in making cigars. It is not an uncommon thing for the crop to exceed 2000 pounds to the acre. Vessels drawing eight feet can ascend to Hartford, which is about 50 miles from its mouth. Its principal affluents are the Deerfield, Farmington, and Chicopee rivers.

**Connecticut**, one of the original thirteen of the American Union, between 41° and 42° 3' N. lat. and 71° 55'



Connecticut Seal.

and 73° 50' W. lon.; bounded N. by Massachusetts, E. by Rhode Island, S. by Long Island Sound, W. by New York. Area, 4845 square miles; coast-line, 100 miles; length, E. to W., 86 miles; average breadth, N. to S., 55 miles.

Connecticut, by census of 1880, ranked 28 among the States in population, 31 in value of agricultural products, and 7 in value of manufactures.

**Topography, Rivers, etc.**—There are no elevations deserving the name of mountains in the State. Numerous ranges of hills; in the E. rounded and fertile, in the W. often broken and precipitous, with bold bluffs of trap-rock. Three principal rivers, with their affluents and some smaller ones, drain the State—viz. the Connecticut, Thames, and Housatonic. The river-valleys generally very fertile, but the Sound shore sandy. The hills furnish good grazing lands. The Connecticut, Housatonic, and Thames are navigable to the head of tide-water. The numerous falls on the smaller streams afford abundant water-power. No lakes, but many ponds in the State.

**Minerals.**—Copper and lead, both combined with silver, in considerable quantities, but not worked profitably hitherto; bog-iron ores, hematite in the N. W. yielding excellent iron, and nickel; limestone for lime, marble, and the brownstone (old red sandstone) of the Portland quarries; flagstones, granite, and gneiss; sulphate of barytes, hydraulic lime, verd-antique, tiling slate, fire-clay and kaolin, and many mineral springs.

**Vegetation and Vegetable Products.**—There is yet considerable timber in Connecticut, including hickory, white, red, and yellow oak, chestnut, butternut, tulip tree, beech, birch, hop-hornbeam, four species of maple, ash, elm, wild cherry, sassafras, and many shrubs and small trees. The soil is good in the valleys, and with judicious cultivation yields liberal crops. Tobacco is the largest crop in the Connecticut Valley, and Indian corn, oats, rye, and buckwheat are largely grown, with some wheat and barley; potatoes and hay are large crops; orchard fruits are plentiful. The W. and S. W. parts of the State produce large quantities of market vegetables and small fruits for the

New York market. Dairy, cattle, and sheep farming are favorite pursuits, and the milk, butter, and cheese of Western Connecticut are famous. The census of 1880 shows the following products in Connecticut: Tobacco, 14,044,652 pounds; Indian corn, 1,880,421 bushels; oats, 1,009,706 bushels; rye, 370,733 bushels; buckwheat, 137,563 bushels; wheat, 38,742 bushels; barley, 12,236 bushels; potatoes, 2,584,262 bushels; hay, 557,860 tons.

**Animals.**—There are few wild animals, except the smaller game and game-birds. The domestic animals are of excellent quality. There were in 1880 in Connecticut 44,940 horses, 236,886 cattle, 59,431 sheep, and 63,699 swine.

The climate is not so harsh in winter as that of the States bordering on the ocean, the extreme range of the thermometer for the year not exceeding 90° F.; maximum 93°, minimum 3°; summer mean about 68° or 69°, and winter mean from 27° to 29°; mean annual rainfall, from 51 to 52.5 inches. The State is generally healthy, pulmonary complaints being somewhat prevalent, and zymotic diseases occurring in the river-valleys. Miasmatic fevers, formerly unknown, now prevail in most parts, but are not severe.

**Manufactures.**—Connecticut is essentially a manufacturing State, and excels any other in the variety of its industries, while the amount of manufactured products is large for its population. All descriptions of textiles; wares of gold, silver, brass, copper, zinc, nickel, iron, steel, leather, wood, etc.; clothing, clocks, watches, carriages, books and printing, firearms and ammunition, sewing-machines and other machinery, flour and food preparations, glass and lamps, hats, hooks and eyes, hoop-skirts and hosiery, jewelry, musical instruments, needles and pins, paper and perfumery, spectacles, straw goods, varnish, veneering, vinegar, and whips are a few of the varied productions of its factories. Statistics for 1880 for some of the principal manufactures were as follows: Cotton, 82 manufactories, products \$16,069,771; woollen, 78 manufactories, products \$16,892,284; mixed textiles, 43 manufactories, products \$5,919,505; silk, 28 manufactories, products \$5,438,075; paper, 65 manufactories, products \$4,337,550. The total number of manufactories was 4485; total products, \$185,697,211.

**Railways.**—Connecticut is traversed by railways in all directions; there were 959 miles in operation in Dec., 1881.

**Finances.**—The State debt, net, in 1880 was \$4,967,600; local debt, net, \$17,034,061; total debt, State and local, net, \$22,001,661. The assessed valuation in 1880 was: real estate, \$229,791,267; personal, \$93,386,118; total, \$327,177,385.

**Commerce.**—The direct foreign commerce from the ports of Connecticut in 1880 was \$1,441,770 imports, \$1,312,873 domestic exports, and \$247 foreign exports. The commerce through the port of New York was more than a hundredfold this amount, the business of Connecticut covering an immense import and export trade. The internal commerce and coasting trade are also very large. In 1880 the registered, enrolled, and licensed vessels in Connecticut were 823, of 82,876 tons; of these, 116 were steam craft, of 29,323 tons. In foreign commerce, 233 vessels, of 49,226 tons, entered and cleared in 1880.

**Fisheries.**—The census of 1880 reports 3131 persons employed; capital, \$1,421,020; value of products, \$1,456,866—viz. general fisheries, \$383,887; whale-fishery, \$32,048; seal-fishery, \$111,851; menhaden-fishery, \$256,205; oyster-fishery, \$672,875.

**Banks, etc.**—Number of national banks in operation in Connecticut Nov. 1, 1881, 85; capital, \$25,539,620; outstanding circulation, \$19,508,037. There are also 14 State banks and trust companies with \$4,125,928 capital and \$4,549,167.71 deposits, 10 private banking-houses with \$1,140,936 deposits, and 85 savings-banks with \$80,522,300 deposits. There are 29 fire and marine insurance companies—13 joint-stock, 16 mutual; the assets about \$14,000,000; also 8 life and 2 accident insurance companies; aggregate assets, nearly \$90,000,000.

**Education, Libraries, etc.**—Connecticut has a school population of 138,423, of whom 119,382 are enrolled in the public schools, with an average attendance of 75,678. There are also 11,215 pupils in other than public schools. Number of school districts, 1498; of schools, 1638; of departments in schools, 2564. There are 286 graded schools, with 1212 departments; schools were taught an average of nine months. There are 2741 teachers—men, 1773; women, 968; average monthly pay of men, \$57.19; of women, \$35.27; whole income for public schools, \$1,390,973; whole expenditure, \$1,375,380; amount of State school fund, \$2,020,000. There are high schools in all the cities, a State normal school with 132 pupils, and 7 teachers' institutes. There are many collegiate schools and seminaries for both sexes, 3 universities or colleges, all well endowed, and 1 (Yale College, at New Haven) having schools of law, medicine, theology, physical science, engineering,

agriculture, art, and philosophy. The 3 colleges had 1273 students in 1879. There are 2 schools for deaf-mutes, one the first established in this country, 1 for the feeble-minded, and 2 reform or industrial schools. There are in the State 130 public libraries of over 300 volumes each, with an aggregate of 432,000 volumes. By the census of 1880 there were in Connecticut 139 newspapers and periodicals, 17 of them dailies; aggregate circulation for the year, per issue, 237,660.

**Churches.**—There are about 1000 churches of all denominations, and over \$15,000,000 of church property. The Congregationalists are the leading denomination, followed in their order by the Methodists, Episcopalians, Baptists, Roman Catholics, Universalists, Presbyterians, Lutherans, Jews, etc.

**Population.**—Constant emigration has prevented a very rapid growth in Connecticut. In 1790 the population was 237,946; in 1820, 370,792; in 1870, 537,454; in 1880, 622,700 (white 610,769, colored 11,931, including 129 Asiatics and 255 Indians). The principal towns are Hartford (capital), 42,015; New Haven, 62,882; Bridgeport, 27,643; Norwich, 21,143; Waterbury, 20,270; Meriden, 18,340; Norwalk, 13,956; Middletown, 11,732; Derby, 11,650; New London, 10,537; New Britain, 13,979; Stamford, 11,297; Danbury, 11,666; Greenwich, 7892.

COUNTIES.	Ref.*	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Fairfield.....	6-C	95,276	112,042	{ Bridgeport.....	27,643
Hartford.....	4-D	109,007	125,382	{ Danbury.....	11,666
Litchfield.....	4-C	48,727	52,044	{ Hartford.....	42,015
Middlesex.....	6-E	36,099	35,589	{ Litchfield.....	452
New Haven.....	6-D	121,257	156,523	{ Haddam.....	2,419
New London.....	6-F	66,570	73,152	{ Middletown.....	11,732
Tolland.....	4-E	22,000	24,112	{ New Haven.....	62,882
Windham.....	4-F	38,518	43,856	{ New London.....	10,537
				{ Norwich.....	21,143
Total.....		537,454	622,700	{ Tolland.....	1,169
				{ Brooklyn.....	2,308

**History.**—The territory now embraced in the State of Connecticut, as well as the eastern part of Long Island, was first explored by the Dutch from the neighboring colony of New Netherlands, who laid claim to it, before 1620, but made no settlement within its limits till 1633. First white settlement, June 8, 1633, by Dutch, at Dutch Point, Hartford; second, also 1633, by a party from Plymouth colony, at mouth of Tunxis (Windsor); third, Wethersfield, 1634, autumn; fourth and fifth at Saybrook, 1635, and additions to Windsor and Wethersfield; sixth, Hartford, 1636; the last three united in 1637, and in May of that year, under Capt. Mason, attacked and destroyed Pequot fort near New London. In 1638, Quinnipiac (afterward New Haven) settled by Davenport, Eaton, etc.; with adjacent towns remained a separate colony till 1665, when, through fear of the Dutch, it united with the river-towns known as Connecticut under charter of Charles II., granted in 1662 to John Winthrop (second). In 1685-87, James II. attempted to annul all the New England charters and put the colonies together under a royal governor—Sir Edmund Andross—appointed by the crown. The demand was made on Connecticut in Oct., 1687, but after some debate the lights were extinguished and the charter secretly conveyed away and hidden in the hollow of a large oak on the Wyllys estate, ever after known as the Charter Oak. Sir Edmund Andross took possession of the government, and for one and a half years ruled tyrannically, but was deposed on the fall of James II., and the charter of 1662 continued to be recognized as the supreme law of the colony for one hundred and twenty-nine years thereafter. The general court or colonial legislature held two sessions a year, and from 1701 to 1875 these and the annual sessions which succeeded them were held alternately in Hartford and New Haven. Hartford is now the sole capital. During the first and second French wars the colony of Connecticut furnished her full quotas promptly, and in the Revolution she furnished more men and more money in proportion to her population than any other colony. Her governor (Jonathan Trumbull) was Washington's wisest counsellor, and her general assembly were among the earliest petitioners for the Declaration of Independence. Connecticut was the fifth State to adopt the Constitution of the U. S., Jan. 9, 1788. Connecticut suffered severely from the events which preceded the war of 1812, but furnished her full quota of men and means for the war. The so-called "Hartford Convention" of Dec., 1814, composed of delegates from all the New England States, was not, as is often alleged, an unpatriotic or treasonable body, but its action was rendered unnecessary by the speedy conclusion of the war. In 1818, Connecticut

adopted her present constitution, which abolished all relics of slavery and of a State-Church. It has been modified of late years, but never abrogated. The State took part in the Mexican war, and early dedicated its Western lands in Ohio to an educational fund for all its children. Since 1813 the State has been generally prosperous and peaceful. She took an active part in the war of 1861-65, and sent her full quota of men into the field as thoroughly equipped and supplied with all that was needful to their efficiency as those of any State in the Union. Her soldiers were distinguished on all the battle-fields of the war, and her war-governor, Buckingham, was one of the President's most trusted counsellors. Politically, the State is very equally balanced between the Democratic and Republican parties. The arms of the State are three vines in fruit, two and one, all proper. The motto is *Qui transtulit sustinet*—"He who transplanted sustains."

#### Governors.

Samuel Huntington.....	1785-96	C. H. Pond (acting).....	1853-54
Oliver Wolcott.....	1796-98	Henry Dutton.....	1854-55
Jonathan Trumbull.....	1798-1809	William T. Minor.....	1855-57
John Treadwell.....	1809-11	Alexander H. Holley.....	1857-58
Roger Griswold.....	1811-13	Wm. A. Buckingham.....	1858-66
John Cotton Smith.....	1813-18	Joseph R. Hawley.....	1866-67
Oliver Wolcott.....	1818-27	James E. English.....	1867-69
Gideon Tomlinson.....	1827-31	Marshall Jewell.....	1869-70
John S. Peters.....	1831-33	James E. English.....	1870-71
Henry W. Edwards.....	1833-34	Marshall Jewell.....	1871-73
Samuel A. Foote.....	1834-35	Charles R. Ingersoll.....	1873-77
Henry W. Edwards.....	1835-38	Richard D. Hubbard.....	1877-79
William W. Ellsworth.....	1838-42	Charles B. Andrews.....	1879-81
Chauncey F. Cleveland.....	1842-44	Hobart B. Bigelow.....	1881-83
Roger S. Baldwin.....	1844-46	Thomas M. Waller.....	1883-85
Isaac Toucey.....	1846-47	Henry B. Harrison.....	1885-87
Clark Bissell.....	1847-49		
Joseph Trumbull.....	1849-50		
Thomas H. Seymour.....	1850-53		

L. P. BROCKETT.

**Con'nectville**, R. R. junction. Fayette co., Pa. (see map of Pennsylvania, ref. 6-B, for location of county), on the Youghiogheny River, 57 miles S. S. E. of Pittsburg. It has a paper-mill and a woollen factory. It has also extensive mines of bituminous coal, and manufactures immense quantities of coke, which is called the best in the world. Pop. in 1870, 1292; in 1880, 3609.

**Con'ner** (DAVID), born at Harrisburg, Pa., in 1792, entered the U. S. navy as midshipman in 1809, served with great honor in the war of 1812-15, and in the Mexican war as commodore. Died at Philadelphia Mar. 20, 1856.

**Conner** (JAMES), born at Charleston, S. C., Sept. 1, 1829, graduated at South Carolina College in 1849, and was admitted to the bar in 1852. In 1856 he was appointed U. S. district attorney for South Carolina; resigned that office Dec., 1860. He was appointed Confederate States district attorney for South Carolina, but did not actively assume the duties of the office; entered the Confederate army in 1861 as captain, and became acting major-general; was engaged in many battles, and after the war again practised law. In 1876 he was made chairman of the State Democratic executive committee, and was elected attorney-general on the ticket with Hampton for governor; resigned in 1877. Died June 26, 1883.

**Conner** (PATRICK E.), born in Ireland in 1820, emigrated to the U. S. in his youth, and settled in Texas; became captain in Walker's Texan regiment, and was severely wounded at Buena Vista; raised a regiment in 1861, and was ordered to Utah; gained an important victory Jan. 29, 1863, over the Indians at Bear River; became brigadier-general Mar. 30, 1863; was long in command of the Utah district; became brevet major-general in 1865.

**Connersville**, city and R. R. junction, capital of Fayette co., Ind. (see map of Indiana, ref. 7-G, for location of county), on the Whitewater River, 67 miles N. W. of Cincinnati. It has a fine court-house and one woollen factory. Pop. in 1870, 2496; in 1880, 3228.

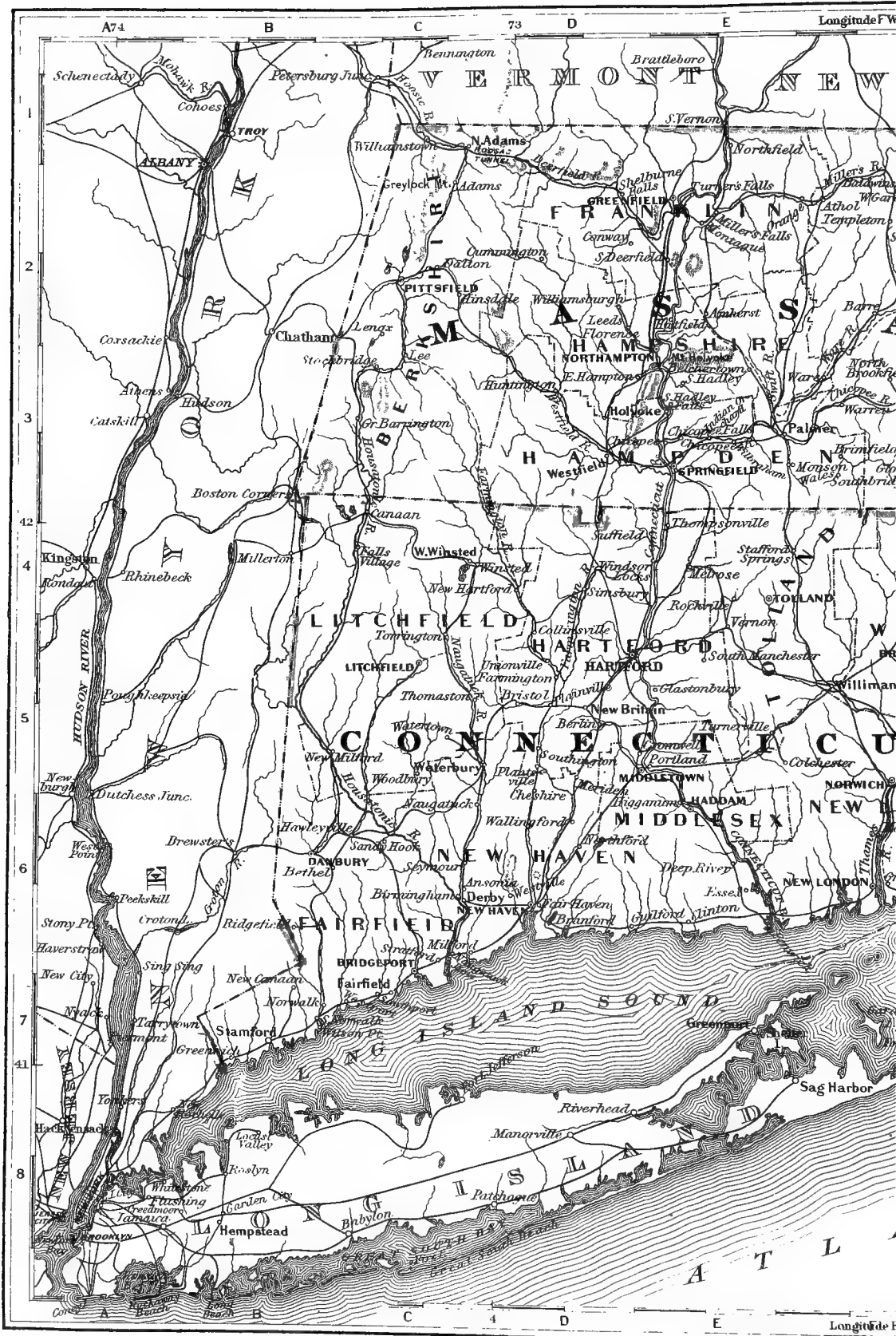
**Con'nor**, called also **Gilt-head** or **Golden Maid**, a small European marine fish, the *Crenilabrus tinca*. A somewhat similar fish is the connor, blue perch, hogset, or bergall of the Atlantic waters of the U. S. (*Ctenolabrus caeruleus*). It is a tolerable fish for the table, for which it is extensively caught.

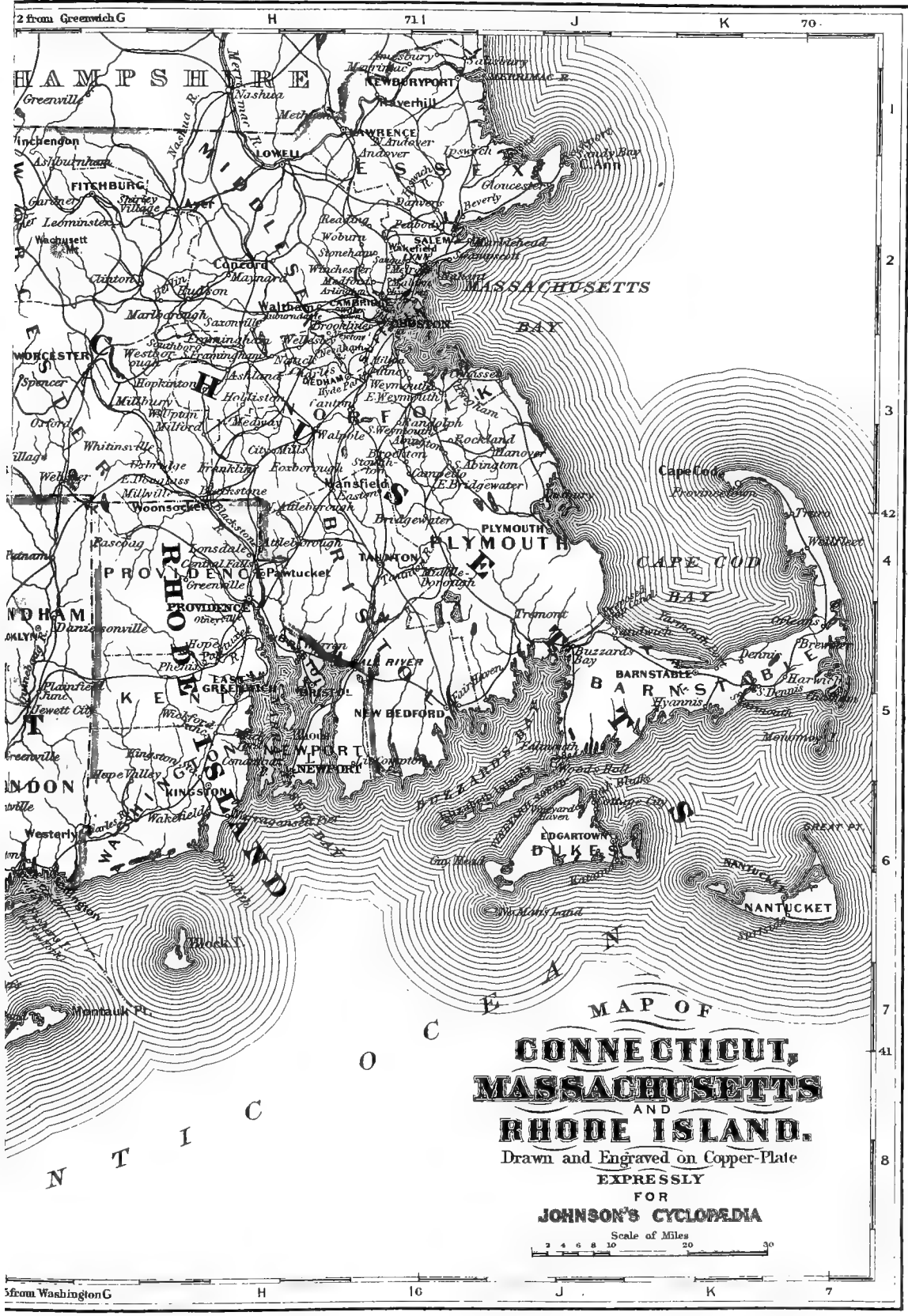
**Connor** (SELDEN), born Jan. 25, 1839, at Fairfield, Me.; graduated at Tufts College, Medford, Mass., in 1859; studied law, but before commencing the practice of it he enlisted as a private in a Vermont regiment at the commencement of the late war; became afterwards a lieutenant-colonel in a Maine regiment; received a commission as colonel, and was severely wounded in the battle of the Wilderness in 1864; he then became a brigadier-general; was appointed an assessor of internal revenue in 1868, a collector of internal revenue in 1873, and was governor of Maine from Jan., 1876, to Jan., 1879.

\* Reference for location of counties. See map of Connecticut.



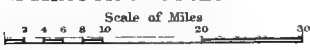






MAP OF  
**CONNECTICUT,  
MASSACHUSETTS  
AND  
RHODE ISLAND.**

Drawn and Engraved on Copper-Plate  
EXPRESSLY  
FOR  
**JOHNSON'S CYCLOPEDIA**





**Co'no-cu'neus** [a compound of the Lat. *conus*, a "cone," and *cuneus*, a "wedge"], a skew surface of the fourth order, generated by a line moving on two directors, one of which is rectilinear and perpendicular to all generators, and the other is a circle usually perpendicular to the plane which contains its centre and the other director. The rectilinear director, and the line at infinity perpendicular to the latter, are double lines on the surface. Its equation is  $c^2x^2 = y^2(a^2 - z^2)$ , where  $a$  is the radius of the circular director, and  $c$  the distance of its centre on the axis of  $y$  from the rectilinear director or axis of  $z$ . This surface was discovered by Wallis.

**Co'noid** [Gr. *κωνοειδής*, "cone-like," from *κῶνος*, a "cone," and *εἶδος*, "form"], a skew surface, generated by the motion of a line which remains parallel to a plane, and has a rectilinear director. When the directing plane and line are perpendicular to each other, the latter is a line of striction on the surface. This line being taken as axis of  $z$ , the equation of the surface may be reduced to the form  $z = f\left(\frac{y}{x}\right)$ , whatever the nature of its second director. Should the latter be also a right line, not in the same plane with the first director, the conoid will be an equilateral paraboloid. The cono-cuneus of Wallis, already described, is also a conoid; and another example is the skew helicoid, the curvilinear director of which is a helix, having the rectilinear director for its axis. The under surface of a spiral staircase presents a familiar illustration of this conoid. A conoid may be regarded as having three directors—one curvilinear and two rectilinear; one of the latter being at infinity. If the first of these directors be a curve of the  $m$ th order, then the order of the conoidal surface will be  $2m$ , and each rectilinear director will be a multiple curve on the conoid of the  $m$ th order of multiplicity. The directing plane being horizontal, the lines of level on the surface will be the generators; the lines of greatest slope, since they cut the former lines perpendicularly, will be projected into circles on the directing plane. Formerly it was a custom to give the name *conoid* to any solid generated by the rotation of a conic section around one of its axes. In this acceptance the term is obsolete, and has been replaced by that of a *quadric of revolution*.

**Co'non, or Ko'non** [Κόνων], an Athenian general of high reputation, entered public life about 413 B. C. He was one of the ten generals chosen in 407, and was defeated by Lysander at Ægospotami in 405. He commanded the combined fleets of Persia and Athens which defeated the Spartans at Cnidus in 394 B. C. He afterwards rebuilt the Long Walls of Athens. His son Timotheus was an eminent commander.

**Co'non of Samos**, a Greek geometer and astronomer, was a friend of Archimedes, who expressed in one of his works a high estimation of his sagacity. He lived at Alexandria about 250 B. C. Conon invented the curve called the spiral of Archimedes. His works are all lost.

**Conquest.** See INTERNATIONAL LAW, by PRES. T. D. WOOLSEY, S. T. D., LL.D.

**Con'rad I.**, of Germany, was elected emperor in 911 A. D. He was previously duke of Franconia, and related to the Carolingian house. He waged war against Henry the Fowler, of Saxony, from whom he conquered Thuringia; Charles the Simple, of France, from whom he conquered Alsace and Lorraine; and Arnulf of Bavaria, whom he drove into Hungary. He fell in a battle against the Magyars Dec. 23, 918.

**Conrad II.**, called THE SALIC, was a son of Henry, duke of Franconia. He was elected king of Germany in 1024, and was crowned as emperor by the pope in 1027. He is said to have been a wise ruler and the author of the written feudal law of Germany. He died June 4, 1039, and was succeeded by his son Henry III.

**Conrad III.**, of Germany, born in 1093, was the first of the Hohenstaufens and a grandson of Henry IV. He was elected emperor in 1138, and waged war against Henry the Proud, duke of Saxony. The party names of Guelph and Ghibelline originated in this war. In 1147 he led a crusade. Excited by St. Bernard of Clairveaux, he took the cross and hastened to Asia Minor at the head of a splendid armament, but his plans were foiled by the treachery of Manuel Comnenus. He besieged Damascus without success, and returned in 1149. He died Feb. 15, 1152; succeeded by Frederick Barbarossa. (See GUNDLING, "Geschichte und Thaten Kayser Conrads III.," 1720.)

**Conrad IV.**, son of Frederick II., emperor of Germany, was born in Apulia in 1228. He was crowned king of the Romans in 1237, and on the death of his father in 1250 assumed the title of emperor. He was supported by the Ghibellines, but the pope and the Guelphs recognized his competitor, William of Holland. Conrad marched into Italy in 1251, and took Naples. He died May 27, 1254.

**Conrad V., or Con'radin**, the son and heir of Conrad IV., was born in 1252. The kingdom of Naples was usurped by his uncle Manfred. Instigated by the pope, Charles of Anjou waged war against Manfred and conquered Naples. Conrad was defeated and captured at Tagliacozzo in 1268 by Charles, by whose order he was beheaded.

**Conrad** (CHARLES M.), a native of Winchester, Va., was taken in childhood to Mississippi, and thence to Louisiana. In 1828 he was admitted to the bar, was U. S. Senator from Louisiana 1842-43, member of Congress 1849-50, and secretary of war 1850-53. He was a Confederate brigadier-general and member of the Congress of the Confederacy during the civil war. D. in New Orleans, La., Feb. 11, 1878.

**Conrad** (ROBERT T.), an American dramatist and orator, born in Philadelphia June 10, 1810. He studied law, and became a judge of the court of general sessions in 1838. Among his works are a tragedy entitled "Aylmere," which was very successful, and a volume of poems (1852). He was elected mayor of Philadelphia by the American party in 1854, and judge of quarter sessions in 1856. Died June 27, 1858.

**Conrad** (TIMOTHY ABBOTT), an American conchologist and palæontologist, born in New Jersey in 1803. He published, besides other works, "Fossil Shells of the Tertiary Formation of North America" (1832), "New Fresh-Water Shells of the United States" (1836), "Miocene Shells of the United States" (1838), and wrote "Palæontology of the State of New York," which was published at the expense of that State (1838-40). He was one of the naturalists employed in the geological survey of New York. Died Aug. 9, 1877.

**Con'ring** (HERMANN), a learned jurist, born at Norden, in East Friesland, in 1606. Among his works, which are in Latin, is a "Commentary on the Origin of the German Law" (1643). Died in 1681.

**Con'salvi** (ERCOLE), CARDINAL, an Italian statesman and reformer, born at Rome June 8, 1757. He became in 1800 chief minister of Pope Pius VII., and negotiated the concordat with Bonaparte in 1801. He promoted art and learning, and was an able diplomatist. Died Jan. 24, 1824. (See CRÉTINEAU-JOLY, "Mémoires du Cardinal Consalvi.")

**Consanguin'ity** [from the Lat. *con*, "with," and *sanguis*, *sanguinis*, "blood"], in law, is relationship by blood, or that subsisting between persons descending from a common ancestor, or where one descends from the other. It is either lineal or collateral. It is said to be lineal when one of the persons whose relationship is to be traced is descended from the other. It is said to be collateral when they are descended from a common ancestor, and one is not descended from the other. There are two principal modes of reckoning collateral consanguinity. One method is to count the degrees intervening between the one farthest removed from the common ancestor and such ancestor. Thus, the son of the nephew of A on that system of computation is related to A in the third degree, as being three removes from the common ancestor, the father of A. This is the method of the canon and common law. The civil law reckons the degrees from the one relative to the other, ascending, on the one hand, from one of the parties to the common ancestor, and then counting downward to the other. On that theory A would be related to the son of his nephew in the fourth degree. The civil law method is generally employed in this country. In reckoning lineal consanguinity the two systems do not differ. Thus, the father and son are related in the first degree, the grandfather and grandson in the second. It frequently becomes necessary to resort to these rules not only in considering the transmission of estates, but in ascertaining persons who are disqualified to act as judges or jurors by reason of relationship.

**Con'science** [Lat. *conscientia*, from *con*, intensive, and *scio*, to "know;" Ger. *Gewissen*], a word originally meaning CONSCIOUSNESS (which see), but now applied to the moral sense, the power or feeling we have which enables us to know whether an act or desire is right or wrong. (See MORAL PHILOSOPHY, by PRES. NOAH PORTER, D. D., LL.D.)

**Conscience, Cases of.** See CASUISTRY.

**Conscience, Courts of**, in England, called also **Courts of Requests**, were constituted for the recovery of small debts by special local acts of Parliament, in London, Westminster, and other trading districts. They were abolished with few exceptions when the county courts were established.

**Conscience** (HENRI), b. at Antwerp Dec. 3, 1812, died in Brussels Sept. 11, 1883. From 1830 to 1836 he served in the Belgian army as simple soldier, but made his name known throughout the whole country by his patriotic songs, to which he often set the tune himself. Nevertheless, from



1836 to 1838 he had to fight hard to make a living as a journeyman gardener, a village schoolmaster, etc., but in 1838 he began to write for the Anti-French League, an association working for the expulsion of the French language from Belgium and the adoption of the Flemish. But, though he wrote all his novels in Flemish ("The Lion of Flanders," "Jacob van Artevelde," "Valentyne," "The Lost Glove," etc.), he soon became one of the most widely-read novelists of the day. His books were translated into German, French, English, Danish, etc. The king of Belgium made him teacher of Flemish to his children; the city of Antwerp raised his statue before his death, etc.

**Con'sciousness** [Lat. *conscientia*; Fr. *conscience*; Ger. *Selbstbewusstseyn*] is the state in which we are when all or any of our mental faculties are in exercise. It is a condition or accompaniment of every mental operation. In metaphysical terminology it signifies the knowledge which the mind has of its own operations. "We not only feel," says Cousin, "but we know that we feel; we not only act, but we know that we act; we not only think, but we know that we think; to think without knowing that we think is as if we should not think; and the peculiar quality, the fundamental attribute of thought, is to have a consciousness of itself. Consciousness is this interior light, which illuminates everything that takes place in the soul; consciousness is the accompaniment of all our faculties, and is, so to speak, their echo." That consciousness is not a particular faculty of the mind, but the universal condition of intelligence, the fundamental form of all the modes of our thinking activity, and not a special mode of that activity, is strenuously maintained by a number of modern philosophers, but has found its most elaborate and thorough representation in Sir William Hamilton's "Lectures on Metaphysics," of which the larger part is wholly devoted to it. This view of consciousness, as the common condition under which all our faculties are brought into operation, or of considering these faculties and their operations as so many modifications of consciousness, has of late been generally adopted; so much so that psychology, or the science of mind, has been denominated an inquiry into the facts of consciousness. This view, however, has many strenuous opponents, especially among recent writers of the materialistic school.

**Con'script Fa'thers** [Lat. *Patres Conscripti*, from *con*, "together," and *scribo*, *scriptum*, to "write"], an appellation given to the senators of ancient Rome, because after the expulsion of Tarquin, when Brutus added another hundred to the number of senators, the names of the new members were "written together" with those of the old, and the whole body received the appellation of Conscript Fathers.

**Con'scription** [Lat. *conscriptio*, a "written list"], a compulsory enrolment of men for military service. This is the system by which the armies of France and some other countries are recruited. The soldiers who are thus compelled to enter the army are called conscripts. The conscription was established in France during the Revolution of 1789. The number required for the service is drawn by lot from the number of young, able-bodied men who are not exempt.

**Consecra'tion** [Lat. *consecratio*, from *con*, intensive, and *sacro*, to "make sacred"] is the act or ceremony of giving a person or thing to the service of God. It was a widely-spread religious ceremony of the ancient world. In the Old Testament we read of the consecration to the Lord of the first-born of man and beast, and the dedication of the Levites, etc. The custom, as regards places and things, was not transmitted immediately from Judaism to Christianity. As soon as the persecution of the Christians ceased, according to Eusebius, "the sight was afforded us so eagerly desired by all—of the festivals of dedications and consecrations of the newly-erected houses of prayer throughout the cities." The practice of consecrating religious edifices is continued to the present time. The forms were at first simple, consisting of prayer, the celebration of the Eucharist, thanksgiving, and benediction; but they subsequently became more imposing, and the bishops, etc. assumed the exclusive power of consecrating. The service which sets apart bishops for their official work is especially designated as consecration.

**Conservation of Force.** See CORRELATION OF FORCES, by PROF. J. H. SEELYE, S. T. D.

**Conservative** [from the Lat. *con*, intensive, and *servo*, *servatum*, to "keep," to "preserve"]. In politics, this term is applied to persons who oppose reform, progress, or radical changes in institutions or laws. In England the party formerly called Tory is now termed Conservative.

**Conserva'tor**, an officer who is charged to preserve the public peace or prevent and punish a breach of the

peace. In England the sovereign is the principal conservator of the peace. The lord chancellor, the justices of the queen's bench, and the master of the rolls are conservators of the peace throughout all parts of the kingdom, and can commit breakers of the peace anywhere. Other judges possess the power only within the limits of their own jurisdiction.

**Conser'vatory** [from the Lat. *conseruo*, *conservatum*, to "preserve"], in horticulture, a glazed structure in which exotic plants are cultivated. It is distinguished from an orangery by its having a glazed roof, whilst that of the latter is opaque, and from a green-house by the plants being in the free soil, thus growing from the floor, while in the green-house the plants are grown in pots placed on shelves. Conservatories are used for plants in a growing state during the winter, and are therefore warmed according to the temperature which such plants require. One of the largest conservatories in the world is that erected at Chatsworth in Derbyshire, England, for palms and other tropical plants; it covers more than an acre of ground, and is above sixty feet high.

**Conser'vatory** [Fr. *conservatoire*; It. *conservatorio*; Ger. *Conservatorium*], a school for the study of vocal and instrumental music. These schools were first so called because they were designed to conserve the science and art of music. They are of ancient origin, and were probably founded by ecclesiastics for the purpose of improving the character of church music. They were originally charity schools, recruited from foundlings and orphans of both sexes. The first conservatory was the famous one of Santa Maria di Loreto in Naples, founded by Giovanni di Tappia in 1537. Among the most famous conservatories of the present day may be mentioned the Conservatoire de Musique of Paris (founded in 1784), those of Vienna (1816), Brussels (1833), and Leipsic (1842). There are several successful schools of music in the U. S. called conservatories.

**Conshohock'en**, on R. R., Montgomery co., Pa. (see map of Pennsylvania, ref. 6-I, for location of county), on the Schuylkill River, 13 miles N. W. of Philadelphia. It has several blast-furnaces, machine-shops, and rolling-mills. Gas-pipes and water-pipes are made here. Pop. in 1870, 3071; in 1880, 4561.

**Considérant** (VICTOR), a French socialist, born at Salins Oct. 12, 1808, was the chief disciple of Fourier. He became the editor of the "Démocratie Pacifique" in 1845, and a member of the National Assembly in 1848. He wrote "Destinée Sociale" (3 vols., 1834-44). He afterwards founded a colony called Reunion, near San Antonio, Tex., but returned to France in 1869.

**Considera'tion** [Lat. *consideratio*; etymology doubtful], mature thought, serious deliberation, meditation; also motive of action, reason. In law, it is the material cause of a contract, the reason which induces a contracting party to make a contract. The leading distinction respecting considerations is, that they are either *good* or *valuable*. A *good* consideration is based upon relationship or natural love, and is of avail only in an executed contract—e. g. a deed of land. A *valuable* consideration either confers some benefit on the promisor or causes some inconvenience or harm to be sustained by the promisee. Under these rules marriage is a valuable consideration. (See CONTRACT, by PROF. T. W. DWIGHT, LL.D.)

**Consignee.** See BILL OF LADING and SHIPPING.

**Consign'ment**, in mercantile law, is the term applied to goods which are consigned or transferred by the owner into the possession of another, either as his own or as an agent or factor for sale or for some other specified purpose. The word is sometimes used to denote the act of consigning.

**Consis'tory** [Lat. *consistorium*, from *con*, "together," and *sisto*, to "stand"], the place of meeting of the cabinet of the Roman emperors; the name is also applied to the council of cardinals, sometimes assisted by other prelates, who attend in person or by proxy, which meets in the Vatican to advise the pope in ecclesiastical and temporal affairs. A court under this title for the regulation of discipline and worship, composed of civil and ecclesiastical jurists, was established by the Lutheran princes of Germany at the time of the Reformation. The earliest was that of Wittenberg, founded in 1537. The lower church courts of the Reformed ("Dutch" and "German") churches in the U. S. are also called consistories.

**Con'sole** [etymology doubtful], in architecture, a projection like a bracket, used to support cornices or such movable objects as busts and vases. It frequently has the form of a letter S.

**Con'sols**, a contraction of "consolidated annuities," is the common name given to the annuities of three per cent. which the British government pays as interest on the national debt. This debt was contracted by loans negoti-

ated at different times and at various rates of interest. To obviate the confusion which arose from the variety of stocks thus created, they were consolidated into one fund, kept in one account at the Bank of England. The Consolidated Annuities act was passed in 1757.

**Con'sonance** [Lat. *consonantia*, from *con*, "together," and *sono*, to "sound"], a term in music applied to a harmonious blending of sounds which so satisfy the ear that no other sound is expected to follow. The effect of consonance depends on the greater or less simplicity of the interval formed by the combined sounds. Intervals whose relative vibrations can be expressed by numbers from one to six are considered consonant. Consonant intervals are therefore the third, fourth, fifth, sixth, and octave; from which it follows that there is only one consonant fundamental chord in music—i. e. the common chord, being a bass-note with its third, fifth, and octave. The system of harmony of the ancient Greeks was different from ours, as they treated the third and sixth as dissonances. Their name for consonance was our word "symphony," and for dissonance, "diaphony." As early as the fourteenth century we find the important rule that two perfect consonances following in similar progression are not allowable. In the sixteenth century, Zerlino ascertained the true mathematical proportions of the major and minor thirds. The exact limit between consonance and dissonance is not definitely fixed.

**Con'sonant**, a letter which can be freely sounded only when joined with another letter called a vowel. Consonants are divided into *mutes* and *liquids* (or semi-vowels). Mutes are those letters which may be said wholly to interrupt or stop the voice when they occur at the end of a syllable—in other words, when they are not immediately followed by a vowel—as *p, k, t, b, g, d*. The liquids or semi-vowels do not wholly stop the voice; they are *l, m, n*, and *r*. The aspirates *f, s*, and *th* are sometimes classed with the mutes, though they admit of the voice passing beyond them, so to speak, when they terminate a syllable, as in *if*, etc. The sibilant *s* is also an aspirate.

**Con'sort** [Lat. *consors*, "allotted together," from *con*, "together," and *sors* (gen. *sortis*), a "lot"], in Great Britain, a term applied to the husband or wife of the reigning sovereign viewed in a public capacity, as participating to a limited extent in the sovereignty. Before the year 1857 the husband of Queen Victoria possessed no English title, and no place in court ceremonies except such as was conceded to him by courtesy. The title of prince consort was conferred upon him in that year.

**Conspir'acy** [Lat. *conspiratio* (from *con*, "together," and *spiro*, to "breathe," to "whisper"), an agreement between several persons to commit some crime, as to kill a ruler or deprive him of power. In law, it is an agreement of two or more persons to carry into effect some unlawful purpose, or to accomplish some lawful purpose by unlawful means. It is a crime of which the true basis is the unlawful combination, and may be prosecuted, though no overt act has been performed. Statute law in some instances makes a conspiracy a grave offence, as, *e. g.*, to destroy a ship with intent to injure insurers.

**Con'stable** [Late Lat. *comes stabuli*, "count of the stable," or *constabularius*; Fr. *comtable*], the former title of a military officer of the highest rank in France. The constable rose gradually in importance until he became *ex-officio* commander-in-chief of the army, the supreme military judge, and chief arbitrator in questions of chivalry. Mathieu de Montmorency, who became constable in 1218, was the first who had the supreme command. The office was abolished in 1627. Napoleon I. appointed his brother Louis constable of the empire, and Berthier vice-constable. Under the Restoration the dignity was again abolished. In England the lord high constable was a personage of high rank and authority until the office was abolished by Henry VIII. A lord high constable is now appointed only on the occasion of great state ceremonies, such as a coronation. In England and the U. S. constables are inferior civil officers appointed to preserve the peace, to arrest felons, execute civil and criminal processes, etc. Some of the U. S. have an officer called "constable of the commonwealth," who is over a part of the constabulary forces, the members of which are his deputies.

**Constable** (JOHN), born at East Bergholt in Suffolk, England, June 11, 1776, died in London April 1, 1837. He was of a somewhat slow growth, and had difficult circumstances to contend with. "Dedham Vale," exhibited in 1811, was the first of his pictures which attracted attention. Nevertheless, though at his death he left a number of pictures unsold in his studio, he produced many which were early recognized as masterpieces ("The White Horse," "Stratford Mill," "The Hay-Cart," etc.), and exercised

considerable influence on both English and French landscape-painting. He was a naturalist, used to work in the open air, and idealism in landscape-painting was to him "all nonsense." (See LESLIE, "Memoirs of the Life of John Constable," London, 1845, and "Forty Mezzotint Engravings," by DAVID LUCAS, London, 1855, folio.)

**Con'stance**, a fortified city of Baden, is on the Rhine and the S. W. shore of the Lake of Constance, 35 miles N. E. of Zurich. It is one of the oldest towns in Germany, and was formerly a free imperial city. It has a magnificent cathedral, founded in the eleventh century; also manufactures of silk and cotton goods and watches. Here was held in 1414–18 an important council of the Church. Pop. 13,372.

**Constance, Council of** [Lat. *Concilium Constantinense*], the seventeenth of the so-called oecumenical councils of the Roman Catholic Church, was convened by writ of the German emperor Sigismund, and opened on All Saints' Day, 1414, by John XXIII., one of the three claimants of the papacy. There were present during parts of the session, besides the emperor, seven patriarchs, twenty-one cardinals, one hundred and fourteen bishops and archbishops, besides many princes, nobles, and ambassadors from most of the Catholic powers and from the emperor Michael Palæologus. Representatives were also present from the principal universities of Europe. One of the objects of this council was the ending of the schism caused by the rival popes (John XXIII., Gregory XII., and Benedict XIII.). This object was accomplished by depositing all three (1415), and choosing Martin V. in their stead. The council also condemned the opinions of Wickliffe and Huss, and cited the latter to appear before it (1414). In the following year Huss was perfidiously burned at the stake for heresy, at Constance, notwithstanding the imperial safeguard which he possessed. In 1416 his friend, Jerome of Prague, met the same fate. The question of the relative authority of the pope and of the Church assembled in general council was warmly and persistently discussed by the Council of Constance, without decisive results. The reform of certain acknowledged abuses was also attempted, with no great success. The forty-fifth and last session was held April 22, 1418.

**Constance, Lake of** [anc. *Brigantinus Lacus*; Ger. *Boden See*], a lake of Central Europe, borders on Baden, Bavaria, Switzerland, the Tyrol, and Württemberg, 1290 feet above the ocean-level. Area, 184 square miles. It is about 40 miles long, and 9 miles wide at the broadest part. The greatest depth is 912 feet. The Rhine enters this lake near the south-eastern end, and issues from the north-western extremity. In 1770 the water rose in one hour twenty feet above the ordinary level. This lake is said to contain twenty-five species of fish, including salmon. Several steamboats ply on it.

**Con'stans** (FLAVIUS JULIUS) I., born about 320 A. D., was the third son of the emperor Constantine I. On the death of his father, in 337, he became the sovereign of Italy, Africa, etc. His brother Constantine invaded Italy, and was killed in battle in 340, after which Constans was master of all the Western empire. He was defeated and killed by Magnentius early in 350 A. D.

**Constant de Rebecque** (BENJAMIN), an eminent French political writer, born at Lausanne Oct. 25, 1767, died in Paris Dec. 10, 1830. He was of French descent, studied at Oxford, Erlangen, and Edinburgh, and finally settled in 1795 in Paris, where he joined the moderate republican party. True to his party, he worked for it both in the assemblies and in the press, under both the directory and the consulate; but, having become obnoxious to Napoleon, he was expelled from the Tribunal in 1802, and soon after found it advisable to retire from France together with Madame de Staël. After spending several years in Germany, chiefly engaged in literary pursuits, he returned to France immediately after the overthrow of Napoleon. His great hope was to see constitutionalism established in France, and he continued to work for this idea with indefatigable ardor during the reign of Louis XVIII. and of Charles X. When the July revolutions broke out, he was in his country-house; but he immediately repaired to Paris, and aided in placing Louis Philippe on the throne. His principal political works are "On the Spirit of Conquest and Usurpation" (1813) and "Cours de Politique Constitutionnelle" (1817–20, 4 vols.). His principal philosophical works are "On Religion, considered in its Sources, Forms, and Developments" (1823–31, 5 vols.) and "Religion of Rome" (2 vols.). His speeches were collected by T. P. Pages (1832–33, 3 vols.). Though not a great orator, he was a great writer, and is not unjustly compared with Voltaire.

**Constan'tia**, a superior wine from the Cape Colony,

South Africa, produced upon the three Constantia estates, 12 miles S. of Cape Town. It is free from the earthy taste which characterizes ordinary Cape wines. It owes its excellence to the highly alkaline soil, the choice variety of grape employed in making it, the genial exposure of the estates, and perhaps more than all to care and skill in its preparation. There are white and red Constantia wines.

**Constanti'na**, a fortified city of Algeria, capital of a province of its own name, and seat of a Catholic bishop, is on a high hill surrounded on three sides by ravines; lat.  $36^{\circ} 24' N.$ , lon.  $6^{\circ} 8' E.$  It is over 2000 feet above the level of the sea. It is surrounded by walls built by the Arabs, and has a citadel, and a fine old Roman bridge across one of the ravines. Here are manufactures of woollen cloth and saddlery. Remains of the ancient Roman *Cirta*, which was a great city of Numidia, are visible here. This place was besieged by the French in 1836; Oct., 1837, it was taken by assault. Pop. in 1866, 35,417.

**Con'stantine**, St. Joseph co., Mich. (see map of Michigan, ref. S-H, for location of county), on R. R. and the St. Joseph River, 94 miles by railroad S. W. of Lansing. Pop. in 1870, 1290; in 1880, 1405; in 1884, 1398.

**Constantine** (FLAVIUS VALERIUS AURELIUS), surnamed THE GREAT, the first Christian emperor of Rome, was born February 27, 274 A. D. He was a son of Constantius Chlorus and his wife Helena, and was originally a pagan. In the reign of Diocletian he gained distinction by his military talents, and became a favorite of the army. He was at York when his father died in July, 306, and was then proclaimed emperor by the army under his command. Galerius, who regarded him with jealous enmity, granted to him the title of *cæsar*, and conferred the higher rank of *augustus* on his own son, Severus. Maximian and his son Maxentius assumed imperial power at Rome, so that in 307 A. D. six men became competitors for the empire. Constantine married Fausta, a daughter of Maximian. After the death of Galerius (311), Licinius and Maximian were masters of the eastern provinces of the empire, and Constantine reigned in Gaul. In 312, Maxentius was defeated and killed by the army of Constantine, who then entered the city of Rome and became master of all the western part of the empire, including Italy and Africa. On the eve of this decisive battle he is said to have seen a sign of the cross in the sky, bearing the inscription: "ΕΥΡΩΤΕΡΑ ΝΙΚΑ" ("By this conquer"). He afterwards treated the Christians with increasing favor, and adopted wise measures for the promotion of public prosperity and order.

In 314 he waged a short war against Licinius, who was the sole emperor of the eastern provinces. This war was followed by a peace of nine years, during which Constantine devoted himself to political reforms, organized a better form of government, and adopted a more humane code of laws, which recognized Christianity as the religion of the state. He renewed in 323 the war against Licinius, whom he defeated near Adrianople. After another decisive victory he reigned over the Roman empire with undivided power. He assembled at Nicæa, in 325 A. D., the first general council of the Church, and moderately favored the orthodox in the controversy against the Arians. He had a son, Crispus, who was accomplished and popular. Having been falsely accused of a crime by Fausta, his step-mother, Crispus was put to death. Constantine selected Byzantium as his capital, and enlarged or rebuilt that city, to which he gave the name of New Rome or Constantinople—"city of Constantine." This was founded by imposing ceremonies in May, 330 A. D. In the latter part of his life he showed favor to the Arians, and was baptized by an Arian bishop only a week before his death. The question is still warmly debated whether the man, or only the emperor, was converted. He died at Nicomedia May 22, 337 A. D., having divided the empire between his three sons, Constantine, Constantius, and Constans. He has a high reputation as a statesman and emperor. (See EUSEBIUS, "Vita Constantini;" GIBBON, "Decline and Fall of the Roman Empire;" JOSEPH FLETCHER, "Life of Constantine the Great," 1852.)

**Constantine (or Constantinus) VII.**, emperor of the East, surnamed PORPHYROGENITUS (Gr. Πορφυρογέννητος; i. e. "born to the purple" or "born in purple"), was born in 905 A. D. He was a son of the emperor Leo VI., who died in 911. Romanus Lecapenus usurped the imperial power in 919, after which Constantine passed many years in retirement and study. He began to reign in 944. He wrote several works of some merit. Died in 959.

**Constantine XIII.**, surnamed PALÆOLOGUS, the last emperor of Constantinople, was born in 1394. He succeeded his brother, John VII., in 1448. The Turkish sultan, Mahomet II., besieged Constantinople with an army of 250,000 men, and took it by storm in 1453. Constantine was killed, fighting bravely to the last, May 29, 1453.

**Constantine** [Lat. *Constantinus*], POPE, a native of Syria, succeeded Sisinnius in 708 A. D. Died in 715.

**Constantine** (NIKOLAEVITCH), grand duke of Russia, the second son of the emperor Nicholas, was born Sept. 21, 1827. He became grand admiral of the fleet and a favorite leader of the old Russian party. In the Crimean war (1854-55) he commanded the Baltic fleet and acted on the defensive. He married the princess Alexandra of Saxe-Altenburg in 1848. He was in 1862 governor-general of Poland, but resigned in 1863.

**Constantine** (PAVLOVITCH), grand duke, the second son of the emperor Paul of Russia, was born May 8, 1779. He commanded a corps at the battle of Austerlitz (1805), and displayed in several actions a courage bordering on rashness. In 1814 he was appointed generalissimo of the Polish troops and viceroy of Poland. When Alexander died without issue in 1825, Constantine was the legitimate heir, but he renounced the throne in favor of his younger brother, Nicholas. In the reign of Nicholas he was viceroy of Poland, and by his tyranny provoked the Poles to revolt in 1830. Died of cholera June 27, 1831.

**Constantino'ple** [Turk. *Stamboul*\* or *Istamboul* in common language, and *Constantinieh* in documentary writing; modern Gr. *Istamboli*; Gr. *Κωνσταντινούπολις*; Lat. *Constantinopolis*, i. e. "city of Constantine"], a celebrated city of Turkey in Europe, capital of the Ottoman empire, was originally called *BYZANTIUM* (which see). It is beautifully situated on the Bosphorus where it enters the Sea of Marmora, and in the province of Room-Elee. Lat.  $41^{\circ} 1' N.$ , lon.  $28^{\circ} 59' E.$  The site is a peninsula, bounded on the N. by an inlet of the Bosphorus, "the Golden Horn" (see *BYZANTIUM*), and surrounded by water on all sides except the W. Few cities can boast so magnificent a position; commanding the two opposite shores of Europe and Asia, it combines the advantages of security and great facilities for trade with the choicest gifts of nature and exquisite beauty of scenery. It occupies seven hills, rising one above another as they recede from the water. This variety of surface, with the numerous gardens, mosques, minarets, and cypress trees, renders the external aspect of the city very picturesque and imposing. The Golden Horn, which is five or six miles long, and varies in width from one to four furlongs, forms a safe and very commodious harbor, which is sufficiently deep to admit the largest ships. As the tide is here scarcely felt, the constant depth of the water permits vessels to land their cargoes with convenience and ease. The Bosphorus, here nearly one mile wide, separates Constantinople from Scutari, and the Golden Horn separates the city from the large suburbs named Galata and Pera. Along the western border of the city proper a lofty stone wall four miles long, and now in a ruinous condition, extends from the Sea of Marmora to the Golden Horn. This wall was built during the Byzantine empire, and presents picturesque specimens of mural ruins. The streets of the city are mostly narrow, crooked, and dirty. It contains about 350 mosques, 180 hospitals, and numerous Christian churches. It is the see of Greek, Latin, and Armenian patriarchs.

The Seraglio, the palace of the sultan, stands on the shore of the Bosphorus at the N. E. point of the peninsula, and commands a beautiful view. This palace, with its gardens, groves, and governmental offices, includes an area of nearly three miles in circuit, which is washed on one side by the Golden Horn. The principal gate or entrance to the Seraglio is called the Sublime Porte, from which is derived the diplomatic name of the sultan's court. Within the precincts of the palace is the celebrated Divan and the Harem, with the "Garden of Delight." The mean annual temperature is about  $56^{\circ} F.$

Among the remarkable edifices are the "Castle of the Seven Towers," built about 1000 A. D., and now partly ruined; the mosque of Solymán the Magnificent, a masterpiece of Saracenic architecture; the mosque of Selim II., and those of Mustapha III., Achmet, and Mahomet II. The mosque of Achmet has six minarets, more than any other in the world. Connected with the mosque of Mahomet II. are eight endowed academies. Near the Seraglio stands the celebrated and magnificent mosque of St. Sophia, once a Christian cathedral, built by the emperor Justinian between 531 and 538 A. D. It is in the form of a Greek cross, 269 feet long, and is surmounted by a flattened dome, which is 180 feet above the ground, and is much admired. It is adorned by 107 columns of fine porphyry, marble, and granite. A lofty minaret rises at each of the four corners of this mosque. Among the antiquities now visible here are the "Burnt Column," erected by Constan-

\* The Turkish name *Istamboul* (contracted into *Stamboul*) is supposed by some a corruption of the Greek phrase *εἰς τὴν πόλιν* ("to the city"). More probably it is a corruption of *Islamul* (*islam*, "believers," and *bul*, "multitude").

tine the Great; the pillar of Marcian; vestiges of the Boucoleon palace; the aqueduct of Valens; and the Theban obelisk, on the site of the ancient Hippodrome.

The city proper is divided into separate quarters for the Jews, Armenians, and Greeks. The Greek quarter, called the *Fanar*, extends along the shore of the Golden Horn, which is always covered with merchant vessels and numerous small boats. It was in this part of the city that Bryennios discovered, in 1875, an important manuscript of early ecclesiastical documents. A bridge of boats connects Fanar with Pera and Galata; the latter is the residence of European merchants, and contains a great number of warehouses. Pera is the residence of the foreign ambassadors, whose palaces are situated on a hill. The numerous cemeteries around Constantinople are among its greatest ornaments.

The city has an extensive foreign commerce, which is mostly in the hands of the Greeks, Italians, British, French, and Germans. The chief articles of export are silks, carpets, hides, wool, potash, linseed, madder, and valonea. Among the imports are grain, iron, coffee, sugar, cotton stuffs, woollen stuffs, metallic goods, drugs, gums, jewelry, furniture, and porcelain. The arrivals at this port in 1882 were 16,567 vessels, the tonnage of which was 6,399,181. Here are manufactures of silk and cotton goods, morocco, leather, saddlery, carpets, and meerschaum pipes.

It is stated that the city has been subjected to twenty-nine memorable sieges. It was taken by the crusaders in 1204, and by the Turks in May, 1453; but in nearly all the other cases the siege ended in the success of the party which defended the city. Pop., including suburbs, estimated at 700,000, about one-half of whom are Mohammedans. (See KRAUSE, "Die Eroberungen Constantinopels," 1870; CONSTANTIUS, "Ancient and Modern Constantinople," 1834, translated by John P. Brown, 1868.)

**Constantius I.**, called **Constantius Chlorus** (FLAVIUS VALERIUS), a Roman emperor, born about 250 A. D., was the father of Constantine the Great. The emperors Diocletian and Maximian chose Constantius and Galerius in 292 A. D., and gave to each the title of *cæsar*. Constantius ruled over Gaul, Britain, and Spain, and became emperor in 305, when Diocletian abdicated. Died July 25, 306 A. D.

**Constantius II.** (FLAVIUS JULIUS), the second son of Constantine I. and Fausta, was born at Sirmium in 317 A. D. He inherited, in accordance with his father's will, the Asiatic provinces and Egypt in 337. He waged war against the Persians, by whom he was several times defeated. He vanquished Magnentius on the Drave in 351, and in Gaul in 353. In 355 he gave the title of *cæsar* to his cousin Julian. He showed favor to the Arians. He died Nov. 3, 361 A. D., and was succeeded by Julian.

**Constellation** [from the Lat. *con*, "together," and *stella*, a "star"], a group of stars. From time immemorial it has been the practice of observers to form the stars into artificial groups, which have received the name of constellations. They are represented by the figures of men, animals, and other objects to which might be traced a fancied resemblance. Before the invention of almanacs the risings and settings of the constellations were looked to by husbandmen, shepherds, and seafaring men as the great landmarks (so to speak) of the seasons, and of the weather which each season was expected to bring with it. Thus, the risings and settings of Boötes, with the bright star Arcturus, which took place near the equinoxes, portended great tempests. The great heat in July was ascribed to the rising of Canis the dog, with its bright star Sirius. The appearance of Castor and Pollux was hailed as the harbinger of fair summer weather. Many nations have from early times arranged the stars into constellations, but our nomenclature is chiefly derived from that of the Greeks and Romans. Eudoxus, who lived about 360 B. C., gave a description of the heavens, with the names and characters of all the constellations recognized in his time. This work is lost, but a poetical paraphrase of it, written about a century later by Aratus, is extant. It describes twelve zodiacal constellations, twenty in the northern hemisphere, and thirteen in the southern. The "Almagest" of Ptolemy includes the preceding, with three additional constellations—one northern and two southern. These are the ancient stellar groups. Large additions to the nomenclature have been made in modern times, owing to the discovery of constellations in the southern hemisphere which were never visible to the world known to the ancient authors. Some stars of the northern heavens not included in the ancient groups have been formed into new ones. Lacaille went in 1751 to the Cape of Good Hope, where he spent nearly four years in making a catalogue of the southern stars and forming them into constellations. (The principal groups will be more fully noticed under their alphabetical heads.)

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The following list comprises all the constellations now generally recognized, although some of the more recent ones are understood to be temporary. The first twenty are known as Ptolemy's northern constellations; next come the twelve zodiacal, and then the fifteen southern constellations of Ptolemy; the forty-eighth was added by Tycho Brahe, though first named by Conon the Samian; the next ten are from Hevelius. All after the fifty-fifth are S. of the equator. Those from Indus to Apus inclusive were named by Bayer; the next thirteen are from Lacaille, and the last two from Royer.

1. Ursa Minor, the Lesser Bear.
2. Ursa Major, the Greater Bear.
3. Draco, the Dragon.
4. Cepheus.
5. Boötes, the Herdsman.
6. Corona Borealis, the Northern Crown.
7. Hercules.
8. Lyra, the Lyre.
9. Cygnus, the Swan.
10. Cassiopeia.
11. Perseus.
12. Auriga.
13. Ophiuchus or Serpentarius, the Serpent-bearer.
14. Serpens, the Serpent.
15. Sagitta, the Arrow.
16. Delphinus, the Dolphin.
17. Equuleus, the Little Horse.
18. Pegasus, the Winged Horse.
19. Andromeda.
20. Triangulum Boreale, the Northern Triangle.
21. Aries, the Ram.
22. Taurus, the Bull.
23. Gemini, the Twins.
24. Cancer, the Crab.
25. Leo, the Lion.
26. Virgo, the Virgin.
27. Libra, the Scales.
28. Scorpio, the Scorpion.
29. Sagittarius, the Archer.
30. Capricornus, the Goat.
31. Aquarius, the Water-bearer.
32. Pisces, the Fishes.
33. Cetus, the Whale.
34. Orion.
35. Eridanus, the River Po.
36. Lepus, the Hare.
37. Canis Major, the Greater Dog.
38. Canis Minor, the Lesser Dog.
39. Argo, the Ship Argo.
40. Hydra, the Water Serpent.
41. Crater, the Cup.
42. Corvus, the Crow.
43. Centaurus, the Centaur.
44. Lupus, the Wolf.
45. Ara, the Altar.
46. Corona Australis, the Southern Crown.
47. Piscis Australis, the Southern Fish.
48. Coma Berenices, the Hair of Berenice.
49. Canes Venatici (the Greyhounds, Asterion and Chara).
50. Lacerta, the Lizard.
51. Lynx, the Lynx.
52. Sextans Urania, Tycho's Sextant.
53. Camelopardalis, the Giraffe.
54. Vulpecula et Anser, the Fox and Goose.
55. Leo Minor, the Lesser Lion.
56. Monoceros, the Unicorn.
57. Indus, the Indian.
58. Crux, the Crane.
59. Phoenix, the Phoenix.
60. Musca, the Fly.
61. Pavo, the Peacock.
62. Toucan, the Toucan.
63. Hydrus, the Water-snake.
64. Dorado, the Sword-fish.
65. Piscis Volans, the Flying-fish.
66. Chamæleon, the Chamæleon.
67. Triangulum Australe, the Southern Triangle.
68. Apus, the Bird of Paradise.
69. Apparatus Sculptoris, or Sculptor, the Sculptor's workshop.
70. Fornax Chemica, the Chemical Furnace.
71. Horologium, the Clock.
72. Reticulum Rhomboidale, the Rhomboidal Net.
73. Cæla Sculptoris, the Graving tools.
74. Equus Pictorius, the Painter's Easel.
75. Antlia Pneumatica, the Air-pump.
76. Octans, the Octant.
77. Norma, the Square-rule.
78. Circinus, the Compasses.
79. Telescopium, the Telescope.
80. Microscopium, the Microscope.
81. Mons Mensæ, the Table-Mountain.
82. Crux Australis, the Southern Cross.
83. Columba Noachi, Noah's Dove.

There have been many more constellations proposed, and some others are needed, especially S. of the equator. Indeed, were it not for the great difficulties attending a change, and the seeming fixity of the present nomenclature, sanctioned by the usage of ages, it is not unlikely that a new arrangement of all the stars would be attempted, and many of the present monstrous figures banished from the maps of the celestial globe.

**Constipation** [from the Lat. *con*, intensive, and *stipō*, to "stow," to "crowd," referring to that state of the rectum in which it is impacted with fecal matter], a condition of the system marked by sluggish action of the bowels upon their contents, due either to diminished secretion of the juices of the mucous membrane or to a want of action of the muscular coat of the intestines. Sedentary habits predispose to constipation, and so does too large a proportion of animal food. Brown bread, ripe fruits, fresh vegetables, and active exercise tend to avert this disorder. An abdominal compress of cold water, covered with a flannel bandage, sometimes proves beneficial. For many cases the use of mild cathartics is necessary. They may be taken in proper doses for many years without bad effects. The use of nux vomica in small daily doses is often useful, and the same is true of belladonna in some constitutions. It is frequently advisable to employ enemata of warm or cold water, and also kneading or careful manipulation of the abdomen. But perhaps the most rational treatment is a careful readjustment of the diet, and the adoption of active habits of life. Ill-chosen and ill-cooked food, perhaps the most frequent cause of intestinal troubles, should be especially avoided. There is no doubt also that habitual constipation may in some instances be overcome by the persistent and systematic attempt to perform the impaired function at a regular time each day.

**Constitution** [from the Lat. *con*, "together," and *statu*, to "place"], in American law, a written statement of the fundamental rules of government, either of a State or of the United States. The word as here used has a widely different signification from that which prevails in England. There it simply means the leading rules of government, without reference to any formal statement. The "constitution" thus consists of documents emanating from time to time from the king or from Parliament, and of traditions and customs. These may be collected in treatises and reduced to a systematic form, but have never received the legal sanction indispensable in America—that of recognition by the nation as distinguished from Parliament. In this country "the people," consisting in each State of those who hold the elective franchise, are by prescribed forms called upon at intervals either to establish the constitution or to amend it. It thus has an authority superior to that of the government organized under it. One extremely important result is, that if any of the departments exceed the limits marked out in the constitution, the act is irregular and void. An illustration of the doctrine is found in an act of the legislature which transcends the constitution; the judicial department will declare it void. The courts have no such power in England. An act of Parliament is commonly said to be "omnipotent"; there is no judicial power which can exercise the function of arresting the regular operation of the act. The power of the courts in the U. S. is, in the best sense of the word, a "veto"—forbidding a direction which has actually been clothed with legislative forms from being carried into effect, on account of its repugnance to the will of the people. The further examination of the subject may be conducted under the following general divisions; I. The mode of originating an American constitution; II. The relation between a State and the U. S. Constitution, and the office of each; III. Principal provisions in American constitutions, including "constitutional limitations."

I. The prevailing method of generating or amending a constitution is the "constitutional convention." It is certainly not the only method, since it sometimes happens that a constitution provides special and different modes of amendment, as is the case with the U. S. Constitution and some others. A distinction has been taken between a "constitutional" and a "revolutionary" convention. These do not differ necessarily in their internal character or in their modes of conducting business, but in their origin. A constitutional convention originates by orderly processes—the creature of law. A revolutionary convention is irregular in its origin. Its ordinances may have a *de facto* validity, and become law on receiving the sanction of the people. The regular method is to have a law of the legislature or a constitutional provision as a basis for the existence of the convention. When a body of delegates of this kind is assembled by legal methods, its powers become a subject of much importance, and are not yet definitely ascertained. Some would hold that the convention holds within its grasp all the powers which inhere in the "people" that created it. In other words, it is sovereign. This is startling doctrine, and will scarcely command general assent. Another extreme view in the other direction is, that it is a mere deliberative body, having power to discuss propositions, to agree upon them, and to recommend them for adoption. Under this view the convention is but little more than a debating society, with very limited powers for preserving order or securing itself from the intrusion of strangers. The true view would seem to be that while the convention is itself acting in subordination to law, yet it has, as *incidental* to the accomplishment of its purposes, such powers as are necessary to carry them into effect. It may accordingly preserve order, punish contempts of its authority, provide for submission to the vote of the people of its proposed ordinances, and do such other acts as reasonably serve to make deliberation free and complete, and also to secure the full expression of the popular will. There are cases where the constitution of the State itself or the act of the legislature provides for the calling of a convention in a prescribed manner and with specified powers. While the restrictions of a constitution must be accepted as binding, it may well be doubted whether an act of the legislature can deprive a convention sanctioned by the people of powers which have been already referred to as incidental to its complete working.

The common method of transacting business is to parcel out among different standing committees the various topics to be provided for, such as a committee on "the Bill of Rights," "the Judiciary," "the Legislative Department," etc. These committees, after due consideration of the subjects entrusted to them, report to the convention, when the matter is taken up by the entire body, discussed, approved, or rejected. (For detailed information see JAMESON, "On Constitutional Conventions.") The debates in

conventions are frequently published in a permanent form, and contain much information of great value on legal and constitutional topics. (Reference may be made to the "Madison Papers," containing debates on the U. S. Constitution, ELLIOTT'S "Debates," and those published in New York, Virginia, Massachusetts, Illinois, and Pennsylvania.)

II. *The Relation between a State and the U. S. Constitution, and the office of each.*—A State constitution is adopted to regulate the action of the various departments of the government and to secure the rights of the people. It is a common statement that a State government has all the powers possessed by the English Parliament, except so far as it is restrained either by the State or national constitution. The object of a State constitution is not so much to confer power, as it is to restrict and define that which already exists. It is to subject the will of the people to prescribed forms, which cannot be overcome by an ordinary act of legislation, but only by an amendment of the constitution itself. On the other hand, the U. S. government is called into existence by a written instrument. It has no powers except those which are contained within it, either in express terms or by reasonable implication. The acts done under its legitimate powers, such as the laws of Congress or treaties with foreign nations, are the supreme law of the land, and all State laws or State constitutions are so far subordinate. It is plain, however, that a State constitution or law may be in conflict with some provision of the U. S. Constitution or law or treaty, or an act of Congress may trench upon legitimate State authority. There must be some power entrusted with the function of deciding these questions in such a way as to keep the two governments within their proper sphere of action. This power appertains to the Supreme Court of the U. S., and in the exercise of its appellate jurisdiction it may review the decisions of State courts for this purpose, under clauses of the "judiciary acts" of Congress passed under the provisions of the Constitution. It thus becomes the final interpreter of the Constitution, and may declare a State law or constitutional provision void as being repugnant to the U. S. Constitution or the laws of Congress or treaties with foreign powers. So, when an act of Congress is not warranted by constitutional rules, it will be declared void. In this way the complex system of government works harmoniously, sound judgment dictating that the rights of the States should be preserved by the court with the same jealous and scrupulous care as those of the U. S. The court cannot exercise this power by the promulgation of an edict or ordinance, but only through the medium of a "case" or controversy between litigating parties. In deciding the case it may proceed upon principles which become a rule for the future, and a body of constitutional law is thus formed which either truly expounds the Constitution or departs from it. If an error be committed, it can only be rectified by a subsequent act of the court overruling the decision or by an amendment of the Constitution. Another point may be adverted to. A State law may be opposed to a State constitution. The duty of deciding this point regularly devolves upon the courts of the particular State, and the U. S. court follows their lead. However, having once acceded to the State interpretation, if that be subsequently reversed in the State court, it will not feel bound to change its view, but may adhere to the first construction. There is thus to be collected from the decisions of State courts a mass of what may be called "State constitutional law." Much of this is special in its nature, having but little value beyond State limits. Other parts of it are general in their character, while some portions of it are coincident with decisions in the U. S. court, as in some instances the same restrictions are found in both instruments.

III. It is not intended under this head to advert to the general scheme of the various State and U. S. constitutions. The text of the latter is given hereafter in full. (See CONSTITUTION OF THE U. S.) Reference will only be made to such provisions in the nature of restrictions as are of a general nature. These are restrictions upon unsound legislation, such as prohibitions of bills of attainder and ex post facto laws, or laws impairing the obligation of contracts; some of the States in the same spirit prohibit divorces by the legislature. Or they may be limitations upon legislation opposed to the spirit of American institutions. Under this head may be ranked prohibitions against granting titles of nobility. There are also limitations for the protection of individual rights addressed to all departments of government. They tend to secure liberty of speech and of the press, religious freedom, to prevent deprivation of rights except through orderly processes in courts of justice, including trial by jury; also to prevent renewed trials for the same offence, to check excessive punishments, etc. A number of such provisions are found in the earlier amendments to the U. S. Constitution. It is an important remark that these were only intended to bind the action of



Congress or other departments of the general government. For this reason like clauses are inserted in the State constitutions. The last three amendments (thirteenth, fourteenth, and fifteenth) are operative upon the States as well as upon Congress. Many of the provisions now considered are taken from the English law, and in the very words of statutes or text-writers. They thus become fundamental law in the sense in which they were used in the country whence they were derived. The last three amendments of the U. S. Constitution were especially intended to secure rights to citizens of African descent, though not confined to them. (See CITIZEN.) Fundamental provisions of this sort, when considered together, are frequently termed a "Bill of Rights." (See BILL OF RIGHTS.) There is in some instances a tendency to insert in the State constitutions matters which are more properly the subject of legislation. Sometimes a political party desires to make its policy on a question like that of internal improvements a permanent one, and secures to that end a provision in the constitution; or perhaps legislatures prove themselves to be unwise or even corrupt, and it is thought well to reduce their capacity to do mischief by shearing them of their legitimate powers. Provisions framed to accomplish such objects do not long prevail, and a reaction in public sentiment soon leads to an amendment of the constitution. The better view is, that constitutions should only deal with fundamental law. When legislators are ignorant or vicious, the true remedy is at the ballot-box, where the voters may show their will to have more suitable men. (See on the general subject COOLEY, "On Constitutional Limitations;" HOUGH's "Collection of State Constitutions;" also the same author's "Annotated New York Constitution of 1846;" STORY, "On the U. S. Constitution;" KENT's "Commentaries;" and the treatises of RAWLE, SARGENT, and PASCAL. The most complete view of the principles governing the whole subject may be obtained from the opinions written by the judges of the Supreme Court of the U. S. in deciding specific cases involving the construction of the Constitution. These are collected in the reports of DALLAS, CRANCH, WHEATON, PETERS, HOWARD, BLACK, WALLACE, etc. Abstracts of the points decided may be found in BRIGHTLY's "Digest" and ABBOTT's "National Digests." These works may be used for easy reference to the volumes of the reports above named. Full expositions of questions arising under the various State constitutions will in like manner be found in the published reports of the decisions of the courts of the respective States.)

T. W. WRIGHT.

**Constitution of the United States**, the fundamental or organic law of the union of the States, thereby united. This, with all acts of the States in Congress assembled, and all treaties made in pursuance of its provisions, constitutes the supreme law of the land throughout the Union. The first Constitution of the U. S. was the Articles of Confederation, adopted by the States during the war for their independence. (See CONFEDERATION, ARTICLES OF; also see CURTIS, "History Constitution U. S.," p. 139; SPARKS, "Writings of Washington," letter to Henry Lee, 22d Sept., 1788, to Benjamin Lincoln, 26th Oct., 1788, and to James Monroe, 22d Feb., 1789.) The first Articles proving inefficient for the accomplishment of the objects of the Union, mainly upon the grounds that they conferred no power upon the central head to regulate commerce with foreign nations, nor to act directly upon the citizens of the several States respectively in the collection of the *quotas* levied upon the States to meet the public expenditures and to sustain the public credit, etc., the Congress, being urged by appeals from several quarters, took up the subject of amendment and general revision on the 21st of Feb., 1787, and then came to the following resolution upon it:

"Resolved, That, in the opinion of Congress, it is expedient that, on the second Monday in May next, a convention of delegates, who shall have been appointed by the several States, be held at Philadelphia, for the sole and express purpose of revising the Articles of Confederation, and reporting to Congress and the several State legislatures such alterations and provisions therein as shall, when agreed to in Congress and confirmed by the States, render the Federal Constitution adequate to the exigencies of government and the preservation of the Union." (See ELLIOTT's "Debates on the Federal Constitution," vol. i., p. 120.)

It was under this resolution of Congress, and in response to it by eleven of the States in choosing and sending delegates, that the ever-memorable Federal Convention assembled in Philadelphia the 14th of May, 1787. Each of the old thirteen States then composing the Union was represented in it, except Rhode Island. George Washington, almost universally styled the "Father of his Country," was unanimously chosen president of the convention. As a whole, it was unquestionably the ablest body of jurists, legislators, and statesmen that had ever assembled on the

continent of America. The convention remained in session from the 14th of May till the 17th of September ensuing. Their entire deliberations and proceedings were with closed doors. The journal of these proceedings was not published until over forty years afterwards. The actual and practical result, however, of their labors in the execution of the high trust committed to them was immediately communicated to Congress, and, being approved by that body, was speedily communicated to the respective States. This was their grand work in framing and proposing that matchless system of Federal government set forth and embodied in the new Constitution for the government of the U. S. of America, which was adopted and ratified by eleven States before the close of the year 1788; so that it went into operation between the States ratifying at the time appointed in 1789. The other two, North Carolina and Rhode Island, adopted and ratified it in less than two years afterwards. The last of the old thirteen which came into the Union, so remodelled in its Federal structure, was Rhode Island. Several features in this new form and constitution of government for separate states and communities are without a parallel in ancient or modern times. It was in contemplation of one of these peculiar features that the learned De Tocqueville, a profound philosopher of France, and one thoroughly versed in the science of politics, made the following commentary: "This Constitution, which may at first be confounded with the federal constitutions which have preceded it, rests, in truth, upon a wholly novel theory, which may be considered as a great discovery in modern political science. In all the confederations which preceded the American Constitution of 1789 the allied States, for a common object, agreed to obey the injunctions of a federal government, but they reserved to themselves the right of ordaining and enforcing the laws of the union. The American States which combined in 1789 agreed that the Federal government should not only dictate, but should execute, its own enactments. In both cases the right is the same, but the exercise of the right is different, and this difference produced the most momentous consequences." (See De TOCQUEVILLE's "Democracy in America," vol. i., p. 198.)

It was in view of the same peculiar, specific difference between the Constitution of the Federal republic of the U. S. and that of all others of a similar general type which caused Lord Brougham, in his "Political Philosophy," thus to speak of the wonderful machinery of the government of the U. S.: "It is," says he (vol. iii., p. 336), "not at all a refinement that a federal union should be formed; this is the natural result of men's joint operations in a very rude state of society. But the regulation of such a union upon pre-established principles, the formation of a system of government and legislation in which the different subjects shall be, not individuals, but States, the application of legislative principles to such a body of States, and the devising means for keeping its integrity as a federation, while the rights and powers of the individual States are maintained entire, is the very greatest refinement in social policy to which any state of circumstances has ever given rise, or to which any age has ever given birth."

The following is the text of the new Constitution proposed by the Convention of 1787, and adopted by a number of the States sufficient for it to go into operation in 1789; beginning with the preamble, and ending with the last of the Amendments.

A. H. STEPHENS.

**CONSTITUTION OF THE UNITED STATES.** We, the people of the United States, in order to form a more perfect union, establish justice, ensure domestic tranquillity, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

**ARTICLE I.** Sec. 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Sec. 2. The House of Representatives shall be composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislature.

No person shall be a representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several States which may be included within this Union according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the

United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every thirty thousand, but each State shall have at least one representative; and until such enumeration shall be made, the State of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment.

Sec. 3. The Senate of the United States shall be composed of two senators from each State, chosen by the legislature thereof, for six years; and each senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

No person shall be a senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen.

The Vice-President of the United States shall be president of the Senate, but shall have no vote, unless they be equally divided.

The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice-President, or when he shall exercise the office of President of the United States.

The Senate shall have the sole power to try all impeachments; when sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the Chief-Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

Sec. 4. The times, places, and manner of holding elections for senators and representatives shall be prescribed in each State by the legislature thereof; but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing senators.

The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall, by law, appoint a different day.

Sec. 5. Each house shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each house may provide.

Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy, and the yeas and nays of the members of either house on any question shall, at the desire of one-fifth of those present, be entered on the journal.

Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

Sec. 6. The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same; and for any speech or debate

in either house they shall not be questioned in any other place.

No senator or representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased during such time; and no person holding any office under the United States shall be a member of either house during his continuance in office.

Sec. 7. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate, shall, before it become a law, be presented to the President of the United States; if he approve, he shall sign it; but if not, he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered; and if approved by two-thirds of that house, it shall become a law. But in all such cases, the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sunday excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return; in which case it shall not be a law.

Every order, resolution, or vote to which the concurrence of the Senate and the House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power to lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States;

To borrow money on the credit of the United States;

To regulate commerce with foreign nations, and among the several States, and with the Indian tribes;

To establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States;

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

To provide for the punishment of counterfeiting the securities and current coin of the United States;

To establish post-offices and post-roads;

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

To constitute tribunals inferior to the Supreme Court;

To define and punish piracies and felonies committed on the high seas, and offences against the law of nations;

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years;

To provide and maintain a navy;

To make rules for the government and regulation of the land and naval forces;

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions;

To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress;

To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings; and

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof.

Sec. 9. The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any State.

No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

Sec. 10. No State shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

No State shall, without the consent of the Congress, lay any impost or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts, laid by any State on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

No State shall, without the consent of Congress, lay any duty of tonnage, keep troops, or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II., Sec. 1. The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

Each State shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of senators and representatives to which the State may be entitled in the Congress; but no senator or representative, or persons holding an office of trust or profit under the United States, shall be appointed an elector.\*

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

No person, except a natural-born citizen, or a citizen of the United States at the time of the adoption of this constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years resident within the United States.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States, or any of them.

Before he enter on the execution of his office, he shall take the following oath or affirmation: "I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

Sec. 2. The President shall be Commander-in-Chief of the Army and Navy of the United States, and of the militia of the several States, when called into the actual service of

the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offences against the United States, except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may on extraordinary occasions convene both houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Sec. 4. The President, Vice-President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

ARTICLE III., Sec. 1. The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

Sec. 2. The judicial power shall extend to all cases, in law and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more States; between a State and citizens of another State; between citizens of different States; between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign states, citizens, or subjects.

In all cases affecting ambassadors, other public ministers, and consuls, and those in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort.

No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture except during the life of the person attainted.

ARTICLE IV., Sec. 1. Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

Sec. 2. The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States.

A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

No person held to service or labor in one State, under

\* This mode of election of President and Vice-President has been modified by the Twelfth Amendment, *post*.

the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. New States may be admitted by the Congress into this Union; but no new State shall be formed or erected within the jurisdiction of any other State; nor any State be formed by the junction of two or more States, or parts of States, without the consent of the legislatures of the States concerned as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular State.

Sec. 4. The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and, on application of the legislature, or of the executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V. The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this constitution, or, on the application of the legislatures of two-thirds of the several States, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes as part of this constitution, when ratified by the legislatures of three-fourths of the several States, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI. All debts contracted and engagements entered into before the adoption of this constitution shall be as valid against the United States under this constitution, as under the Confederation.

This constitution, and the laws of the United States which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the constitution or laws of any State to the contrary notwithstanding.

The senators and representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States and of the several States, shall be bound by oath or affirmation to support this constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII. The ratification of the conventions of nine States shall be sufficient for the establishment of this constitution between the States so ratifying the same.

Done in convention, by the unanimous consent of the States present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names.

GEO. WASHINGTON,  
*Presid't, and Deputy from Virginia.*

NEW HAMPSHIRE.	PENNSYLVANIA.	VIRGINIA.
John Langdon,	B. Franklin,	John Blair,
Nicholas Gilman.	Thomas Mifflin,	James Madison, Jr.
	Robt. Morris,	
MASSACHUSETTS.	Geo. Clymer,	NORTH CAROLINA.
Nathaniel Gorham,	Tho. Fitzsimons,	Wm. Blount,
Rufus King.	Jared Ingersoll,	Rich. Dobbs Spaight,
	James Wilson,	Hu. Williamson.
CONNECTICUT.	Gouv. Morris.	
Wm. Saml. Johnson,	DELAWARE.	SOUTH CAROLINA.
Roger Sherman.	Geo. Read,	J. Rutledge,
	Gunning Bedford, Jr.	Charles Cotesworth
NEW YORK.	John Dickinson,	Pinckney,
Alexander Hamilton.	Richard Bassett,	Charles Pinckney,
	Jaco: Broom.	Pierce Butler.
NEW JERSEY.	MARYLAND.	GEORGIA.
Wil. Livingston,	James M <sup>th</sup> Henry,	William Few,
David Brearley,	Dan. of St. Thomas	Abr. Baldwin.
Wm. Paterson,	Janifer,	
Jona. Dayton.	Dan. Carroll.	

Attest: WILLIAM JACKSON, *Secretary.*

#### AMENDMENTS.\*

ARTICLE I. Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise

thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the government for redress of grievances.

ARTICLE II. A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III. No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war but in a manner to be prescribed by law.

ARTICLE IV. The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war and public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself; nor to be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI. In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defence.

ARTICLE VII. In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

ARTICLE VIII. Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishment inflicted.

ARTICLE IX. The enumeration in the constitution of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X. The powers not delegated to the United States by the constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.

ARTICLE XI. The judicial power of the United States shall not be construed to extend to any suit in law or equity commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign state.

ARTICLE XII. The electors shall meet in their respective States, and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves. They shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice-President shall be the Vice-President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the

\* Articles I. to X., inclusive, were proposed by the First Congress in 1789-90, Article XI. in 1793, Article XII. in 1803, Article XIII. in 1865, Article XIV. in 1868, and Article XV. in 1870.

whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

ARTICLE XIII., Sec. 1. Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV., Sec. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the legislature thereof, is denied to any of the male inhabitants of such State being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

Sec. 3. No person shall be a senator or representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

Sec. 4. The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

Sec. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV., Sec. 1. The right of the citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation. (See CONSTITUTION, by PROF. T. W. DWIGHT, LL.D.)

#### Constitutions of Clarendon. See CLARENDON.

**Construct'ion** [Lat. *constructio*, from *con*, "together," and *struo*, *struction*, to "build"], the act of building; fabrication, structure; the mode of putting together the parts of a building or system. In grammar, it signifies syntax, or the arrangement and connection of words in a sentence; their meaning or interpretation. In architecture and engineering, construction is that branch of the science which relates to the practical execution of the works required to realize the artist's design; it is immediately connected with the distribution of the different forces, the strains of the parts and materials of a building, and the properties of the various materials used.

**Construction.** See INTERPRETATION, by PROF. T. W. DWIGHT, LL.D.

**Consubstantia'tion** [from the Lat. *con*, "together," and *substantia*, "substance"], the transformation, transition, or union of substances originally distinct into a common substance—substantial conjunction; a term used in antithesis to TRANSUBSTANTIATION (which see), which means the transition of one substance into another, either by transmutation or by annihilation and substitution—one substance in place of two; while consubstantiation results in one substance out of two. The term consubstantiation has been used in the controversies on the REAL PRESENCE (which see), the mode of the presence of the body and blood of Christ in the EUCHARIST (which see). The theories of presence may be thus classified:

- I. SUBJECTIVE: 1. Natural—Zwingli;
  2. Supernatural—Calvin.
  - II. OBJECTIVE: 1. *Monistic*; one substance only really present; the body and blood: Roman Catholic *transubstantiation*.
  2. *Dualistic*; the two substances really present—bread and wine, body and blood.
    - a. *Substantial conjunction* of the two—consubstantiation, IMPANATION (which see), as held by John of Paris and Rupert; falsely charged on the Lutheran Church.
    - b. *Sacramental conjunction*—mystical mediating relation of the natural (bread and wine) to the supernatural (body and blood), each unchanged in its substance, and without substantial conjunction; the Lutheran view.
- This tabular view at once accounts for the fact that the charge of holding this doctrine has been so commonly made against the Lutheran Church, and shows how groundless the charge is. (See KRAUTH'S "Conservative Reformation," 757-775.) The same charge, with an equal want of accuracy, has been made against Dr. Pusey and his school.

C. P. KRAUTH.

**Consue'gra**, a Spanish town, in the province of Toledo, 38 miles S. E. of Toledo. It is an old place with steep, narrow streets, and a ruined fortress of supposed Roman origin. It manufactures coarse stuffs. Pop. 6870.

**Con'sul** [from the Lat. *consulo*, to "consult" or "advise"], the supreme magistrate of ancient Rome after the expulsion of the kings. The number was two, and the period of office one year, but there was no restriction as to the number of times the same individual might be elected, although a certain interval was at length required before again holding the office. Consuls were the supreme executive officers, but had no legislative authority. They were originally chosen only from the patricians, but afterwards from the plebeians also. The age required by law was forty-three years, but besides this it was requisite to have passed through the inferior offices of quaestor, aedile, and praetor. They were elected at the *comitia centuriata* some months before their entrance into office, which took place at different periods of the year at different times, but finally in January. During the interval they were termed *consules designati*, or "appointed consuls." Soon after the entrance into office they cast lots for the provinces to fall to the share of each, the superintendence of which was conferred on them by the senate. Under the emperors the nominal office of the consulate was preserved, but its substantial power destroyed; the elections became mere forms, the emperor appointing whom he pleased. Then, too, the custom was introduced of having several sets of consuls in one year; those admitted on the first day gave their name to the year, and were distinguished from the others, who were termed *suffecti* ("substituted"), by the title *ordinarii* ("regular"). Persons also were sometimes dignified with the title without enjoying the office, and were then styled *honorary consuls*. Under Justinian the year ceased to be called by the name of the consul.

Consuls in French history were the persons to whom, after the dissolution of the Directory in Nov., 1799, was entrusted the provisional government of the country. According to the constitution thus framed, Bonaparte, Cambacérès, and Lebrun, called first, second, and third consuls, were elected at the same time by the conservative senate, each for ten years, and invested with different degrees of authority. But the senate having passed various decrees which curtailed the powers of the second and third consuls, and augmented those of the first, the government was gradually assimilated to a monarchy, and after the lapse of four years and a half an easy transition was made from the consular to the imperial form; the title of emperor was substituted for that of consul, and the exercise of the sovereign authority was delegated exclusively to Napoleon Bonaparte.

**Con'sul\*** [Fr. *consul*; It. *console*], a public officer appointed by a government to reside in foreign seaports and other places for the purpose of protecting the interests of commerce and performing administrative, and sometimes judicial, duties in regard to his countrymen who may be in the place where he resides. Consuls also aid in authenticating documents, in protecting the rights of seamen, and in various other minor duties. There are consuls-general, vice-consuls, deputy-consuls, consular and commercial agents, etc. They are not in general considered as diplomatic officers. They are, as a rule, under obligation to obey the laws of the place where they reside. Consuls of the U. S. are governed by detailed provisions of statutes

\* Not only the chief magistrates of ancient Rome, but those of other Italian cities, were in a later time called consuls; the Italian republics, it appears, applied the title to those magistrates whom they sent to the colonies in the Levant, and afterwards to their representatives at other ports.



passed by Congress, which are collected in Brightly's "Digest and Supplements." These statutes regulate their appointment and compensation, their duties towards seamen and masters of vessels, their power to take possession of the estates of deceased persons, to administer oaths, perform the acts of a notary, etc. In some countries, such as China, Japan, Turkey, and Persia, they are empowered to exercise judicial functions, both criminal and civil, and to inflict specified punishments. The details of the laws are too voluminous to be stated. An important provision, however, is worthy of special reference. By the act of 22d June, 1860, all marriages in the presence of any consular officer in a foreign country, between persons who would be authorized to marry if residing in the District of Columbia, shall have the same validity as if the marriage had been solemnized in the U.S. The officer is directed to give to each of the parties a certificate of marriage, stating their names, ages, places of birth, and residence, and to forward a duplicate to the department of state at Washington. The general powers of consuls are discussed in the treatises on international law. (See INTERNATIONAL LAW, by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

**Consumption** [Lat. *consumo*, *consumptum*, to "wear away"], the popular name of various diseases characterized by a wasting of the body, such, for example, as "anæmia" (known as "consumption of the blood"), but applied especially to *phthisis pulmonalis*, a very common and very fatal disease of the lungs. It has long been taught, upon the authority of Laennec, Louis, and Andral, that the characteristic symptoms of pulmonary consumption depend upon the presence in the lung-tissue of a new growth, or neoplasm, called TUBERCLE (which see); but the studies of Virchow, Niemeyer, and other recent pathologists have demonstrated that cases of originally tuberculous consumption are quite rare, although they do occur, the presence of the tubercles giving rise to local pneumonic inflammation in their neighborhood; while ordinary consumption is generally characterized by (1) local consolidation, (2) cheesy degeneration of the solidified spot, and (3) destruction of the degenerated tissue and formation of a cavity. This is the direct result, in most cases, of a "catarrhal" inflammation—that is, of an inflammation of an epithelial surface, such as lines the air-passages—the inflammation being associated with a free discharge of mucus from the surface of the membrane. Next, the air-vesicles of the lungs become filled by inhalation and by other means with the young cells of the secretion. If, as in non-fatal cases of ordinary pneumonia, these cells soon undergo liquefaction and absorption, the patient recovers. But if the accumulation of cells remains unabsorbed in the air-vesicles, it suffers a cheesy degeneration, a sort of slow decay. It appears that an inflammatory process is set up around this caseous degenerate mass, and that the cheesy degeneration is soon present in the inflamed lung-tissue itself. After a time the degenerate mass may assume a more or less complete purulent form, and may be discharged by coughing. This, however, does not always happen. The mass may be absorbed, the pulmonary tissue become indurated and callous, without a trace of tubercle; the bronchial tubes may become dilated, and the disease, spreading slowly, may disorganize but not consume the lungs. This is a very common condition in old consumptive cases. Meanwhile, the less changed bronchi near the seat of the disease pour forth a profuse catarrhal secretion, causing copious expectoration. The pleura near the seat of the disease becomes thickened, and adheres by organized exudations to the wall of the chest. In the majority of cases these changes begin at the apex of one or both lungs.

The first subjective symptoms are usually dull pains about the collar-bones, tightness across the chest, and there is not unfrequently a dry, hacking cough, not very severe in the morning and late at night. Headache, weariness, dyspepsia, and loss of appetite are often present. The pulse increases permanently, in most cases exceeding 90 or 100 beats in a minute. The rapidity of breathing is usually increased. An early symptom is a high evening temperature—103° or 104° F. In the second stage night-sweats are often extremely severe, pus is freely expectorated, hectic fever is decidedly present, the pulse is more frequent. In the third stage, when considerable cavities often form in the lung, the preceding symptoms are much intensified; colliquative diarrhœa supervenes, and yet in many cases the patient continues serene and hopeful, and the mind is remarkably clear and active.

The causes of consumption are very numerous. Niemeyer assigns the first place as a cause to that depraved, ill-nourished state (called the scrofulous diathesis) in which there is a tendency to the increased production of young cells. Any depressing circumstance may tend to the establishment of consumption. An hereditary tendency is one of the most important of these circumstances, but any depressed

state of the parent, especially of the mother, whether consumption, starvation, anæmia, scrofula, or any other dyscrasia, appears to have a nearly equal effect on the offspring. Bowditch and others have shown that, other things being equal, it is most frequently observed in places where the air and soil are charged with moisture. Cold weather in itself appears to have little or no tendency to produce the disease, but a very changeable temperature is one of its most fruitful causes.

There has been considerable discussion as to whether consumption is or is not a contagious disease; and facts are not wanting which appear to show a danger of infection, especially to those who take care of and intimately associate with consumptives. Another interesting question is whether consumption is ever caused or promoted by habitual drunkenness, either in the case of the drunkard or of his offspring. The best opinion among physicians appears to be that while in selected cases alcoholic stimulants may be useful adjuvants, the remedy is a dangerous one, since there is no doubt that many more consumptives are injured than are benefited by it. On the offspring of the consumptive the effect of hard drinking is confessedly deplorable. Over-study at school appears to develop the disease in some young people. Overwork, factory-life, the grinding of metals, cabinetmaking, and all kinds of dusty or sedentary work are undoubtedly prolific sources of the disease. Mental trouble, excessive care, too frequent child-bearing, and sexual excess are to be reckoned in the list of causes. Consumption frequently follows measles, typhoid fever, and whooping cough, not improbably resulting from the bronchitis which accompanies those diseases.

It is also thought that pregnancy will check the disease in the female; and while there are numerous observations which go to show that for the time the disease is sometimes (but not always) held in abeyance, it is certain that this abeyance is often followed by a period of greatly increased activity; and the probability that a child born in such circumstances will be sickly and short-lived ought to prevent the resort to any such practice as a curative measure.

The physical signs of consumption are those which are determined by inspection, palpation, auscultation, and percussion of the chest. Their relative importance can be appreciated by none except the well-trained and experienced diagnostician.

The treatment of consumption cannot be discussed except in the most general terms, for no disease is less amenable to mere routine treatment. Yet there is no reasonable question that, especially in its earlier stages, this disease is a curable one. One of the first requisites is the establishment, if possible, of normal nutrition—a process which is usually much impaired in those liable to this disease. The use of such tonics as quinia and strychnia in some conditions, the administration of cod-liver oil, either as food or for its assumed alterative powers, and judicious change of climate, are among the most useful measures. Alcoholic stimulants benefit some patients and injure others, and on the whole do more harm than good; the hypophosphites of soda and lime appear to cause increase of weight and diminution of cough and expectoration in many cases; thorough counter-irritation of the chest-walls is a very important adjuvant; the wearing of sufficient clothing to protect the body from sudden changes of temperature is not less important. Systematic, and even severe, physical labor benefits some patients, but others appear to be injured by any but the gentlest exercise. Special symptoms, like diarrhœa and night-sweats, will require palliative treatment. Life in the open air is advisable, except in wet and bleak weather. The dry air of the Western plains and of the Rocky Mountain region, the equable weather of Florida, and the dry, sandy soil and balsamic exhalations of the great pine forests of the South, are believed to afford favorable conditions for recovery in many cases. Much depends on the peculiar history and temperament of individual cases, and the proper appreciation of these conditions in any case is likely to tax severely the judgment of even the ablest practitioner.

CHARLES W. GREENE.

**Consumption**, in political economy, the converse of production. Although frequently used by political economists, the word has never had a definite meaning. It may be said that everything which is produced by human labor is to cease in its turn to exist. There is a consumption which may be termed annihilation, and a consumption which is gain or an addition to the wealth of the world. Food is an article of production immediately consumed, but the food of the working man sustains him while he is producing more than he consumes. A thousand dollars spent in building a house produces something which lasts for many years. The same sum spent in raising a wheat-crop will seem to be immediately consumed, but it may have in reality been laid out more beneficially than the

other, through the process of reproduction. If a thousand dollars laid out on land increases its value, and makes it worth eleven hundred, while the wheat raised by the expenditure of the other thousand is sold for fifteen hundred dollars, there is less consumption in the latter expenditure than in the former.

**Contact** [Lat. *contactus*, from *con*, "together," and *tango*, to "touch"]. In geometry, two lines, one of which at least is curved, are said to be in contact when they have a common point, from which they recede in such a way that the deflection of the one from the other will, if a sufficiently small departure be taken, become as small a fraction as we please of that departure.

**CONTACT, ANGLE OF**, the angle made by a curve line with its tangent. It is also called *angle of contingency*, and is equal to the angle of curvature.

**Contagion** [from the Lat. *con*, "with," "together," and *tango*, to "touch"], the transmission, direct or indirect, from one person to another, of disease. If of a given number of healthy persons exposed to association with the sick, a larger proportion becomes ill than is observed among persons not exposed to this cause of disease, it is said to be propagated by contagion. It was formerly called "common contagion" when the disease might possibly arise from some cause other than direct or indirect personal contact; while, if the characters of the disease are well marked, and traceable to no cause except infectious contact, it is said to be due to a specific contagion, which may be in some cases shown to be capable of reproducing the primary disease to an illimitable extent, being conveyed either through the secretions or through exhalations. Contagious diseases are sometimes epidemic, travelling from place to place, but there are epidemic diseases which are by no means contagious. No question in the etiology of disease is more difficult than that of the boundary line between contagious and non-contagious diseases; and, simple as the definition of the term may appear, the nature, conditions, and limitations of contagious influence are as yet almost unknown.

REVISED BY WILLARD PARKER.

**Contarini**, the name of a noble family of Venice that produced numerous doges and senators, of whom the most famous were—**AMBROGIO**, a senator, who was sent as ambassador to the king of Persia in 1473. He returned in 1477, and published in 1487 a curious account of his mission and travels.—**ANDREA**, elected doge in 1367. He gained in 1380 an important victory over the Genoese, and saved Venice from imminent danger. Died in 1382.—**DOMENICO**, elected doge in 1659, waged war against the Turks, who took Candia in 1667 after a famous siege. Died in 1674.—**GASPARO**, a cardinal and writer, was born at Venice in 1483. He was sent as ambassador to the court of Charles V., and was papal legate at the Diet of Ratisbon in 1541. Died in 1542.

**Contempt** [Lat. *contemptus*, from *contemno*, *contemptum*, to "despise"], in law, is a wilful disregard or disobedience of a public authority. By the Constitution of the U. S. each house of Congress may punish its members for disorderly behavior, and with the concurrence of two-thirds expel a member. The power to punish for contempt is also possessed by either house of Congress, as incidental to the complete exercise of the authority granted by the Constitution, and extends to strangers or persons who are not members. This power of punishing for contempt must be exercised during the session of Congress, and the punishment itself cannot extend beyond the existence of the Congress.

**CONTEMPT OF COURT**. Courts of justice have an inherent power to punish all persons for contempt of their rules and orders, for disobedience of process, and for disturbing them in their proceedings. When a person is regularly adjudged to be in contempt he cannot be discharged by another court or judge on a writ of *habeas corpus*. In some of the States the law of contempt is carefully regulated by statute.

**Conti, de** (ARMAND DE BOURBON), PRINCE, born in Paris in 1629, was a brother of the great prince of Condé and a son of Henry II., Prince de Condé, and Charlotte of Montmorency. In the civil war of the Fronde he commanded a royalist army against the prince of Condé. He married a niece of Cardinal Mazarin. Died in 1666.

**Conti, de** (FRANÇOIS LOUIS DE BOURBON), PRINCE, a French general, a son of the preceding, was born in Paris in 1664. He had so high a reputation for valor and other popular qualities that he was chosen king of Poland by a large party in 1697, but Augustus of Saxony obtained the throne. He served with distinction at Steenkerke in 1698, and received the command of an army in Flanders in 1709, but he died Feb. 22, 1709. According to Saint-Simon, he was the "idol of the soldiers and the hero of the officers." (See SAINT-SIMON, "Mémoires.")

**Continent** [from the Lat. *contineo*, to "continues" (from *con*, "together," and *teneo*, to "hold"), because it has an unbroken extent], a large, unbroken tract of land, greater than an island. The portion of the solid crust of the earth rising above the surface of the ocean is divided into six great bodies, the continents, besides innumerable smaller ones, the islands. A continent is not simply a larger piece of land; it has a general structure found in all, but not in islands, and which may be called the continental structure. Moreover, each continent has special traits of configuration and a diversity of climate, plants, and animals which distinguish it from every other, and stamp upon it a real individuality. Every large body of land has a form more or less triangular. North and South America are triangular; Europe, together with Asia, forms another large triangle; and the main body of Africa is also triangular. In Australia alone the square form seems to predominate, though the tendency to the triangular appears when we consider the continent as prolonged to the southern point of Tasmania. This remarkable coincidence in the fundamental form evidently points to a general law of structure which geology may some time discover. In the two Americas and in the southern continents of the Old World the sharper point of the triangle is turned towards the south, in Asia and Europe towards the W. In the Western World, therefore, the greatest extension of land is from N. to S., 9000 miles, passing through all zones of climate, with great changes in plants and animals; in Asia and Europe the land extends about 9000 miles from E. to W. along the parallels, and the temperature and vegetable and animal forms are very similar.

Notwithstanding their resemblance in general form, the outlines of the continents offer striking differences, some being deeply indented with gulfs, bays, inland seas, and projecting peninsulas, while others present a massive form with simpler outlines, without indentations worthy of notice. Carl Ritter has called attention to the vast importance of this kind of configuration to civilization. Such indentations greatly increase the length of the coast-line, and the contact of land and water favors the formation of convenient harbors, opens the interior of the continents to commerce by the paths of the sea, and facilitates communication with the outer world. The sea penetrating into the land moderates the extremes of heat and cold, and gives moisture and fertility. This subdivision of the continents into peninsulas, which make as many peculiar physical regions, secures a richer development by assisting in the formation of distinct nationalities, such as those reared in the great peninsulas of India and Arabia on the Asiatic, and Greece, Italy, and Spain on the European, portion of the great eastern land-mass. In this respect there is among the continents a significant gradation. No other part of the world has so large a number of indentations, compared to its extent, as Europe has. The triangle which makes the body of this continent has three peninsulas on each of its maritime sides—Greece, Italy, and Spain projecting into the blue waters of the Mediterranean; the peninsulas of Bretagne, Denmark, and Scandinavia on the shores of the Atlantic; while the British Isles themselves are hardly less than a projection of the mainland. Numerous indentations are also found in the large Asiatic continent, though not so many in proportion to its size. Arabia, India, Indo-China in the S., on the shores of the Indian Ocean, and China, Manchuria, with Corea and Kamtchatka, in the extreme eastern point of Asia, on the waters of the Pacific Ocean, form a necklace of rich lands surrounding two-thirds, and containing the most valuable portions of its domain. North America, although less indented, still has the peninsulas of Florida and Nova Scotia on the Atlantic; Labrador and Melville Peninsula on its northern Arctic shore; and California and Alaska on the Pacific. In these three continents the gulfs, bays, and inland seas abound correspondingly. In Europe the large peninsular appendages are to the total area of the continent as 1 to 4; in Asia, as 1 to 5.5; in North America as 1 to 14. In Africa, South America, and Australia the waters of the ocean nowhere penetrate deeply into the heart of the continents. The so-called gulfs or bays—like that of Arica in South America, the Gulf of Guinea in Africa, and the great South Australian Bay—are only slight bends in the coasts; and the projection of the Atlas lands and of Cape Guardafui in Africa, and of York Peninsula in North Australia, are hardly to be counted among the true peninsulas. These three continents are trunks without branches, as Ritter expresses himself, or bodies without members; while the northern continents are beautiful trees with trunks and abundant branches, or bodies richly articulated with useful members.

There are upon the entire globe three bands of land and six continents—the two American continents forming one band; Europe and Africa another; Asia and Australia a

third; the last two pairs being clustered together on one side of the globe, the first isolated on the opposite side. As two of the three bands of land, or four continents, are crowded together in the eastern hemisphere, it contains two-thirds, and the western hemisphere only one-third of the lands. The Old World is thus double the size of the New World. (See EARTH.) ARNOLD GUYOT.

**Continen'tal** [originally applied in contradistinction to provincial; belonging to the whole American continent, and not to any one province or colony], a term applied to the money and troops of the revolting colonies during the Revolutionary war. It was introduced in the early part of that contest by the colonists, to distinguish their own forces from those of the British government. The latter were called "ministerial forces," being under the control of the British ministry. The "Continental Congress" was the Congress of the colonies, and after the Declaration of Independence it was the Congress of the U. S. previous to 1788, when the Constitution came into force. It had only one house.

**Continen'tal Sys'tem**, a name given to Napoleon's plan for excluding British merchandise from all parts of the continent of Europe. It commenced with the Berlin Decree (issued by Napoleon Nov. 21, 1806), which declared the British Islands in a state of blockade, and treated as prisoners of war all Englishmen found in the territories occupied by the French armies or by the allies of France. The French government was not able to render this blockade complete. The British ministers retaliated by an "Order in Council," which was issued in Jan., 1807, and prohibited all neutral vessels from entering any port belonging to France or her allies; vessels that violated this order were confiscated if captured.

**Contingency** [from the Lat. *contingo*, to "happen"], a fortuitous event; a casualty. In law, contingency is an event the occurrence of which, though uncertain, is sufficiently probable to be provided for.

**Contin'gent**, fortuitous, occurring without design; in law, depending on an uncertainty. The term is also applied to the quota of troops furnished to the common army by each member of a confederation; the proportion of troops or money furnished by each party to an alliance.

**Contin'ued Frac'tions**, expressions which arise from the approximate valuation of fractions whose terms are large. For example, the ratio of the circumference to the diameter,  $\frac{355}{113}$ , may be represented by the continued fraction—

$$3 + \frac{1}{7 + \frac{1}{15 + \frac{1}{1 + \frac{1}{25 + \frac{1}{1 + \frac{1}{7\frac{1}{2}}}}}}}$$

For convenience, the fraction may be written thus:

$$3 + \frac{1}{7} + \frac{1}{15} + \frac{1}{25} + \frac{1}{1} + \frac{1}{7} + \frac{1}{4}$$

To convert a proper fraction into a continued fraction, divide the denominator by the numerator, and make of the mixed-number quotient a new denominator to the numerator, 1. Proceed in like manner with the fractional part of this new denominator, and so continue as long as the division leaves a remainder, or as long as is necessary for the object in view. If the given fractional number is, as in the foregoing case, an improper fraction, it must first be reduced to a mixed number, after which the above rule applies to the fractional part. F. A. P. BARNARD.

**Continu'ity**, **Law of**, a principle of considerable use in investigating the laws of motion and of change in general, and which may be thus enunciated: *Nothing passes from one state to another without passing through all the intermediate states.* Leibnitz claims the merit of having first made known this law; but, in so far as motion at least is concerned, it is distinctly laid down by Galileo, and ascribed by him to Plato. But, though a perception of its truth seems to have been felt long before, Leibnitz was certainly the first who applied the principle to test the consistency of theories or supposed laws of nature. The argument on which he attempted to establish it *a priori* is, that if any change were to happen without the intervention of time, the thing changed must be in two different conditions at one and the same instant, which is obviously impossible. A remarkable application of the law of continuity was made by John Bernoulli in an "Essay on the Laws and Communication of Motion," which gained the prize of the Academy of Sciences in Paris (1724), to prove that perfectly hard bodies cannot exist, because in the col-

lision of such bodies a finite change of motion must take place in an instant—an event which, by the law now explained, is impossible. This conclusion was objected to by D'Alembert and Maclaurin, who, on account of it, were disposed to reject the law of continuity altogether; but the difficulty is got over by supposing (which on various grounds is extremely probable) that there is no real contact, and that bodies begin to act on each other when their surfaces, or what seem to be their surfaces, are yet at a distance.

**Continuity**, **Principle of** (in math.). See PROJECTION.

**Con'toocook**, Merrimack co., N. H. (see map of New Hampshire, ref. 8-E, for location of county), at the junction of the Concord and Claremont and the Contoocook River R. Rs. It has an academy and manufactures of carriages, lumber, tubs, and woollens. Pop. in 1880, 326.

**Contour'**, in the fine arts, the external lines which bound and terminate a figure. The beauty of contour consists in those lines being flowing, lightly drawn, and sinuous. They must be scientifically drawn, and this cannot be done without a good knowledge of anatomy.

**Con'tra**, a Latin preposition signifying "against," "opposite to;" also a musical term meaning opposite, lower, and applied to the alto and tenor parts when they form the lowest part in harmony. When a part lower than the usual bass is employed, it is called *contra-basso*.

**Con'traband** [It. *contrabando*, from the Late Lat. *contra bannum*, "contrary to proclamation"], in commercial language, goods exported from or imported into a country against its laws. *Contraband of war* are such articles as a belligerent has by the law of nations the right of preventing a neutral from furnishing to his enemy. Articles contraband of war are, in general, arms and munitions of war and those out of which munitions of war are made. All these are liable to be seized; but very arbitrary interpretations have been affixed to the term by powerful states when able to enforce them by arms. Thus, provisions have been held to be contraband of war when it is the object of a belligerent to reduce his enemy by famine. Where the primary use of goods is military, they would seem to be plainly contraband; where the use is of a doubtful character, and they are suited either for a state of war or peace, their character leaves open an inquiry as to the objects of the shipment and the use to which the goods may be put. The act of carrying contraband goods is not, in general, good ground for confiscation of the ship; the contraband goods only are subject to seizure. The uncertainty respecting the law concerning this whole subject is due to the natural conflict between the necessities of war and the laws of trade. The remark of Calvo appears to be justified, that international law has not yet been able to establish a rule universally accepted and respected concerning the distinctive character of contraband of war. The act of carrying despatches to or for a belligerent, or the act of transporting his ambassadors in a neutral vessel, has given rise to grave discussions involving principles resembling those applied to contraband, though requiring separate consideration. Such acts may become serious violations of the law of nations, substantially identifying the neutral with the belligerent, and subjecting his ship to confiscation by the opposing party to the war. A question of great magnitude arose in the recent civil war in the U. S. in connection with the seizure by an American officer of the Trent, an English ship, then engaged in carrying Messrs. Mason and Slidell, ministers of the insurgents, to a neutral country. The result of the controversy was an assumption by both parties to it that the law of nations does not allow a belligerent at sea to take into his control, from a neutral vessel, such persons. The regular course is to have the ship brought before a prize court of the captor for condemnation. It is, however, claimed by some writers that there is ground for maintaining that a belligerent may take noxious persons, such as military men belonging to the enemy, from a neutral vessel without any prize proceedings, and after their removal release the ship. The exercise of such a right, if it exist, is so delicate and likely to cause irritation on the part of the neutral, that it seems to demand regulation by treaty. (Consult WHEATON, KENT, CALVO, and other text-writers. See INTERNATIONAL LAW No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.) REVISED BY T. W. DWIGHT.

**Contrabands** was the name and the plea under which fugitive negro slaves were received and retained by the Union army during the civil war. It originated from Gen. Butler. The day after his arrival at Fort Monroe, a sally was made into Hampton, and three negroes held as slaves by Col. Mallory of that place escaped into the Union lines. They were brought before Butler, who was very much in need of laborers for field-works he was about to construct. When asked what he would do with the runaways, he answered, "Keep them as contrabands."

**Contract** [Lat. *contraho*, to "draw together"], an agreement in which a party undertakes to do or not to do a particular thing. Contracts are distinguished, according to their form, either as contracts of record, specialties, or simple contracts. Contracts of record are such obligations as are evidenced by judicial records, as, for example, recognizances and judgments. (See these titles severally.) Specialties are contracts under seal, such as deeds, bonds, and covenants. Simple or parol contracts include those agreements which are not comprised within the first two classes, and may be either oral or in writing. As regards the mode of their creation, contracts are further distinguished as express or implied. They are express when stated by the parties thereto consenting in direct and formal terms; implied, when they derive their origin and validity from construction of law, as being of such a nature that reason and justice dictate their fulfilment. Contracts are still differently classified in reference to the time of their performance, as executed and executory. They are said to be executed when the obligations therein created have been already carried out; executory, when their fulfilment is yet to be accomplished. Contracts of every variety include four essential constituent elements: First, there must be appropriate parties; second, there must be mutual consent to the terms of the agreement; third, there must be a valid consideration, either actual or presumed; and, fourth, there must be a definite subject-matter to be acted upon. As regards the first point, all persons are capable of binding themselves by their contracts except certain important classes of individuals who labor under some natural infirmity, either from want of sufficient age (as infants), or from lack of requisite mental soundness (as idiots and lunatics), or who are placed arbitrarily under disability in consequence of their legal status (as married women). Drunkards, seamen, aliens, and bankrupts are also incapacitated in certain instances. Infancy at law is the condition of persons under the age of twenty-one, though in some States females are considered to arrive at majority at eighteen. It is a general principle, though subject to exceptions, in accordance with modern judicial decisions, that an infant's contracts are not void, but voidable; *i. e.* they may be confirmed or disavowed by him, either, in some instances, before majority, or, in all cases, within a reasonable time afterwards. The chief important exception to this rule is an infant's contracts for necessities, which are considered binding upon him. The import of the term "necessaries" is not invariable, as different articles would be comprised within the designation according to the wealth and station of various persons. The validity of these obligations is established for the same reason that others are considered voidable—that the infant's welfare may be ensured until he arrives at years of discretion. Moreover, the contract of marriage may be entered into by males at the age of fourteen, and by females at the age of twelve, unless there is some statutory provision to the contrary. Idiots and lunatics are relieved from responsibility for their contracts, because they are incapable of understanding the nature of the promises they make, and of giving a valid assent. But it is likewise true of them, as of infants, that contracts for necessities suitable to their station, if entered into with other parties who act in good faith, are obligatory. Insane persons may also have lucid intervals, and would be liable for agreements made under such circumstances. Temporary mental weakness resulting from intoxication will relieve from liability when it is sufficient in degree to preclude reasonable action, and is not contracted purposely to defraud others. Mere mental feebleness, however originating, which is not so excessive as to prevent a comprehension of the nature of a contract, will be no ground of exemption unless a person affected by it is led into a contract by imposition. Married women, at common law, are placed under an almost entire inability to contract. Their legal existence is deemed to be merged in that of their husbands. In some instances they have power to bind their husbands, as when they act as agents or make engagements for necessities which their husbands refuse to supply; but agreements of this kind are not their own personal obligations. Courts of equity and recent statutory provisions have considerably extended the powers of married women to enter into engagements which will be binding upon their property. This result in equity has been accomplished through the medium of trusts. The incapacity of aliens extends mainly to their ability to acquire a valid title to real estate, and in some States has been removed. Seamen are relieved, in certain instances, from their stipulations, to protect them from the consequences of their own improvidence; while the engagements of bankrupts are in some instances nullified to prevent injury to their creditors. Persons who are forced into contracts by duress, either through imprisonment or reasonable fear of injury to life or limb, are excused from their fulfilment.

As regards the nature of the obligations which they assume, parties to contracts may act either severally or jointly, or jointly and severally. When any joint liability exists, as in the last two instances, and one of the parties discharges it by paying more than his share of the indebtedness, he may, under the notion of an implied contract, recover from the others their just proportion. This is termed "contribution." It rests on a doctrine of natural justice, and is more completely enforced in a court of equity. The right to enforce agreements against others may also be either several or joint; that is, it may inhere in a single individual or in two or more collectively. No right of this kind, however, can be both joint and several at the same time, and in this respect it differs from the corresponding liability. Parties may also act on their own behalf, or in a representative capacity as agents or partners. For the purpose of making a contract, a corporation, however numerous its members may be, is regarded as a single person. The second element of contracts, assent, is necessarily implied in the term "agreement"—a meeting of minds. Assent must be mutual, and have reference to exactly the same stipulations. There must not only be a proposal, but an acceptance, and if any modification in the terms of the original offer is made by the party by whom it is received, no contract is established. The entire concurrence of all the parties concerned is indispensable. Such proposed change would be, in itself, a new offer, which would need acceptance. It is not necessary that a proposal when made should be acceded to at once. An offerer may contemplate a continuance of the offer for a certain definite or understood period, within which assent may be expressed by the offeree and a valid contract created; or an offer to enter into an agreement may be sent to a person at a distance, who must reply by mail. In cases of this kind the contract, according to the prevailing opinion, though with weighty dissent, is deemed to be completely formed from the time when the letter of acceptance is posted, without regard to the fact of its being received.

The element of consideration is that which gives contracts a legal, as distinguished from a moral, validity, for, as a rule, promises are not enforceable in law which do not rest on such a basis. The consideration is the cause of a contract, the return for a stipulation, the price for a promise. It may be something actually rendered, as is requisite in nearly all simple contracts, or its existence may be conclusively presumed, as in negotiable paper which has passed into circulation, and in contracts under seal. The care and deliberation with which the latter are usually formed are considered a sufficient substitute for an actual consideration. In the case of negotiable paper, a proper consideration will only be conclusively presumed when it is necessary to protect the interests of innocent, unsuspecting third parties into whose hands the paper has passed before maturity. The requisites of a valid consideration are that it shall either be some benefit to the party promising or some disadvantage or injury to the party to whom the promise is made. Considerations are distinguished as good or valuable. The former term is applied to inducements of relationship and natural affection; the latter, to some mode of making return which is either directly pecuniary or estimable pecuniarily through its probable consequences in occasioning profit or loss. Marriage also is included within this latter designation. A good consideration will only support an executed contract, and then simply between the parties themselves. As illustrations of a valuable consideration may be mentioned the payment of money, the performance of work, the forbearance to sue, the delivery of property, the making of a promise for a promise, and the like. In such cases it is not necessary that the consideration be an equivalent for the agreement made. A moral obligation will constitute no legal consideration for a promise, except in cases where there has been a pre-existing legal obligation which is no longer enforceable in a court of justice, as where a debt has existed, but is barred by lapse of time under the provisions of statutes of limitation. If a consideration be illegal or impossible, the contract founded upon it will, in consequence, be rendered nugatory. Considerations are also distinguished, as regards the time of their fulfilment, as executed, executory, and concurrent. They are said to be executed when performed before the promise founded upon them is made, and are insufficient to support such promise unless they grew out of a previous request, since the agreement cannot be the reason of their accomplishment; executory, when they are to be performed in the future; concurrent, when they and the promises based upon them are simultaneous. The last two forms of consideration are sufficient to support all agreements otherwise unobjectionable.

The general principle in regard to the subject-matter of contracts is, that parties may enter into agreements of any character they may choose. Certain important exceptions

are, however, established on grounds of public policy. Thus, the subject-matter must not contemplate any illegal or immoral undertaking. Such agreements are necessarily nugatory, and if attempted to be enforced their illegality may be alleged as a valid defence. But when the terms of the parties' stipulations are not thus contravened, it is the object of the courts to arrive at the exact meaning of the language employed as expressing the intentions of the persons contracting, and to enforce all unfulfilled obligations thence resulting. For this purpose certain definite rules of interpretation and construction have been established, which are adapted to remove ambiguities and resolve uncertainties. These are principally applicable to agreements in writing. If the application of these shows a comprehensible agreement, and no defences alleged prove its invalidity or that its terms have been satisfied either wholly or in part, an adequate remedy will be given for its violation. In courts of law this consists of pecuniary recompense or damages for the injury sustained, while courts of equity, in proper instances, will decree a specific performance of the engagements undertaken.

Certain contracts are required to be in writing, for the better prevention of fraud and convenience in proving their stipulations. This requirement depends upon the so-called "statute of frauds." The principal classes of agreements within its provisions are contracts made upon consideration of marriage, contracts to answer for the debt, default, or wrongful act of another, contracts which are not to be performed within one year, contracts for the sale of any interest in land, and contracts for the sale of personal property of a specified value—usually fifty dollars and upwards. In all these cases the agreement, or some memorandum thereof, when written, must also be signed, or in some States subscribed, by the party charged therewith or his agent. In the sale of goods, the delivery by the seller and the acceptance by the purchaser of a portion of the goods will render a reduction of the contract to writing unnecessary.

The remedy upon contracts by action at law is confined by "statutes of limitations" within certain prescribed periods after their maturity. The provisions generally made are that no action can be brought upon a simple contract after the lapse of six years, or upon sealed instruments after twenty years, from the time when they become due. (See LIMITATIONS, STATUTES OF.) Important and difficult questions also arise as to the effect of the laws of different States upon contracts when obligations are assumed in one country and sought to be enforced in another (for which see INTERNATIONAL LAW, PRIVATE, and MARRIAGE).

The Constitution of the U. S. provides that "no State shall pass any law impairing the obligation of contracts." Much discussion has arisen upon the effect of this prohibition. It has been decided that it applies as well to executed contracts or grants as to those which are executory. Not only agreements between individuals, but with States, as the charters of corporations, confer privileges which are inviolable, unless there is some prior reservation of a power to make alterations. An exception is, however, established in the case of municipal corporations, which are considered mere instruments of government, and continually subject to legislative authority. Moreover, contracts by which States undertake to resign necessary governmental functions are not generally deemed unchangeable by subsequent legislation, though an exception to this rule has been established in the case of taxation. A deprivation by a State of all remedy to enforce contracts is held to be an impairment of their obligation, and therefore unlawful; this is not true, however, when, on a change of remedies, one that is substantial and sufficiently convenient remains or is supplied.

(Reference must be made for different forms of contracts to such topics as AGENCY, BILLS OF EXCHANGE, PARTNERSHIP, SALE, GUARANTY, BAILMENT, SHIPPING, INSURANCE, etc., and for defences to PAYMENT, PERFORMANCE, ACCORD, AWARD, RELEASE, SET-OFF, USURY, etc., etc. Convenient books of reference are the works of PARSONS, ADDISON, CHITTY, HILLIARD, METCALF, SMITH, STORY, POTNIER, "On Obligations," KENT's "Commentaries," and DOMAT, "On Civil Law.") T. W. DWIGHT.

**Contractility** [Lat. *contractilitas*, from *con*, "together," and *traho*, *tractum*, to "draw"], a property by which the particles of some bodies resume their original position when the force applied to separate them is withdrawn; also the vital property which gives to certain parts (muscles, for example) the power of contracting, by means of which animals perform their motions. Contractility, in the latter sense, is a property confined to living organisms. It is not peculiar to animals, but is shared by the vegetable kingdom; being, among plants, most apparent, as a rule, in the protophytes, which are microscopic plants of a low grade. Among the lowest forms of animals the whole substance of the organism usually possesses contractility, but

in the higher animals this property is, by differentiation, limited more or less completely to the organs called muscles. But such motions as those of cilia are common to both the vegetable and the animal kingdoms; and among animals are common to man as well as to the protozoan. The existence of this important class of motions shows that in no organism is contractility entirely limited to the muscles. Contractility in such cases is quite independent of any will or self-determining power. But at a very low point—if not at the very lowest—in the animal scale we begin to find signs of a self-determining power, or will, residing within the organism, and having a certain degree of control over that contractile quality of the tissues. Upon the exercise of this control depends the power of voluntary motion. Contraction of a muscle may indeed be quite independent of volition or consciousness, as in the beating of the heart and in all motions of non-striated muscles. But all organic motion or contractile action appears to depend upon some stimulus, whether it be the mysterious nervous force or the not less mysterious influences called heat and electricity. The immediate cause of muscular contraction is quite unknown. The theory, that it depends solely upon the oxidation of muscular tissue, is quite exploded. It is now held by many theorists that oxidation of non-organized blood-plasma within the capillaries of the muscles is one of the causes of muscular contraction, and that this oxidation liberates heat, which by the nervous influence is transmuted into kinetic energy. Electricity also appears to have intimate relations with some forms, at least, of organic contraction.

**Contrac'tion** [for etymology see CONTRACT], the act of contracting or reducing to a smaller volume; the reverse of EXPANSION (which see). In grammar, the abbreviation of a word, the reduction of two syllables into one by the omission of a letter or letters, as *can't* for *cannot*.

**Contraction**, in surgery, is the diminution or obliteration of the calibre of any hollow vessel, and is more frequently called STRicture (which see). But frequently contraction denotes the permanent shrinkage in bulk (of an organ), in area (of a surface), or in length (of a muscle, tendon, or other elongated part). Contraction may result (1) from acute inflammation, with the formation of neoplasms; the latter afterwards degenerating, or rather drying up, into ordinary connective tissue, which occupies less than the space of the original intrusive tissue. This is well illustrated in the case of burns which destroy much skin: the scar contracts, and often causes shocking deformity. Yet it is the result of a process which is essentially reparative, and which is necessary to the recovery of a healthy condition. (2) From nervous irritation, direct or reflex. Thus, the pain of a severe accident to the ankle has been known to be immediately followed by permanent strabismus. (3) From paralysis. Thus, when only one of a pair of antagonistic muscles loses its functional contractility, the other by its normal exercise may produce a permanent deformity.

**Contra'to**, an Italian word, is a term used in vocal music to denote the part immediately below the treble, formerly called also the *counter-tenor*. It is often popularly called *alto*.

**Con'trast**, opposition of things or qualities. In the fine arts, contrast is an opposition of lines or colors to each other, so contrived that the one gives greater effect to the other. By means of contrast, energy and expression are given to a subject even when employed on inanimate forms. All art indeed may be said to be a system of contrasts; lights should contrast with shadows, figures with figures, and groups with groups. It is this which gives life, soul, and motion to a composition.

**Contravalla'tion** [from the Lat. *contra*, "against," and *vallum*, a "rampart"], in fortification, an intrenchment formed by the besiegers between their camp and the place besieged, to secure themselves and check the sallies of the garrison. The line of *contravallation* is thus, as the name implies, a sort of counter-fortification.

**Contrayer'va** [Sp. *contrayerba*, a "counter-herb" or "antidote"], a drug once in repute as a diaphoretic and stimulant, derived from the root-stocks of four different species of *Dorstenia*, of the order Urticaceæ. The genus is remarkable for the roughly quadrangular receptacle on which the numerous small flowers appear; the staminate flowers in shallow depressions, the pistillate flowers in deeper ones. *Dorstenia Contrayerva* is a perennial Mexican herb with irregularly-lobed leaves. *Dorstenia Houstonia* and *Dorstenia Drakena* also grow in Mexico. The root-stock is about half an inch thick, sending out on all sides many slender fibres covered with small knots. It has an aromatic odor, and a bitter, astringent taste. *Dorstenia Brasiliensis*, a stemless species, with heart-shaped leaves and a circular receptacle, a native of the West Indies and



Brazil, furnishes much of the *contrayerva* of commerce. These plants have been represented as efficacious for serpent bites, and hence the name *contrayerva*, an "antidote," like our "snake-root," is given to many different plants.

**Contre'ras**, a battle-field 14 miles S. of the city of Mexico. The battle was fought Aug. 19 and 20, 1847, between the U. S. forces of Gen. Scott and the Mexican division of Gen. Valencia. (See *CHURUBUSCO*.)

**Contreras, de** (JUAN SENEN), a gallant Spanish general, born in 1760 at Madrid, entered the Spanish service in early youth, and in 1727 visited France, England, and Germany on public affairs. In 1788 he fought against the Turks. In 1795 he began to serve against the French. He fought at Talavera in 1809; as a captain-general he defended Tarragona obstinately, but without success. He was taken prisoner and sent to France in 1811, escaped in 1812, returned to Spain in 1814, and died in his native city in 1826. He wrote several books, chiefly military.

**Contribution** [Lat. *contribuo*, to "impart mutually"], in common law, an obligation imposed upon several persons who are under a common duty, or who own estates subject to a common burden, to share between them the charge of performing the duty of relieving their property of the burden. It is emphatically a rule of equity jurisprudence, and an illustration of the familiar maxim that "equality is equity." The illustrations of it are numerous. Such instances may be cited as general average in the law of shipping; the case of co-sureties, including insurers; that of owners of parcels of land subject to a single mortgage or other lien, where there are no special reasons for casting the burden of payment on one owner more than another; of joint debtors, etc. Contribution is sometimes exacted in a court of law on the theory of an implied contract, but the remedy is not so complete as in equity. It is usually said that there is no contribution among wrong-doers. This proposition must be received with some qualification, for while the rule must be rigidly applied to wilful wrong-doers, and perhaps to such as are guilty of negligence, it could not be properly extended to persons who, acting in good faith, commit a technical wrong, as, *e. g.*, to sureties who execute a bond of indemnity to a sheriff to secure him against the consequences of a trespass in selling property which he has reasonable grounds for supposing belongs to a debtor against whose property he has an execution, while it turns out that the property does not belong to the debtor. T. W. DWIGHT.

**Contrition** [Lat. *con*, intensive, and *tero*, *tritum*, to "rub," to "wear away" by rubbing], in ordinary usage, denotes thorough repentance for sin. In the Roman Catholic Church contrition (*contritio cordis*) is the complete sorrow and utter detestation which the penitent feels for past sin, joined with the purpose to sin no more. Contrition, confession, and satisfaction are essential parts of the sacrament of penance. ("Canons of Trent," s. xiv., c. 4.) But some, with Dens ("Theol.," vi., 51), hold that *attrition*, or imperfect repentance, joined with confession, satisfaction, and absolution, is sufficient. Others teach that attrition is but a step leading towards contrition.

**Control'ler** (originally written **Comptroller**), [Fr. *contrôleur*], an officer appointed to control or supervise the accounts of other officers, and to certify whether the matters confided to his care have been controlled or examined. The minister of finance in France was formerly called *contrôleur-général*. In the State of New York a controller is elected by the people. His title is written **COMPTROLLER** (which see).

**Contumacy** [Lat. *contumacia*, from *con*, intensive, and *tumeo*, to "swell" (with pride)], in civil and ecclesiastical law, a wilful disobedience to any lawful summons or judicial order. In a criminal process contumacy is punished by a sentence of fugitation; in a civil process the only consequence is that the case will be proceeded with and a decree pronounced against the contumacious party.

**Convent** [Lat. *conventus*, from *con*, "together," and *venio*, *ventum*, to "come"], literally, a "meeting"; a religious house inhabited by a society of monks or nuns, or, more strictly, the society itself. But in exact language the term "convent" designates a meeting (*conventus*) of all the members of a religious community, or, more properly, of those who can vote in the assembly. These voters are called "conventuals," though the latter term is often used in other senses. On certain questions it is customary in some congregations to assemble the convent either for the counsel to be obtained from the brethren or for their consent to some ordinance. All the abbots of a congregation may be called upon in like manner to meet in a "provincial" or "general convent." (See *MONACHISM*.)

**Con'vent**, capital of St. James Parish, La. (see map of Louisiana. ref. 10-E, for location of parish), on left bank of Miss. River, about 50 m. W. of New Orleans. P. not given.

**Con'venticle** [Lat. *conventiculum*, a diminutive of *convetus*, a "meeting"], a term originally applied to a cabal among the monks of a monastery, formed to secure the election of a favorite as abbot. It was given to the assemblies of Wickliffe's followers as a term of reproach, and was afterwards applied to the meetings of the English and Scottish non-conformists. Severe laws were passed for the suppression of conventicles. The most celebrated is that of 1664, passed by the British Parliament, which forbade persons over five in number and over sixteen years of age, unless of one family, to meet for domestic or social worship. For the first offence the leader and the occupier of the premises received three months' imprisonment or were fined five pounds. The second offence was followed by twofold punishment. Married women found at a conventicle were imprisoned one year, unless their husbands paid a ransom of forty shillings sterling. The third offence was punishable by transportation or by a mulct of £100 sterling. No jury was required for the trial, and a justice of the peace might enforce the act upon the testimony of one person. This act was modified in 1670, and repealed in 1689. An act of Elizabeth's reign (1593) made the frequenting of conventicles punishable by imprisonment and death.

**Convention** [from the Lat. *con*, "together," and *venio*, *ventum*, to "come"], a term applied in political language to assemblies of national representatives meeting on extraordinary occasions without being convoked by the legal authority. (See *CONVENTION-PARLIAMENT*.) In French history the name convention is applied to that assembly which met after the legislative assembly had pronounced the suppression of the royal functions (Sept., 1792), and proclaimed the republic at its first sitting. This body dissolved itself on the establishment of the Directory in Oct., 1796. The Scottish assembly which met on the flight of James II. of England was entitled the Convention of Estates. In the U. S. meetings of representatives specially chosen by the people of separate States to revise and amend the State constitutions are termed State conventions.

**CONVENTION**, in the language of diplomacy, is generally synonymous with treaty, with the vague distinction that a convention relates to a few or unimportant or non-political points. Contracts between belligerents as to certain rules to be adopted on both sides in carrying on the war are technically termed general conventions. Treaties between the pope and Protestant powers have been often termed conventions.

**CONVENTION**, in military affairs, a treaty between military commanders concerning terms for a temporary cessation of hostilities, generally between a victor and a defeated general for the evacuation of a district or position by the latter. The two most celebrated conventions of modern times were that of Closter-Seven (1757), between the dukes of Cumberland and Richelieu, and that of Cintra (1808), between Junot and the English generals.

**CONVENTION, CONSTITUTIONAL.** See *CONSTITUTION*, by PROF. T. W. DWIGHT, LL.D.

**Conven'tion-Parliament**, in Great Britain, a parliament convened without the authority of the sovereign, when the crown is in abeyance. As parliaments have no right to assemble without royal authority, the acts of convention-parliaments must afterwards be ratified by a parliament summoned in accordance with the provisions of the constitution. Two convention-parliaments have occurred in English history—the first, that which met in April, 1660, and restored Charles II. to the throne, the Lords assembling by their own authority, and the Commons by virtue of writs issued in the name of the keepers of the liberties of England, by the authority of Parliament; the second, that which met in 1688, each house by its own authority and on the summons of the prince of Orange, and declared that King James II. had abdicated the crown, which was transferred to William and Mary. (See *CONVENTION*.)

**Conver'gent Fraction**, the ordinary fraction which is equal to any portion of a continued fraction obtained by neglecting all that follows any particular quotient. Thus,

$$1; 1 + \frac{1}{2} = \frac{3}{2}; 1 + \frac{1}{2 + \frac{1}{3}} = \frac{10}{7}; 1 + \frac{1}{2 + \frac{1}{3 + \frac{1}{4}}} = \frac{43}{30}, \text{ etc., are}$$

three successive convergents of  $1 + \frac{1}{2 + \frac{1}{3 + \frac{1}{4 + \frac{1}{5}}}}$ , etc.

To obtain the numerator (or denominator) of any convergent corresponding to a certain quotient, multiply the numerator (or denominator) of the preceding convergent by that quotient, and to the product add the numerator (or denominator) of the next preceding convergent; thus  $43 = 10 \times 4 + 3$ ;  $30 = 7 \times 4 + 2$ . F. A. P. BARNARD.

**Converging Series**, in mathematics, a series in which each term is less than the term next preceding. Thus, the

geometrical series descending,  $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$ , etc., is a convergent or converging series. An infinite series is said to be convergent when, however many of its terms may be added together, the sum never exceeds numerically some finite quantity. On the other hand, it is said to be divergent when by adding a sufficient number of terms a sum can be obtained which numerically exceeds any given finite quantity, however great. A series is not necessarily convergent when its terms continually decrease in magnitude. If, however, besides decreasing numerically, the terms have alternate signs, the series will be convergent; thus,  $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8}$ , etc. A series will be convergent if the quotient obtained by dividing each term by the preceding one is numerically less than some assignable proper fraction, or if this property obtains from and after a certain term. On the other hand, the terms being all of the same sign, the series will be divergent if the quotient in question is equal to or greater than unity. This test of convergency and divergency cannot be always applied, and recourse must be had to others. For instance, the ratio of the  $n^{\text{th}}$  term to the  $(n-1)^{\text{th}}$  term of the series  $1 + \frac{1}{2} + \frac{1}{3}$ , etc.

being  $\frac{n-1}{n}$ , is always less than 1, but no proper fraction

can be assigned than which it is always less, for it approaches unity without limit as  $n$  increases. The series is in fact divergent; for the third and fourth terms are together greater than  $\frac{2}{3}$ ; the four following terms are greater than four times the last, or  $\frac{4}{5}$ ; the eight following terms are together greater than  $\frac{8}{9}$ , and so on; so that the whole series has a greater sum than  $1 + \frac{1}{2} + \frac{1}{3} +$ , etc., which is manifestly divergent. (See CAUCHY, "Cours d'Analyse.")

F. A. P. BARNARD.

**Conversa'no**, a town of Italy, province of Bari, 20 miles S. E. of Bari, is defended by a Norman castle, has a cathedral, bishop's palace, and several convents. Pop. 9731.

**Conversion** [from the Lat. *con*, intensive, and *verto*, *versum*, to "turn"], in metallurgy, the process by which steel is produced from iron or from iron carbide (cast iron). Iron is converted into steel by long heating in contact with carbon. Cast iron is converted by "puddling," or by the well-known process of Bessemer. The theory in both cases is the same—viz. to oxidize the excess of carbon in the carbide, and so remove it in the form of carbonic acid gas.

**Conversion in Logic.** See Logic.

**Conversion**, in law. This word has two significations: 1. In equity jurisprudence it means the theoretical change of land into money or money into land. The will of an owner of property thus to change it, expressed in legal forms, is in some instances equivalent to an actual change, as where a testator directs his land to be sold and converted into money. It is deemed to be sold from the moment of his death, and to have the qualities of personal property. This is termed *equitable conversion*. 2. In the law-courts the word "conversion" is applied to an unauthorized exercise of acts of ownership over the personal property of another. It is deemed to be a wrong or "tort," and the owner of the property may either reclaim it or treat the wrong-doer as having become owner and recover the value of it. Conversion lies at the foundation of the common-law action of trover, which word is derived from the French word *trouver*, to find. There is a legal fiction that the defendant found the plaintiff's property and converted it to his own use. The material part of the case is the conversion. To constitute a case of conversion it is not necessary that there should have been any intent to deprive the owner of his interest. It is enough if there were an intent to appropriate the goods or to exercise an act of ownership over them, even though that were done in entire ignorance of the owner's right. Thus, if an auctioneer should sell stolen goods, not knowing of the theft, he would be deemed to have converted the goods to his own use. As the intent is a main ingredient in the case, it has been considered that a mere trespass, or an accidental loss of property by a carrier, or the use of property as an act of kindness to the owner without any intent to convert it, does not amount to a conversion. There is an important distinction between the case where the original taking of the goods is lawful and where it is not. In the former case there must in general be a demand and a refusal before the conversion takes place. Thus, if I lend a book to another to be returned on request, there is plainly no conversion until I demand it and there is a refusal to return it, since until that time there is no exercise of ownership. When the original taking is unlawful, no demand is necessary. The better opinion is, when an action is brought for conversion, that the title to the chattel does not pass to the wrong-doer by mere force of the judgment of the court, but that there must be actual satisfaction of the judgment on his behalf.

T. W. DWIGHT.

**Conver'ter**, in metallurgy, the receptacle used to hold the iron or carbide of iron which is subjected to the process of conversion into steel. The Bessemer converter is a large, approximately spherical vessel, lined with fire-clay or brick, the bottom of which is perforated with many holes, through which a powerful blast of air is driven during the process. The vessel is suspended on pivots, and controlled by a hydraulic apparatus; by means of which, when the appearance of the escaping flame shows that the process is complete, it is turned over, and the liquid steel is received into moulds.

**Convey'ance**, in law, is a deed transferring property from one person to another. In the transference of personal property the term, though strictly applicable, is not generally used.

**Con'vict** [from the Lat. *con*, intensive, and *vinco*, *victum*, to "conquer" or "overcome," in allusion to the culprit being completely overcome or overwhelmed by the proofs brought against him], a term applied to a person proved guilty of a crime. The name came by custom to be applied to persons subject to punishment for the more serious class of offences; of late its meaning has been often restricted in Great Britain to criminals who were transported to the distant colonies. Criminals condemned to penal servitude for longer or shorter periods are termed convicts under penal discipline; offenders sentenced to short periods of detention in the ordinary jails are called prisoners. The system of transportation to New South Wales was suspended in the year 1840. In France, however, transportation of convicts still prevails, especially in the case of political offenders. Among the penal colonies of France are Cayenne and New Caledonia. The true result of the convict system, however, is not yet fully ascertained.

**Convoca'tion** [from the Lat. *con*, "together," and *voco*, *vocatum*, to "call"], a meeting of the clergy of the Church of England to discuss ecclesiastical matters in time of Parliament. There is one convocation for the province of Canterbury, and one for the province of York, but the voice of the latter is only a feeble echo of that of the former. Each convocation has two houses—the upper consisting of bishops, and the lower of deans, archdeacons, and prebends. Acts of convocation were formerly of great importance in the canon law, but since the time of Henry VIII. they have no force when opposed to statute law. The convocations have been recently revived, but with little or none of their ancient importance. There is an Irish convocation, with even smaller powers than those of the English Church.

**Convolvula'cææ** [from *Convolvulus*, one of the genera], a natural order of exogenous plants which mostly have twining stems and a milky juice. It comprises nearly 700 known species, many of which are natives of tropical countries, and have beautiful flowers with five stamens. The corolla is monopetalous, and the fruit a capsule. The roots of some species possess purgative qualities, as jalap (*Exogonium Purga*). Among the valuable products of this order is the sweet potato. Some of the species are cultivated for the sake of the flowers, as the *Ipomœa purpurea*, or morning glory, a native of tropical America.

**Convol'vulus** [from the Lat. *con*, "together," and *volvo*, to "roll"], a genus of plants of the natural order Convolvulacæ, containing many species, herbaceous or shrubby. The stems are usually twining, the flowers often large and of various beautiful colors; calyx 5-parted, corolla monopetalous, with regular 5-lobed and plaited limb; five stamens; the ovary free, with one to four cells and few ovules; the fruit a capsule somewhat succulent. Some are cultivated as ornamental plants. The *Convolvulus Scammonia* yields scammony. *Convolvulus scoparius*, a shrubby species, native of the Canary Isles, yields the "oil of rhodium" and one of the kinds of wood called rosewood, which has an odor somewhat like that of roses. The original genus is for convenience divided into several sub-genera. Most of the genuine species belong to the Old World. The showy morning glories, etc., chiefly American, belong to *Ipomœa*.

**Con'voy** [Fr. *convoy*, from *convoyer*, to "carry" or "conduct"], a name given to one or more ships of war employed to protect a fleet of merchant-vessels against an enemy in time of war or against pirates. If a ship part company with the convoy or neglect to obey the signals, all claims for insurance are forfeited. (See INTERNATIONAL LAW No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

**CONVOY**, in the military service, is a train of wagons laden with provisions or warlike stores, or a detachment of troops appointed to guard such a train.

**Convul'sion** [from the Lat. *convello*, *convulsus*, to "pull violently"], (synonyms *Eclampsia*, *Acute Epilepsy*), an acute nervous affection occurring in paroxysms, during which the patient loses consciousness, the muscles of the body are spasmodically contracted, and the limbs first stiff-

fened and twisted, then agitated by irregular involuntary movements. The face is distorted, the eyeballs rolled upward, the teeth clenched, biting the tongue, which protrudes at the beginning of the attack. Respiration is arrested by the stiffening of the chest-muscles and by closure of the glottis; the patient grows black in the face, and froth oozes from the mouth, and sometimes from the nostrils; the veins of the neck swell. After some time the muscles relax again, respiration is restored, the agitation of the limbs ceases, the patient either returns entirely to consciousness or falls into a heavy sleep, which may last several hours. The appearance and the nature of the attack are the same in the convulsions of epilepsy and in the so-called eclamptic convulsions of children or of women in childbirth. They may result from any cause that first irritates and then suddenly abolishes the functions of the brain and spinal cord. Convulsions occur, therefore, in diseases of the nervous centres; in diseases of other organs of the body, that transmit irritation to these centres; finally, in morbid conditions of the blood which interfere with their nutrition. Under the first head may be mentioned congestion or anæmia (bloodlessness) of the brain, inflammations, tumors, finally premature ossification of the bones of the head, by which the brain becomes subject to abnormal pressure. In other cases more obscure there seems to exist in the brain and cord a congenital susceptibility to irritation, and consequent exhaustion of functions, so that the most trifling circumstance may occasion a convulsion. It is then that are observed the convulsions of hysteria and of epilepsy. The latter is only distinguished by the constitutional tendency that persists during the intervals of the attacks, and suffices to cause their removal. The hysterical convulsion, however, offers some peculiarities, and consciousness, though perverted, is not abolished, the interference with respiration is less complete than in typical eclampsia, and leads to involuntary laughing and crying; there is no lividity of the face or frothing at the mouth; the return to consciousness is immediate, without the transition stage of heavy sleep. Neither the irregular convulsive movements of chorea ("St. Vitus' dance," "clonic" muscular contractions) nor the rigidity of tetanus ("tonic" muscular contractions) are sufficient to constitute a convulsion, in which the two forms of muscular contraction are combined, the last occurring at the beginning, the first at the end of the attack.

Convulsions dependent on transmitted irritations occur principally in children. They may occur spontaneously, owing to a congenital predisposition by which normal physiological processes become irritating, or they may be excited by inflammation of the gums in dentition, by indigestion, by worms, by the invasion of acute diseases, as pneumonia or eruptive fevers; by some accidents, as extensive burns. Women in childbirth are liable to convulsions of a similar character, which may be excited by the mere act of parturition. This dangerous complication (puerperal eclampsia) is more frequently, however, associated with an alteration of the blood that is liable to occur during pregnancy, and due to transient kidney disease (nephritis). The kidneys act imperfectly, and hence part of the elements of the urine that should be secreted by them are retained in the blood, poisoning it, while at the same time part of the albumen of the blood passes off in the urine. These convulsions are therefore called albuminuric or uræmic, and afford most striking illustrations of the morbid influence of altered blood upon the nerve-centres. They occur also in genuine nephritis or Bright's disease, and in that which often complicates the second and third stages of scarlet fever. Various mineral or narcotic poisons introduced into the blood have a similar effect to uræmia in causing convulsions. Finally, a great diminution in the mass of blood, caused by exhausting hæmorrhages or by diarrhoea, has been shown to determine convulsions as certainly as if the blood had been poisoned.

Any convulsion may prove fatal if the arrest of respiration be sufficiently prolonged. The danger varies very much according to the cause, the uræmic convulsions of women in childbirth (*puerperal eclampsia*) being far the most frequently fatal. After them may be successively ranked, 2, uræmic convulsions in primary nephritis, or that complicating scarlet fever; 3, those caused by narcotics (opium) or mineral poisons (lead); 4, by the anæmia resulting from hæmorrhage or diarrhoea; 5, by the irritation of morbid dentition, worms, or indigestion in young children; 6, by diseases of the nervous centres or disorders in their circulation (congestion, anæmia); 7, the convulsions of epilepsy; 8, those that mark the invasion of acute diseases.

The treatment of convulsions may sometimes be addressed exclusively to the cause, as in the last three cases just mentioned, where the danger of the paroxysm itself is known to be small. In the other cases, where life is liable

to be endangered by the duration or rapid repetition of convulsive attacks, these urgently demand relief. Means of relief are—1st, compression of the carotids; 2d, alcoholic stimulants; 3d, venesection; 4th, chloral; 5th, chloroform; 6th, antihysterical medicines; 7th, warm baths; 8th, cold applications to head. Each is adapted to a special case. Compression of the carotids has been used principally in idiopathic epilepsy (where, as said, the paroxysm itself is often left without treatment). It is intended to relieve the congestion existing at the base of the brain, and has sometimes proved successful. Cold applications are used for the same purpose, and may be combined with the other methods of treatment. Stimulants are only used where the convulsion results from hæmorrhage or inanition. Venesection may be required in cases of intense venous congestion of the brain, as indicated by extreme lividity of the face and distension of the veins of the neck. It is most often needed in puerperal convulsions. Large doses of chloral (15–30–60 grains) are especially useful for infantile convulsions, or for those of scarlet fever, or during the interval of attacks to prevent their renewal. The sedative action of chloral is entirely analogous to that of inhaled chloroform, but the latter is much more powerful, and may be used in more severe cases, or where the patient is unable to swallow. *Veratrum viride* is a powerful agent to lower the pulse and increase the force of the heart's impulse; hence it may be used in the same cases as venesection, to dissipate the stagnation of blood in the veins. Finally, the warm bath, with or without mustard, may be used in nearly all cases, except perhaps in puerperal convulsions, where it may be contraindicated by the difficulty, and even danger, of moving the patient. On the other hand, the facility of its use with young children makes it especially applicable to them.

An hysterical convulsion may be treated with the nervous stimulants formerly called antispasmodics, especially assafœtida, valerian, ether (internally). In the interval of the attacks galvanism should be applied to the spine. Apart from special indications, therefore, treat the average convulsions as follows: 1st, place the patient in a warm bath, and keep cloths wrung out in cold water on the head; 2d, if the paroxysm begins to rapidly abate, give hydrate of chloral, 3–5 grains to an infant, 10–15 grains to a child, 30 grains to an adult; 3d, if the paroxysm be more severe, administer chloroform by inhalation; 4th, if suffocation be imminent, bleed to a few ounces. ABRAHAM JACOBI.

**Convulsionists** is the name of a party which arose among the Jansenists about 1730, and continued flourishing till the middle of the century. The position of the Jansenists was rather difficult at that moment. Supported by Cardinal Fleury and Archbishop de Noailles of Paris, the Jesuits had gained the ascendancy. Then it was suddenly rumored that miracles were wrought on the grave of Dean François of Paris, who died in 1727 and was buried in the cemetery of St. Medard. He had been one of the most conspicuous Jansenists, and by his extraordinary charity and his ascetic life he had brought Jansenism in favor among the lower classes. People now crowded in great numbers to the cemetery, and when they reached the grave they were generally seized by convulsions, in which state of mind they then began to prophesy and to testify in favor of Jansenism. The Jesuits were in despair. The government ordered the cemetery closed, but earth from the grave proved to have the same effect as the grave itself. The enthusiasm, with its convulsions and its miraculous cures, continued for nearly twenty years.

**Con'way**, a small seaport-town in Wales, in Carnarvon county, is on the estuary of the river Conway, here crossed by a suspension bridge 327 feet long, 13 miles E. N. E. of Bangor. Here is Conway Castle, a grand feudal structure built by Edward I. in 1283 on a steep rock, with eight vast towers. It is on the Chester and Holyhead Railway. Pop. 3254.

**Conway**, on R. R., capital of Faulkner co., Ark. (see map of Arkansas, ref. 3–D, for location of county). Pop. in 1880, 1028.

**Con'way**, capital of Horry co., S. C. (see map of South Carolina, ref. 5–G, for location of county), on the Waccamaw River, about 120 miles E. by S. from Columbia. Pop. in 1870, 606; in 1880, 575.

**Conway** (HENRY SEYMOUR), an English general, born in 1720. He had a high command in Germany in 1761, and became secretary of state in the Whig cabinet in 1765. In 1782 he was appointed commander-in-chief, and made a motion in Parliament to terminate hostilities against the U. S. He was a field-marshal. Died July 10, 1795.

**Conway** (MONCURE DANIEL). See APPENDIX.

**Conway** (THOMAS), COUNT DE, a general, born in Ireland in 1733, removed to the U. S. in 1777. He became a brigadier-general in the American army. He was a partisan of

Gen. Gates, and took an active part in the intrigues against Gen. Washington. He afterwards entered the French service, became a count, a field-marshal, and governor of the French East Indies. Died about 1800.

**Con'y**, an animal mentioned in the Bible, is supposed to be the same with the **HYRAX** (which see).

**Con'y** (**SAMUEL**), a lawyer, born at Augusta, Me., Feb. 27, 1811, graduated at Brown University in 1829, was a judge of probate (1840-47), and governor of Maine (1864-67). Died Sept. 5, 1870.

**Con'ybeare** (**HENRY**), son of W. D. Conybeare, noticed below, an engineer and architect, born in Somersetshire, England, Feb. 22, 1823, has acquired great professional distinction in England and in India.

**Conybeare** (**JOHN**), born at Pinhay, England, Jan. 31, 1692, became bishop of Bristol in 1750. He wrote a "Defence of Revealed Religion" (1732), in answer to Tindal. Died July 13, 1755.

**Conybeare** (**Rev. WILLIAM DANIEL**), F. R. S., an English geologist, born near London June 7, 1787. He discovered the plesiosaurus, and wrote several treatises on the coal-fields and other strata of Great Britain. In 1845 he was appointed dean of Llandaff. Died Aug. 12, 1857.

**Conybeare** (**W. J.**), a son of the preceding, was a fellow of Trinity College, Cambridge. In conjunction with Dean Howson he published "The Life and Epistles of Saint Paul" (1852). Died in 1857.

**Con'yers**, on R. R., capital of Rockdale co., Ga. (see map of Georgia, ref. 3-G, for location of county), 30 miles E. by S. from Atlanta. Pop. in 1880, 1374.

**Conyngham**, **MARQUESSSES** of (1816), Earls Conyngham (1797), earls of Mount Charles (1816), Viscounts Mount Charles (1797), Viscounts Conyngham (1789), Viscounts Slane (1816), Barons Conyngham (Ireland, 1789), and Barons Minster (United Kingdom, 1821).—**FRANCIS NATHANIEL CONYNHAM**, second marquess, K. P., G. C. H., P. C., lieut.-gen., born June 11, 1799, succeeded his father Dec. 28, 1832. Died July, 1876.

**Cook** (**CHARLES**), D. D., an eminent Wesleyan divine, chief founder of Methodism in France, was born in London on May 31, 1787, entered the Wesleyan ministry in 1817, went to France in 1818, travelled there, founding Methodist societies and aiding in the revival of the Huguenot churches till his death in Lausanne, Feb. 21, 1858. He wrote "L'Amour de Dieu pour tous les Hommes." His "Life" was written by T. P. Cook (Paris, 1862).

**Cook** (**CLARENCE CHATHAM**), an American journalist and writer, born at Dorchester, Mass., Sept. 8, 1828, was the son of Zebedee Cook, noticed below. He graduated at Harvard in 1849, and studied architecture in the office of A. J. Downing (his brother-in-law) and Calvert Vaux at Newburg, and afterward pursued for many years the profession of teaching. In 1863, Mr. Cook contributed to the New York "Tribune" a series of articles on American art, based upon the exhibition of pictures at the New York Sanitary Fair of that year. He continued the profession of teacher until 1869, at the same time contributing the art criticisms which appeared in the "Tribune," besides occasional articles to magazines. In 1869 he went as correspondent of the "Tribune" to Paris, but resigned that position upon the outbreak of the Franco-Prussian war, passed some time in Italy, and on his return to America resumed his connection with the "Tribune." He published "The Central Park," N. Y., 1868, "The House Beautiful," New York, 1878, and edited, with copious notes, a new translation of Lübke's "History of Art," 2 vols., New York. Became editor of "The Studio" in 1884.

**Cook** (**DUTTON**), born in London in 1832, was educated at King's College, and served articles for some time in a solicitor's office. Afterward he was assistant editor of the "Cornhill Magazine," dramatic critic to the "Pall Mall Gazette," and contributor to many other periodicals and journals. Besides collections of essays and studies—"Art in England" (1869), "Hours with the Players" (1870), "Nights of the Play" (1883, 2 vols.), etc.—he has published "Paul Foster's Daughter" (1861), "A Prodigal Son" (1862), "The Trials of the Tredgolds" (1864), "Hobson's Choice" (1866), "Doubleday's Children," etc. Died Sept. 11, 1883.

**Cook** (**ELIZA**), an English poetess, born in London in 1817, was the daughter of a respectable tradesman. She began literary life as a contributor to various journals. Her first volume of poems appeared in 1840, and was highly successful. She has published, besides other works, "New Echoes" (1864), and was long editor of the "Journal" which bore her name.

**Cook** (**Captain JAMES**), a celebrated English navigator, born of very poor parents at Marton, in Yorkshire, Oct. 27, 1728. He entered the navy in 1755, and served as master

of a sloop at the capture of Quebec in 1759. He commanded an expedition sent to the South Pacific Ocean in 1768 to observe the transit of Venus. After he had observed the transit with success on the island of Tahiti, he visited New Zealand and explored the coast of New South Wales. Having made important discoveries in geography, he returned by the Cape of Good Hope, and arrived in England in June, 1771. In 1772 he conducted another exploring expedition in the Resolution and Adventure, in order to discover the *Terra Australis*, a continent supposed to exist in high southern latitudes. He circumnavigated the globe, discovered the island of New Caledonia, and penetrated southward as far as 71° S. lat., but did not find the *Terra Australis*. He returned to England in July, 1775, having lost only one man by disease during the voyage. He published a well-written journal of his voyage (2 vols., 1777). In July, 1776, he sailed on a third voyage, the object of which was to discover a north-west passage by way of Behring Strait. He discovered the Sandwich Islands in 1778, and explored Behring Strait. Having returned to Hawaii to pass the winter, the natives of that island stole one of his boats. Captain Cook with a few men went on shore to recover it, and was killed by the savages Feb. 14, 1779. (See A. KIPPIS, "Life of Captain James Cook," 1788; HARTLEY COLERIDGE, "Lives of Distinguished Northerns," vol. iii.)

**Cook** (**JOSEPH**), a distinguished lecturer on religious and social topics, was born at Ticonderoga, N. Y., Jan. 26, 1838, graduated at Harvard in 1865 and at Andover in 1868, remaining there as a resident licentiate till 1870. He was pastor of a church in Lynn, Mass., 1870-71, spent one year (1872-73) in Europe, carried on the Monday lecture in Boston 1874-80, in Europe and Asia 1880-82, and resumed the Monday lectureship in Boston in 1883. He has published several volumes of the Monday lectures.

**Cook** (**RUSSELL STURGIS**), a Congregational clergyman, born at New Marlborough, Mass., Mar. 6, 1811. From 1839 to 1856 he was one of the secretaries of the American Tract Society, and was the originator of its system of colportage. Died at Pleasant Valley, N. Y., Sept. 4, 1864.

**Cook** (**ZEBEDEE**), son of Zebedee Cook and Sarah Knight, was born in Newburyport, Mass., Jan. 11, 1786. His ancestors came from Devonshire, England. Born of parents in humble circumstances, he had few advantages in the way of schooling, and went early to Boston to seek his fortune, and from about 1815 to 1838 was engaged there in the business of insurance. He was among the first to introduce into this country the system of mutual insurance, and in 1838 was invited to New York to be the president of the first company established in that city on the system of a division of the profits between the insurers and the insured. This company was called the Mutual Safety Insurance Company, and was engaged entirely in marine business. While living in Boston, Mr. Cook, always much interested in rural pursuits, gave the first impulse to the formation of the Horticultural Society by an article in the "New England Farmer" for Jan. 9, 1829. On Feb. 24th of the same year a meeting was held in Mr. Cook's office to found a horticultural society, and as the result of this and subsequent efforts the Massachusetts Horticultural Society was incorporated June 12, 1829. Gen. Dearborn was the first president and Mr. Cook first vice-president. In 1834, on the resignation of Gen. Dearborn, Mr. Cook was elected president in his place. He introduced the Isabella grape into New England from cuttings. To Mr. Cook as much as to any one belongs the credit of founding the cemetery of Mount Auburn, the first of these institutions, we believe, in the country. Mr. Cook was twice married. Caroline Tuttle, his first wife, was a granddaughter of Col. David Mason, one of Washington's aides—a man distinguished for his courage and patriotism, and for his interest in the scientific discoveries of his time. By this lady Mr. Cook had nine children. His second wife was Ann Somes, daughter of Hon. Israel Trask. Died in Framingham, Mass., Jan. 24, 1858.

**Cooke** (**AMOS STARR**), **REV.**, a Congregational missionary, born in Danbury, Conn., in 1810, graduated at Yale in 1834. He sailed from Boston in the service of the American Board of Foreign Missions in 1836, and arrived at the Sandwich Islands in April, 1837. In that year he took charge of the education of the royalty and nobility of the realm. He remained in charge of the royal school for twelve years, and exerted a controlling influence in shaping the character of the rising kings and nobles; and the last three Kamehamehas were educated by him. Died at Honolulu Mar. 20, 1871.

**Cooke** (**EDWARD**), D. D., an American clergyman and educator, born at Bethlehem, N. H., Jan. 19, 1812, graduated with honor at Middletown in 1838. He was teacher of natural science in the Amenia Seminary, in Dutchess

county, N. Y., and afterwards principal of the newly-founded seminary at Pennington, N. J., 1840-47, and minister in various Methodist Episcopal churches at Boston and elsewhere until 1853. He took the direction of the institute now known as Lawrence University in Appleton, Wis., the presidency of which in its more prosperous days was again offered him, but declined. Returning to the East in 1861, he was two years pastor of the Harvard street church in Cambridge, Mass., where he was one of the board of examiners of Harvard College, which conferred upon him the degree of D. D. in 1855. In 1864, Dr. Cooke was elected to the principalship of the Wesleyan Academy at Wilbraham, Mass., one of the oldest Methodist literary institutes in America.

**Cooke** (GEORGE FREDERICK), a popular English actor, born in Westminster in 1755. He performed in Dublin and London for many years, was successful in both tragedy and comedy, and was a rival of John Kemble. In 1810 he visited New York, where he died in 1812.

**Cooke** (JAY), an American financier, born in Sandusky, O., Aug. 10, 1821, went to Philadelphia in 1838, and became a clerk in the banking-house of E. W. Clark & Co., of which he became a partner at the age of twenty-one. He established the firm of "Jay Cooke & Co." in 1861, and became well known as a successful government agent for the war-loans during the civil war of 1861-65. The firm to which he belonged subsequently became agents for the Northern Pacific R. R., and their suspension in 1873 was one of the causes of the financial panic of that year.

**Cooke** (JOHN ESTEN). See APPENDIX.

**Cooke** (JOHN ESTEN), a novelist and lawyer, born at Winchester, Va., Nov. 3, 1830. He published, besides other works, "Leather Stocking and Silk" (1854), "The Virginia Comedians" (1854), and a "Life of General Robert E. Lee" (1871). He served as an officer in the Confederate army in the civil war.

**Cooke** (JOHN R.), an American lawyer, a brother of General P. St. G. Cooke (noticed below), born in Bermuda in 1788, became a prominent and influential member of the Virginia bar. He was greatly beloved in private life, and was called "a model of lofty courtesy, chivalry, and generosity." Died at Richmond, Va., Dec. 10, 1854.

**Cooke** (JOSIAH PARSONS, JR.), an American chemist, was born at Boston, Mass., Oct. 12, 1827, and graduated at Harvard in 1848. He became in 1851 Erving professor of chemistry and mineralogy in Harvard University. He has published "Chemical Physics" (1860), an admirable work entitled "Religion and Chemistry" (1864), "Principles of Chemical Philosophy" (1870), and many valuable monographs.

**Cooke** (NICHOLAS), born at Providence, R. I., Feb. 3, 1717, was deputy-governor of his native State in 1775, and governor of the State (1775-78). He was a personal friend of General Washington. Died Sept. 14, 1782.

**Cooke** (PARSONS), D. D., born at Hadley, Mass., Feb. 18, 1800, graduated at Williams College in 1822. He is best known as an able controversialist, and was for many years (from 1840) editor-in-chief of the "New England Puritan" and the "Boston Recorder." Died at Lynn, Mass., Feb. 12, 1864.

**Cooke** (PHILIP ST. GEORGE), an American officer, born 1809 in Berkeley co., Va., graduated at West Point in 1827, and Nov. 12, 1861, brigadier-general U. S. A. He served as infantry officer on the Western frontier 1827-33; in Black Hawk war 1832, engaged in the battle of Bad Axe; and adjutant Sixth Infantry 1832-33. As a dragoon officer he served on frontier duty 1833-46; on expedition to California during the war with Mexico 1846-47 (brevet lieutenant-colonel); as superintendent of cavalry recruiting 1848-52; on frontier duty and scouting 1852-56, engaged in skirmishes against hostile Indian tribes; quelling the Kansas disturbances 1856-57; on Utah expedition, in command of the cavalry, 1857-58; preparing cavalry tactics 1859; and in command of Utah 1860-61. In the civil war he was in Virginia Peninsula 1862, engaged at Yorktown, Williamsburg, Gaines' Mill, and Glendale; in command of Baton Rouge district, La., 1863-64; superintendent of recruiting 1864-66; in command of the department of the Platte 1866-67, and afterwards of the department of the Lakes. Brevet major-general Mar. 13, 1865. He studied law and was admitted to practice, and is the author of "Scenes and Adventures in the Army," 1856. Retired from active service Oct. 29, 1873. GEORGE W. CULLUM.

**Cook'ery** [Fr. *la cuisine*; Ger. *Kochen* or *Kochkunst*; Lat. *ars culinaria*] is the art of preparing food for the table by dressing and by the agency of fire. We have no record of a time when cooking was wholly unknown, and it is highly probable that the practice began soon after the discovery of fire. So universal is the art that some writers have re-

garded it as the distinguishing trait of the human family, and have defined man as "a cooking animal." In its rudimentary form, as seen among the lower races of men, no utensils are employed, but the food is either laid directly upon the fire or suspended above it from poles. The degree of skill and taste manifested by a nation in the preparation of food may be regarded as to a very considerable extent proportioned to its culture and refinement. We read in the Scriptures that Abraham prepared "cakes of fine meal" and "a calf, tender and good," which, with butter and milk, he set before the three angels in the plains of Mamre. We are told of the chief butler and chief baker as officers in the household of Pharaoh. The ancient Egyptians appear to have eaten the flesh of a few animals, together with bread made of barley, wheat, or the centre of the lotus (see *NELUMBIUM*), and great quantities of vegetables. In the Homeric age of simplicity, royal Greeks were content to cook their own meats, but before the time of Pericles professional cooks of great skill were known in Greece. These cooks stood in the market at Athens ready to be hired for particular occasions. Magnificent banquets were prepared at an enormous expense, and poets and philosophers appear to have thought it no unworthy ambition to be distinguished as the inventors of a new cake or a popular sauce. The names of many authors of cook-books are preserved, that of Archestratus, a poet of Syracuse, being the most famous. Among all classes of Greeks fish was a principal article of food. Large quantities of salt fish were brought from the shores of the Euxine and Hellespont. These, with meal, cheese, and onions, are said to have formed the chief food of the armies and navies when on service. The Greeks ate the flesh of sheep, pigs, lambs, and goats, though vegetables appear to have constituted their principal food. They had also poultry, game, and sausages made of blood.

In the early days of Rome a cruel meal of barley was the chief food of the people, and with vegetables was, till later times, the usual fare of the inferior classes, meat being used but sparingly. By degrees, however, a taste for luxury was imported. Lucullus introduced habits of epicurism from Asia; the gourmand Apicius earned for himself a deathless name by the costliness of his dishes. The wealthy Romans paid especial attention to the elegant serving of their table, as well as to the quality of the viands. With them, as with the Greeks, fish was a necessity as well as a luxury; they took great pains to procure their oysters, and gave large sums for other fish. In the later days of the republic and under the empire a taste for extravagant and eccentric cookery was indulged at an unheard-of expense. Lucullus gave banquets at a cost of 50,000 denarii each.\* A single dish composed of nightingales' tongues, the brains of peacocks and pheasants, and the livers of the most costly fish, is said to have cost Vitellius the sum of 1000 sestercia, equal to nearly \$40,000, and probably equivalent to \$300,000 at the present time. Many similar absurdities might be mentioned. The favorite meat at this time among the Romans was pork, and "hog in Trojan style" was looked upon as the *chef-d'œuvre* of a good cook. This dish was derived from the Greeks. The animal was served whole, being roasted on one side and boiled on the other, and its interior was filled with numbers of ortolans, thrushes, and becaffoes.

The *pistor* (baker), who made the bread and pastry, and the *structor*, who composed artificial figures of fruit or flesh, and who also arranged the dishes, seem to have shared the duties of the cook. The Romans made a free use of oil in the preparation of their food. The Greeks and Romans used honey for the purposes for which we use sugar. It was an ancient saying that the number of persons at a repast should not be less than that of the Graces nor more than that of the Muses.

With the invasions of the northern barbarians in the fifth century the art of cookery retired into the convents, and was only revived five hundred years later with the rising power of the free cities of Italy—Venice, Florence, etc.

Catharine de Médicis introduced the luxuries of Italian cookery into France during the reign of Henry II. England is said to have been indebted to William the Norman for her first lessons in the refinements of gastronomy. At a later period the taste for luxurious living had become so common in English monasteries that it was found necessary to limit the excesses of the monks and clergy by an edict.

In modern times the French have excelled all other nations in cookery, considered as an art. In the reign of Louis XIV. sumptuous and extravagant cookery was in vogue among the higher classes, but during the succeeding reigns its character was greatly modified and refined.

\* More than \$7000 of our money, but, if we take into consideration the relative scarcity of the precious metals, probably equivalent to \$60,000 at the present time.



American cookery may be said to be derived in about equal measure from the English and the French. From the former we have derived our simpler and more substantial dishes, such as roasts, steaks, and some kinds of pastry—from the latter the more delicate and complicated side-dishes and desserts.

**Cook'man** (GEORGE G.), an eminent pulpit-orator of the Methodist Episcopal Church, was born at Hull, England, in 1800. While engaged in business he was a local preacher in the U. S., and afterwards in England. Having returned to the U. S. in 1825, he entered the itinerant ranks in 1826, and soon became distinguished as a preacher of great ability and success. He was chaplain to the House of Representatives (1838-39). He was lost at sea on the steamer President which left New York for Liverpool Mar. 11, 1841.

**Cook's In'let**, a part of the Pacific Ocean, is in Alaska, opposite the island of Kodiak, between lat. 58° and 61° N., and lon. 151° and 154° W. It is 130 miles long.

**Cook'ville**, capital of Putnam co., Tenn. (see map of Tennessee, ref. 6-G, for location of county), about 80 miles E. of Nashville. Pop. in 1870, 156; in 1880, 279.

**Coo'ley** (LEROY C.), born in Lyme, N. Y., in 1833, graduated at the New York State Normal School in 1855 and at Union College in 1858. He was a teacher in seminaries at Lockport, Fairfield, and Cooperstown, N. Y., and in 1861 became professor of natural sciences in New York State Normal School at Albany. He is the author of text-books of natural philosophy, physics, and chemistry.

**Cooley** (THOMAS M.), a jurist, born at Attica, N. Y., Jan. 6, 1824, removed to Michigan in 1843, and became a lawyer in 1846. He has published many volumes of legal reports, digests, and compilations. He became professor of law in Michigan University in 1850, and a justice in the supreme court of Michigan in 1864, and chief-justice in 1867.

**Coo'lidge** (CARLOS), LL.D., was born at Windsor, Vt., in 1792, graduated at Middlebury in 1811, became a prominent lawyer and State politician, and governor of Vermont (1849-51). Died Aug. 15, 1866.

**Cooly**, or **Coolie**, a word of uncertain etymology, is used both in a general sense, denoting an Asiatic laborer not belonging to the artisan class, and in a more special sense, a native of China or India emigrating to some foreign country under contract of labor. This coolie emigration began when slavery ceased. As the free negro could not be induced to engage in field-labor on the tropical plantations, and as the white man proved physically incapable of doing the work, the owner of a great plantation had, indeed, only one chance left—that of importing laborers from India or China. Both countries were over-peopled; both races were acclimatized. Toward the middle of the present century the traffic began. The first to avail themselves of the overstocked labor-market of China were the British colony of Guiana, Peru, and Cuba. In 1847 two vessels went from Amoy to Havana with, respectively, 350 and 629 coolies on board. A few years later on, however, dismal rumors sprang up, denouncing the whole traffic as a new form of slavery more degrading and atrocious than the old one. It was found out that, of 4000 coolies who had been consigned to the guano-pits of Peru, not one had survived. England took effective measures against the evil in 1855, but the result was simply that the whole traffic came into the hands of the Portuguese and degenerated still further. The convention of 1866 between France, England, and China first succeeded in confining the evil within certain limits. At a much earlier date the Indian coolies had begun to emigrate to Ceylon, the Straits Settlements, and Tenasserim, afterward also to Anam, Burmah, and Mauritius. Between 1834 and 1837 about 700 coolies were shipped from Calcutta alone to Mauritius, and in 1838 it was ascertained that up to that year no less than 25,000 coolies had left India for Mauritius. From 1834 to 1872, 161,539 coolies were exported to Trinidad, Jamaica, etc.

**Coomas'sie**, the capital of the kingdom of Ashantee, in Western Africa, is about 120 miles N. N. W. of Cape Coast Castle; lat. 6° 35' N., lon. 2° 12' W. It has some trade with Central Africa. Pop. 20,000.

**Coombe** (WILLIAM), an English humorous and satirical writer, born at Bristol in 1741. Among his works are a "Tour of Doctor Syntax in Search of the Picturesque" (1812), and "Tour of Doctor Syntax in search of a Wife," both in verse. Died Jan. 19, 1823.

**Coon'tie**, or **Coon'ta** [an Indian word], the popular name of the *Zamia integrifolia*, a plant of the natural order Cycadaceae, a native of Southern Florida. Its stem abounds in starch, from which a part of the Florida arrow-root is prepared. Other species of the genus are cultivated

in the Bahamas and in Asia for their starch, which, however, is usually classed as Sago (which see). Florida once produced great quantities of this commodity, of which the quality was often excellent.

**Cooper**, capital of Delta co., Tex. (see map of Texas, ref. 2-J, for location of county). Pop. in 1880, 294.

**Cooper** (ANTHONY ASHLEY). See SHAFTESBURY.

**Coop'er** (SIR ASTLEY PASTON), F. R. S., LL.D., D. C. L., an eminent English surgeon, born at Brooke, in Norfolk, Aug. 23, 1768. He began to study surgery under Mr. Cline in London in 1784. He became professor of anatomy at Surgeon's Hall in 1792, and surgeon to Guy's Hospital in 1800. In 1805 he was chosen a fellow of the Royal Society. He gained distinction by a valuable work on hernia (1804-07), and practised surgery with great success in London. His annual income is said to have amounted to £21,000. He was appointed surgeon to the king in 1828. Among his works are "The Principles and Practice of Surgery" (1836-37), a treatise "On Dislocations and Fractures" (1822), and one on the "Anatomy and Diseases of the Breast" (1829-40). Died Feb. 12, 1841. (See B. B. COOPER, "Life of Sir Astley P. Cooper," 1843.)

**Cooper** (GEORGE H.), born in New York, July 27, 1882, entered the navy as midshipman Aug. 4, 1837; became a lieutenant in 1851, commander 1862, captain 1867, commodore 1874, and rear-admiral in 1881. He served in boat-expeditions against the Seminole Indians in Florida; in the Mexican war he commanded a detachment at Point Isabel, was engaged in attacks on Tobasco, Alvarado, and Tuspan, and remained with squadron until capture of City of Mexico; was employed in the South Atlantic blockading squadron during the civil war, and during the bombardment of Fort Sumter in 1863 was in command of the monitor Sangamon; was commandant of navy-yard at Norfolk 1872, Pensacola 1875-76, and New York 1878-81; in command of North Atlantic Station 1882-84. Retired 1884.

GEORGE C. SIMMONS.

**Cooper** (JAMES), GENERAL, was born in Frederick co., Md., May 8, 1810, graduated at Washington College, Pa., in 1831, studied law with Thaddeus Stevens, was a Whig member of Congress from Pennsylvania (1839-43), and was a leading opponent of the repudiation movement in Pennsylvania in 1847. He was attorney-general of Pennsylvania in 1848, U. S. Senator from 1849-55, appointed brigadier-general of Union volunteers in 1861, served in Virginia, and died at Columbus, O., Mar. 28, 1863.

**Cooper** (JAMES FENIMORE), a popular American novelist, born at Burlington, N. J., Sept. 15, 1789, was a son of Judge William Cooper. The latter removed to Otsego co., N. Y., about 1790, and founded Cooperstown. Young Cooper entered Yale College in 1802, and became a midshipman in the U. S. navy in 1806. In 1811 he quitted the naval service and married Susan de Lancey, a sister of Bishop de Lancey. He published anonymously, in 1819, "Precaution," a novel, which was considered a failure. In 1822 he produced "The Spy, a Tale of the Neutral Ground," which had great success, was republished in various parts of Europe, and translated into several languages. "The Spy" opened a new and fresh field of national and imaginative literature. His next work was the "Pioneers" (1823), in which he gave a graphic description of American scenery and the adventures of life on the frontier of civilization. He published in 1823 "The Pilot," a tale of the sea, which was very popular. He represented with great success in this work the character of sailors and peculiar phases of maritime life and scenery. In the "Last of the Mohicans" (1826) he gave a vivid picture of the life and character of American savages and trappers. In 1827 he visited Europe, where he remained nearly six years, during which he published "The Prairie" (1827), "The Red Rover," an admired tale of the sea, and other works. He criticised and satirized the national defects and foibles of the Americans in "The Monikins" (1835), "Homeward Bound" (1838), and "Home as Found" (1838). Among his other works are a "History of the Navy of the United States" (1839), "The Pathfinder" (1840), "Wing-and-Wing" (1842), "Afloat and Ashore" (1844), "The Chain-Bearer" (1845), and "Oak Openings" (1848). Died at Cooperstown Sept. 14, 1851. "He wrote for mankind at large," says W. C. Bryant; "hence it is that he has earned a fame wider than any [American] author of modern times. The creations of his genius shall survive through centuries to come, and only perish with our language." "His writings," says Prescott, "are instinct with the spirit of nationality. In his productions every American must take an honest pride; for surely no one has succeeded like Cooper in the portraiture of American character, or has given such glowing and eminently truthful pictures of American scenery." In

person he was well formed, dignified, and had an imposing presence. (See "North American Review" for July, 1822, July, 1826, April, 1831, and Oct., 1859; ALLIBONE, "Dictionary of Authors.")

**Cooper (MYLES), LL.D.,** OXON., an accomplished scholar, second president of King's College (now called Columbia College), New York City, born in England in 1735, and educated at Oxford, became a fellow in Queen's College. He came to America in 1762, as assistant to Dr. Samuel Johnson, first president of King's College, and was made president in May, 1763. In the revolt of the colonies he remained loyal to the Crown, and was compelled to flee the country. He became one of the ministers of the English chapel in Edinburgh. Died at Edinburgh May 1, 1785.

**Cooper (PETER), LL.D.,** an American manufacturer, inventor, and philanthropist, born in New York City Feb. 12, 1791. His early life was one of labor and struggle, as it is with most of our successful men in this country. He commenced in early boyhood to help his father as a manufacturer of hats. He attended school only for half of each day for a single year, and beyond this very humble instruction his acquisitions were all his own. At the age of seventeen he was placed with John Woodward to learn the trade of coachmaking. In this trade he served his apprenticeship so much to the satisfaction of his master that the latter offered to set him up in business, but this he declined, on account of the debt and obligation it would involve.

The foundation of Mr. Cooper's fortune was laid in the opportune invention of an improvement in machines for shearing cloth. This was largely called into use during the war of 1812 with England, when all importations of cloth from that country were stopped. The machines lost their value, however, on the declaration of peace. Mr. Cooper then turned his shop into the manufacture of cabinet-ware. He afterwards went into the grocery business in New York, and finally he engaged in the manufacture of glue and isinglass, which he carried on for more than fifty years. Mr. Cooper in three particulars—as a capitalist and manufacturer, as an inventor, and as a philanthropist—was connected with some of the most important and useful accessions to the industrial arts of this country, its progress in invention, and the promotion of educational and benevolent institutions intended for the people at large. His attention was early called to the great resources of this country for the manufacture of iron. In 1830 he erected works in Canton, near Baltimore. Subsequently he erected a rolling and a wire mill in the city of New York, in which he first successfully applied anthracite to the puddling of iron. In 1845 he removed the machinery to Trenton, N. J., where he erected the largest rolling-mill at that time in the U. S. for the manufacture of railroad iron. In these works he was the first to roll wrought-iron beams for fireproof buildings. These works have now grown to be very extensive, including mines, blast furnaces, and water-power.

While in Baltimore, Mr. Cooper built, in 1830, after his own designs, the first locomotive engine ever constructed on this continent. It was successfully operated on the Baltimore and Ohio R. R. Next we find Mr. Cooper taking great interest and investing large capital in the extension of the electric telegraph. He was the first and only president of the New York Newfoundland and London Telegraph Company, which continued its operations for eighteen years. He was honorary director of the Atlantic Telegraph Company, president of the American Telegraph Company, and president of the North American Telegraph Association, which at one time represented more than two-thirds of all the lines in the U. S. He took part actively in the first expedition that laid the Atlantic cable in 1854.

Mr. Cooper interested himself early in the New York State canals. Before the water was let into the Erie Canal it was an anxious question what was the best propelling power for the boats to be employed on the canal. Mr. Cooper then made an interesting experiment of propelling a boat by means of an endless chain two miles long, supported on posts and rollers, which was driven by the force of elevated water, and might be driven by any other power. By means of this he propelled a boat two miles in eleven minutes, carrying with him the governor, De Witt Clinton, and other distinguished men at that time. Although this method of propulsion was not adopted at that time, it has since been successfully and very usefully applied by Mr. Welch in passing boats through the locks of the Delaware and Raritan Canal.

Mr. Cooper served in both branches of the New York common council. He was a trustee in the Public School Society, first formed to promote public schools in New York, and when that was merged in the board of education he became a school commissioner.

But the most cherished object of Mr. Cooper's life, early

conceived and faithfully carried out as soon as his means permitted, was the establishment of an institution for the instruction of the industrial classes. He desired to furnish this instruction during their leisure from work or in the evenings, when they might obtain higher attainments in the practical arts in which they happened to be engaged, or learn some industrial pursuit they might desire. Having felt the need of this sort of instruction during his own early and laborious life, and knowing that neither the common school nor the academy and college can supply the technical knowledge and practical education needed by the great mass of youth, Mr. Cooper determined to set an example in supplying this want of practical instruction for the working classes, that should prove not only useful in his own city, but be contagious throughout our republican land. He saw, with that wise forecast as well as broad philanthropy which characterizes his mind, that the youth must be trained to industry under an advancing and higher order of work which machinery was introducing. Accordingly, in the year 1854 he laid the corner-stone of a large building at the junction of the Third and Fourth avenues in New York, "to be devoted for ever to the union of art and science in their application to the useful purposes of life." This institution has grown under the fostering care of the trustees appointed by Mr. Cooper and his own unremitting attention till his death, until at the present time it counts over 1500 pupils in the course of the year. It has a school of art for women, taught in the daytime, in which free instruction is given in all branches of drawing, in painting, wood-engraving, and photography. It has likewise a free school of telegraphy for young women. These schools for the daytime accommodate about 200.

In the evening are opened the free schools of science and art for young men and women. Here the mathematics, practical engineering, and practical chemistry are thoroughly taught, and free lectures are given in natural philosophy and the elements of chemistry. In the art department every branch of drawing and painting is taught. Besides these free schools, there is a large free reading-room and library at the disposal of all comers. About 1500 resort to this daily, where they have free access to 280 periodicals and papers, foreign and domestic, and about 10,000 volumes. Besides this, there is a free course of lectures given every Saturday evening during the winter in the large hall of the Cooper Union, that will seat 2000. Last year there was spent over \$56,000 for the support of the different departments.

On May 18, 1876, the Independent party nominated Mr. Cooper for President of the U. S., and at the following election he received nearly 100,000 votes. Died Apr. 4, 1883.

J. C. ZACHOS, Curator of Cooper Union.

**Cooper (PHILIP H.),** born Aug. 5, 1844, in the State of New York, graduated at the Naval Academy in 1863, became a master in 1865, a lieutenant in 1866, a lieutenant-commander in 1868, and is now (1883) commander. He served in the steam-sloop Richmond at the battle of Mobile Bay, which occurred Aug. 5, 1864, and was commended "for coolness and courage" on that occasion by his commanding officer, Captain Thornton A. Jenkins.

FOXHALL A. PARKER.

**Cooper (SAMUEL), D.D.,** an eloquent and learned American divine, born at Boston Mar. 28, 1725, graduated at Harvard in 1743. He became pastor of the church in Brattle street, Boston, in 1746, and was intimate with Doctor Franklin. He was an efficient promoter of the popular cause in the Revolution. Died Dec. 29, 1783.

**Cooper (SAMUEL),** an American general, born in the State of New York about 1795, graduated at West Point in 1815. He became a captain in 1836, and served in the Mexican war (1846-47). In 1852 he was appointed adjutant-general with the rank of colonel. Having resigned his commission in Mar., 1861, he soon became adjutant-general of the Confederate army, and was promoted to the rank of full general. D. Nov., 1876.

**Cooper (SUSAN FENIMORE),** the eldest daughter of the great novelist, was born in 1815, and has published "Rural Hours" (1850), "Rhyme and Reason of Country Life" (1854), "Country Rambles," and other works characterized by refined taste and admirable style.

**Cooper (THOMAS APHTHORPE),** an actor, born in London in 1776, played with much applause in London and the U. S. His daughter married a son of President Tyler, under whom Cooper held various government offices. Died at Bristol, Pa., April 21, 1849.

**Cooper (THOMAS), M. D., LL.D.,** a natural philosopher, physician, and lawyer, born in London Oct. 22, 1759. He accompanied Dr. Priestley to the U. S. in 1792, became a Democrat, and took an active part in politics. In 1820 he was chosen president of South Carolina College at Columbia. He published many learned and vigorous pamph-

lets on politics, and several important legal works. Died May 11, 1839.

**Cooper** (THOMAS SIDNEY), an English painter, born at Canterbury Sept. 26, 1803. He has painted cattle and sheep with great success.

**Coop'era** [from *cooper*, a "barrel-maker;" in Old English *coop* (Ger. *Kiufe*) signified a "cask"], the art of making various wooden vessels, such as barrels, casks, etc., the sides of which are formed of upright pieces called staves, so skilfully shaped that when all are built and hooped together, their edges shall exactly coincide; the staves are made broadest in the middle, and narrowed in a curved line towards each end; they are made to meet at their inner edges, and by driving the hoops are compressed until the outside gaps are closed, and thus slight inaccuracies of fitting are remedied. The hoops are hammered down from the narrow to the wide part of the vessel by means of a mallet striking a piece of wood held against the hoop. Both wood and iron are used for hoops. The cutting of staves is largely done by machinery. Iron hoops are sometimes put on hot, in order that their contraction on cooling may bind the work together.

**Co-operation** [from the Lat. *co* (*con*), "together," and *operor*, *operatus*, to "work"] is the name given to the attempts made within the last forty years, both in Europe and the U. S., but chiefly in France and England, to introduce into the relations under which ordinary and indispensable operations of industry, production, and distribution are carried on, principles which may

"Ring out the feud of rich and poor  
Ring in redress for all mankind,"

and thus realize gradually, without any violent shock to existing customs, those brilliant anticipations of a "good time coming," and attainable by man through his own exertions, which in the earlier part of the century the efforts and teaching of three remarkable men—Claude Henri Conte de Saint-Simon, Charles Fourier, and Robert Owen—kindled in the imaginations of their disciples. It would occupy far more space than we can spare to give even an outline of the principles by which the divergent theories of these illustrious social reformers are distinguished. (For a literally full, fair, and very readable account of them we may refer those who are interested in such studies to the "*Les Réformateurs Contemporains*" of Louis REYBAUD, Paris, 1841.) Still less can we give here the history of the schools of thought which arise out of their teachings, or attempt to trace the variety of social systems produced by the successors of these breakers of the fallow ground—men such as J. P. Greaves in England and Pierre Leroux, Cabet, and Proudhon in France. One exception only we must make in favor of M. Louis Blanc, from the influence exercised by his work, "*L'organisation du Travail*," published in 1840, on the subsequent progress of co-operation.

The systems of Saint-Simon, of Fourier, and of Owen have the common character of claiming to be revelations of a code of principles or laws by which the whole life of man shall be transformed as by an enchanter's wand, and a new-created world of moral order and material prosperity spring up in place of our present civilization. Louis Blanc proposed to start from things as they are, and for that purpose suggested a scheme of which he gives the following outline: The government should take upon itself the supreme regulation of production and the task of putting an end to competition, in which it must slay the evil genius of society by arms borrowed from competition itself. To effect this task the government shall raise a loan, of which the proceeds shall be applied to the creation, in all the more important branches of national industry, of a number of social factories, originally rigorously circumscribed on account of the considerable outlay required for their construction, but organized so as to have an unlimited power of expansion. The government shall draw up the regulations of these factories, which shall be discussed and voted by the representatives of the nation, and thus have the force of law. All workmen who can offer guarantees for their character shall be admitted to work in them up to the limits of the number for whom the original capital can furnish the means of work. And (notwithstanding the difficulty caused by the false education given to the existing generation, which furnishes no motives for energy and emulation except an increase of reward) the salaries shall be equal, for the new education may be trusted to change ideas and customs. During the first year after the establishment of any factory the government shall regulate the hierarchy of functions. At its termination a hierarchy shall be formed by the election of the workers, who will then have had time enough to appreciate each other, and will all be equally interested in the success of the association. For in every year the profits of the work shall

be divided into three parts: one to be equally distributed among all the members; a second to be devoted, first, to the support of the aged, the sick, and the infirm; second, to the alleviation of any crisis affecting any other industry, since all the industries should aid each other; while the third shall be consecrated to furnish the means of work to those who desire to join the association, so that it may grow indefinitely. Workers engaged in occupations naturally disposed to scatter and localize themselves shall be admissible into the associations formed for industries which can be carried on upon a large scale; so that each social factory may be composed of different businesses grouped round some great industry, parts of the same whole, obeying the same laws, and sharing in the same advantages. Each member of a social factory shall be entitled to dispose of his salary at his own pleasure, for the evident economy and incontestable excellence of life in common will ere long produce from the association of labor a voluntary association for necessities and pleasures. Capitalists may be admitted into these associations, and draw the interest upon the capital contributed by them, which shall be guaranteed by the budget, but shall not be allowed to share in profits except as workers. (*Organisation du Travail*, Paris, 1848, pp. 103-105.)

Such was the scheme of which Louis Blanc anticipated that were it tried it would lead to the suppression of competition by the absorption of all industries carried on upon any other system, and prepare the way "for the realization of the principle of fraternity, which must be the work of instruction." "Thus would the day arrive when it would be recognized that he owes more to his kind who has received from God a large measure of strength or intelligence. Then would genius assert its legitimate empire not by the importance of the tribute levied on society, but by the importance of the services rendered to it." "For the inequality of capacities has as its true object not the inequality of rights, but the inequality of duties." (*Ib.*, p. 118.)

It will be seen that this remarkable scheme is characterized by that tendency too common in many French proposals, of relying upon the government to do for the people what they despair of being able to do for themselves. Nevertheless, it marks a great epoch in the history of social reform, by the clearness with which it pointed out three principles ever since more or less distinctly felt to be the life-blood of co-operative efforts: 1st, the looking to the association of workers carrying on their accustomed work in common as the true means of raising their social condition through the use of the profits arising from their work; 2d, the restricting the payment of capital to a fixed rate of interest, and giving the capitalist security for his principal in lieu of profit; 3d, the elimination of the ruinous effects of competition, and the substitution of a healthy emulation in its place, by the union of different establishments carrying on the same industry by common centres, by means of which diverse industries may also be united. Thus, setting aside the arbitrary rule of an absolute equality of salaries, which experience has not justified where the attempt to act upon it has been tried, and which seems to us to err as much by sacrificing the individual to the body as the present inequality of payment errs in sacrificing the body to the individual,—this *organisation du travail* may still be regarded as the prolific egg out of which the ideas of co-operation sprang in France, and which has had no inconsiderable influence on the ideas of co-operators in England. There the scheme of united action, which Louis Blanc proposed to realize through the intervention of the government, has been gradually realizing itself through the voluntary action of individuals, who, however, have attacked the problem from another side, on which practically it is more accessible. The new societies imagined by Fourier or Owen rested upon associations where the residents, raising their own food by the cultivation of their own lands, and to a great extent supplying their other wants by their own labor, would have been substantially independent of each other, and not have needed to trouble themselves much about the mutual exchange of their surplus produce. But if the workers are to sustain themselves by the sale of articles which they cannot eat, as M. Louis Blanc proposed, the command of a market through which these sales may be effected becomes an indispensable condition of success. Hence arises the importance of the distributive association or store in any scheme of social improvement founded upon the union of artisans to carry on their accustomed work. But how are these stores to be formed? The answer practically given has been, By unions of consumers, who shall contribute the capital necessary to obtain the articles for their own supply, and divide among themselves the profits arising from this sale, which the shopkeeper, if he supplies that capital, puts into his own pocket. Stores of this nature can be formed by the workers for themselves without any alteration in their

accustomed methods of employment. They can be formed by a very small expenditure of capital in proportion to the business done if the rule of cash payment for all articles supplied by them is adopted. They have in themselves a natural tendency to expansion, since there is no class of persons in them interested in restricting the number of members, while the larger the store the greater is the security for the capital invested in it, and the smaller the proportionate cost of distribution. They are attractive not only by the economy which they realize, but also by the protection against adulteration afforded through their means, since they contain no body of persons benefited by adulteration. They are instruments by which the workers may gradually save up the capital needed to set themselves to work, without feeling any burden from the operation, since the savings are made out of a fund before inaccessible to them—viz. the profits on their own consumption. And this fund enables them to pay interest on the accumulations while they are in process of being made, so that the worker, while preparing the means of becoming his own employer, derives a safe and increasing income from the operation. Again, by the practice of selling at ordinary prices and dividing the accruing profit from time to time, the store is converted into a self-acting savings bank, by which the frittering away of the profits in small expenses is prevented. Thus, by laying his hands upon the thing nearest to him, within his own reach, the supply of his own consumption, the artisan may see the prospect held out to him by Louis Blanc continually drawing nearer, distribution constructing the road leading to production. But to complete this road a further operation is necessary—viz. that the local centres of supply shall be collected under some common head, by which the aggregate wants of large districts may be ascertained, and so a market be obtained for the productive associations, when formed, sufficiently large to absorb their productions. Now this operation is facilitated by the system of distribution existing in society as it is—the well-known division of retail and wholesale trade. Between the consumer and the actual producer there intervene at present not only the retailer, but the dealer from whom this retailer obtains the goods he supplies, and if those goods are not produced at home, but imported, a further set of importers and dealers from whom they buy, and brokers through whom these purchases are made, which we need not specify. For their own advantage, to make the system of self-supply complete, the consumers must therefore form for themselves wholesale centres, whence their local stores may obtain the goods supplied by them, and these centres, when formed, furnish natural channels through which the articles produced by co-operative manufacturing societies may be distributed to the consumers, with a certainty that the proportion between supply and demand shall always be duly preserved, since the production will be founded upon the ascertained wants of the districts supplied. Upon the system thus sketched co-operation has grown up in the United Kingdom with a rapidity of which the following statistics will give an idea: At the close of 1844 the celebrated Rochdale Pioneers' Society was founded by seventeen weavers, with a total capital of £28. At the present time its share capital has risen to £133,000, of which £46,000 is applied to carry on the business, £20,000 being represented by business premises, machinery, and fixtures, and the remainder is invested in the shares of or loans to various other societies, or in land or cottage buildings, of which it owns 122. At Christmas, 1872, it had 6444 members; its business during the year 1872 was £267,000; its income from all sources, £33,646; and its average dividend to its members on their purchases 2s. 3d. in the pound. The extent to which the example set by Rochdale has been followed is shown by a statement compiled from official returns, published in 1872 for the year 1871, laid before the Co-operative Congress which was held in April, 1873, at Newcastle-on-Tyne, and showing also the localities in which co-operation has spread most widely in England:

	Lancashire and Yorkshire.	All other counties.	Total of England and Wales.
Property and stock ins'd	£701,570	£484,991	£1,186,564
Members end of 1871.....	157,225	104,963	262,188
Share capital " ".....	£1,868,729	£442,222	£2,305,951
Capital " ".....	174,862	40,691	215,553
Cash sales during 1871....	6,082,585	3,856,583	9,439,471
Average stock.....	658,050	374,487	1,029,446
Total expenses.....	200,747	187,974	388,721
Int. on shares and loans	82,556	18,182	100,778
Liabilities.....	2,157,817	708,501	2,856,318
Assets.....	2,308,048	717,519	3,025,567
Disposable net profits....	438,307	232,414	670,721
Dividend to members....	388,659	194,613	583,290
" to non-members.....	10,708	51,542	16,248
Applied to education.....	4,126	671	5,097

The statement, indeed, is not perfect, since it takes no notice of Scotland, where there were 255 registered societies, but of which 70 only had made returns to the registrar; and it relates only to about nine-tenths of the societies believed to exist in England and Wales, because no returns had been made from the other tenth. But of these 746, twenty-two only were formed for manufacturing purposes other than the preparation of flour. The collective share capital of these societies (excluding a cotton-factory at Rochdale, within the immediate influence of the Equitable Pioneers, which possessed £93,656) was only £22,195, giving an average of about £1050, while the share capital of the 724 other societies gives an average of about £3050, although the successful conduct of manufacturing operations demands a much larger capital than is needed by a store, which deals for ready money. This fact seems to us a striking proof of the advantage possessed by the method of beginning by organizing distribution, and thus accumulating the capital required for productive enterprise, over that which seeks to obtain the capital at once out of the contributions of the intended workers. A confirmation of this view is afforded by the experience of the Continent: 1st, in the history of French co-operation; 2d, that of the system of co-operative banks introduced by Mr. Schultze Delitzsch into Germany. In France a number of societies sprung up in 1848 under the influence of the ideas of which M. Louis Blanc's *organisation du travail* is the most brilliant expression; and of these many appear still to subsist; indeed, the number is said to have increased of late, and of those which subsisted at the outbreak of the German war, none failed either from the pressure of the siege or the action of the Commune. (*Letters of M. Merlot, and Monsieur Herbart Valleroci's report to Bolton Congress, 1872, p. 99.*) But they do not appear to have made any striking progress. Monsieur Merlot speaks of the want of capital to obtain the instruments of manufacture and a reserve fund to meet embarrassments as the great obstacles to their success. M. C. Limousin, in a monthly journal recently established at Paris, called "*Le Bulletin du Mouvement Social*," ascribes it—1st, to a refusal to use capital supplied by persons outside; 2d, to the not giving any share of profits to the workers not members; and 3d, to an extreme distrust of those elected to direct the undertakings, so that they are constantly removed. Now, for all these evils an appropriate remedy appears to be provided in the creation of a central fund for the promotion of such productive establishments through the accumulative savings of the consumers to whom the articles manufactured may be sold; for of this capital the workman can feel no jealousy, since it is really supplied by himself. The consumer may counteract the spirit of exclusiveness proper to the factory by the spirit of free admission natural to the store when profits are divided upon purchases; and they may regulate, by the governing action of the distributive stomach, the distrustful impatience of the producing members.

While France has thus been slowly groping her way to productive union, in Germany a peculiar form of combined action has sprung up, suited to the condition of labor in that country. It consists in the formation of local associations for the joint purchase of raw materials, or for obtaining advances of capital by the poorer classes, on terms as advantageous as those at the command of the richer, introduced in 1859 at the suggestion of Mr. Schultze Delitzsch. This movement so prospered that at the end of 1871 it numbered 2059 societies with 1,200,000 members, a subscribed capital of £4,700,000, a loan capital of £12,750,000, and a turn-over of £60,000,000; while in association with it there existed 404 societies connected with manufactures, and 827 stores. (*Report for 1871, by Mr. Schultze Delitzsch, published 1872.*) A similar system has recently grown up with great promise of success in Italy.

To complete this sketch, we must add that both in Germany and in England central associations adapted to bring the separate societies into collective action are in operation, and are beginning to exercise a powerful influence. In Germany the function of the central body appears at present confined to the collection and diffusion of accurate information as to the condition of the local societies, by which they may be guided in their dealing with each other, and to the discussion of any matters affecting generally the interests of the members. In England, while this function has been discharged for the last four years by an annual congress of delegates from various co-operative societies, and by a central board appointed by them to keep alive the sacred fire during the rest of the year, this central board, by the resolutions of the congress held at Newcastle in 1873, was reorganized with the view of giving it increased efficiency. A great advance towards the practical combination of the local distributive stores into a common action for the supply of the wants of large districts has been made by the

formation in 1864. at Manchester, of the North of England Wholesale Society, now called "The Wholesale Society," as the federal head of a mass of co-operative societies, by whom its capital is subscribed, and by whose delegates at their quarterly meetings its governing body is appointed and its operations controlled. Commencing with a capital of £1000 and a business in its first year of little more than £40,000, "The Wholesale" has grown year by year, till in April, 1873, it embraced 277 shareholding societies with 134,276 members, and had made sales amounting during the last quarter to £303,697, and during the year to £1,153,132—an increase of nearly 52 per cent. on the sales of the year preceding. (*Report of Congress at Newcastle.*)

The time has arrived, in the opinion of English co-operators, when the step may safely be taken through this wholesale organization to manufacture articles which the consumers commonly require. Accordingly, "The Wholesale" has recently commenced the manufacture of biscuits, and has decided to begin that of boots and shoes, in which 59 societies only in connection with it had, according to their accounts, an annual trade of £66,876. They are also arranging to enter upon the Manchester trade for the supply of drapery, hosiery, etc., articles constituting no inconsiderable part of the large amount of business done by the stores, which does not now pass through "The Wholesale." This step therefore will probably open the way to other productive fields of manufacturing enterprise.

During the last year also a very promising beginning has been made in uniting banking business to the other modes of co-operative effort, thus making the large accumulated balances of the stores available for the extension of co-operation.

The brief sketch given above may suffice to show how noble a prospect lies beyond the gentle unimposing pass leading from the world where man is the slave of capital to the world where capital shall become the servant of man. The housewives who watched that the kettle did not boil over during ages past little imagined the part that steam was one day to play, and the heads of poor families who have joined in buying a chest of tea and dividing it amongst them, have as little foreseen that they were playing with a power which could turn the worker into his own employer, and rearrange the distribution of wealth among mankind.

The student of social science will find the first act legalizing co-operative societies in England in the statute-book of 1852 (15 Vict., c. 31), and may trace the development of the movement in the subsequent acts 17 and 18 Vict., c. 25, 19 and 20 Vict., c. 40, 25 and 26 Vict., c. 87, 30 and 31 Vict., c. 117, and 34 and 35 Vict., c. 80.

THOS. HUGHES, M. P.

**Coop'er Riv'er**, in South Carolina, rises in Charleston co., and flowing south-eastwardly unites with Ashley River to form Charleston Harbor.

**Coop'er's Creek**, a stream in the interior of Australia, formed in Queensland by the junction of the Victoria and Thomson creeks, flows southward, and empties itself into the salt lake Gregory. Cooper's Creek has a tragic interest, from the fact of the explorers Burk and Wills having perished in its vicinity.

**Cooperstown**, capital of Otsego co., N. Y. (see map of New York, ref. 5-H, for location of county), is pleasantly situated on R. R. and at the S. end of Otsego Lake. The lake is 9 miles long, and is traversed by steamboats. Cooperstown has a union school and academy, a hospital, and an orphan asylum. Pop. in 1880, 2199.

**Cooperstown**, Dak. See APPENDIX.

**Cooper Union**. See COOPER (PETER), by J. C. ZACHOS, Curator of Cooper Union.

**Cooper's Well**, an artesian mineral spring, 4 miles from Raymond, Hinds co., Miss. Its water is an active saline chalybeate, and is much visited for the cure of chronic diarrhoea, dyspepsia, and many other diseases.

**Co-or'dinates**, in mathematics, a system of lines or surfaces by which the position of a point is determined. If, for example, three lines,  $x$ ,  $y$ ,  $z$ , be so drawn that each is perpendicular to the plane of the other two, lines may be drawn from any point in space perpendicular to each of the intersecting planes, and the length of the perpendiculars being known, the position of the point will also be known. Two rectilinear co-ordinates are sufficient to determine any point in a plane. If the co-ordinates are so inclined to each other as to form any oblique angles, determining lines may be drawn at similar angles from the point. In polar co-ordinates an initial axis is assumed (one extremity of which is called the pole), and an initial plane passing through the axis. The co-ordinates of any point are the radius vector, its angle with the polar axis, and the angle between the vectorial and initial planes. Various other systems of co-ordinates are employed in analytical geometry ;

*e. g., trilinear, triangular, tetrahedral, tangential, elliptic, spherical, etc.*

**Coorg**, a province of Southern India, is situated between lat.  $11^{\circ} 56'$  and  $12^{\circ} 45' N.$ , and is bounded by Mysore, Malabar, and South Kanara. Area, 1583 square miles; population, 178,312. The country is high and mountainous; its general elevation is about 3000 feet above the level of the sea, and its highest peak, Tandiandamol, rises 5781 feet. It is drained by the Cauveri, which rises on the eastern side of the Western Ghats, and a number of minor streams, which rise in the country itself and during the rainy season carry great masses of water. Parts of the surface are covered with dense forests—teak, sandalwood, red and white cedar, ebony, etc.—with an undergrowth of cardamon, wild pepper, arums, and ferns. In the fields rice is cultivated and excellent fruit is raised, especially oranges. The fauna comprises the elephant, tiger, tiger-cat, hunting-leopard, wild-dog, elk; several species of deer, wild-boar, the cobra di capello, and the alligator. The inhabitants are of Dravidian origin and speak a Canarese dialect. They are well formed, bold, and active, but ignorant and unskilled; the only manufacturing industry they have developed is a kind of coarse blankets used as garments. They are also superstitious, having retained the devil-worship of their ancestors. Polyandry and polygamy prevail among them, the wives of the brothers of a family being considered as common property. They were governed by independent rajahs of the Nair caste from 1583 to 1834, when the mismanagement of Viraraja caused England to interfere and annex the country.

**Co'os** [Κῶς], the New Testament name (Acts xxi. 1) of the island of Cos (which see), a small island at the eastern entrance of the archipelago, celebrated in ancient times for its light woven fabrics, its excellent wines, and more especially for its famous temple of Æsculapius, which was virtually a museum of anatomy and pathology, from its votive models, and to which was attached a school of physicians. The chief town, of the same name as the island, stood on the north-eastern shore, near the promontory of Scandarium, and derived considerable importance from its position as an intermediate station between Miletus and Rhodes. St. Paul passed a night there on his third missionary journey. The history of the island has many interesting points of connection with the Jews. From the edict of Simon Maccabæus (1 Macc. xv. 23) we learn that many Jews were settled in the island, and Josephus ("Ant." 24. 7) tells us that during the Mithridatic war the Jews of Cos were very wealthy.

**Coos'a**, a river of the U. S., is formed by the Etowah and Oostenaula, which unite at Rome in Georgia. It crosses the eastern boundary of Alabama, flows south-westward, and then southward, until it unites with the Tallapoosa on the southern border of Elmore co., Ala. The stream thus formed is the Alabama River. The length of the Coosa is estimated at 350 miles.

**Coos Bay**, the principal seaport of Southern Oregon. Its entrance, just N. E. of Cape Arago (lat.  $43^{\circ} 20' 38'' N.$ , lon.  $124^{\circ} 22' 11'' W.$ ), is very good, and its bar has fourteen feet of water at high tide. The Coos River flows into it. Four miles from the bar, on the S. shore, is Empire City, the capital of Coos co.; and four miles from the mouth of the river is Marshfield, an important coal-mining centre. The bay is important chiefly for its vast quantities of tertiary lignitic coal, which is found on the S. side over a large area. It is by many regarded as the best coal on the Pacific coast, but is inferior to the bituminous coals. The bay is surrounded by an elevated and densely timbered region.

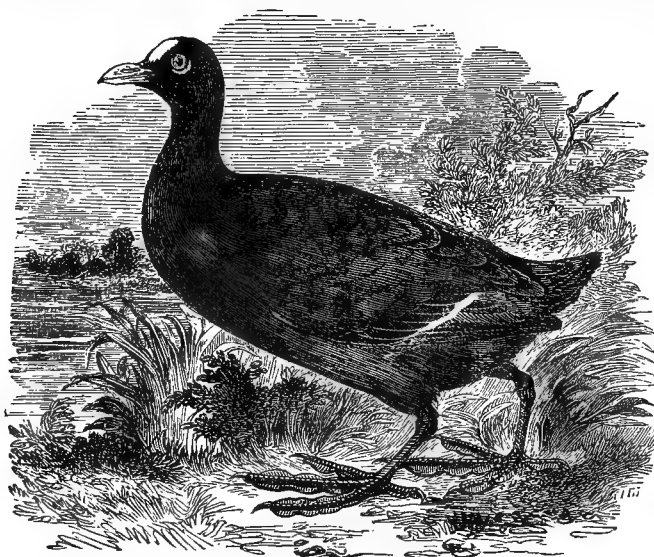
**Coosy**, a river of India, rises on the southern slope of the Himalayas, in lat.  $28^{\circ} 25' N.$ ; receives several affluents, among which is at least one from the northern side of the mountains; reaches the plain in lat.  $26^{\circ} 45' N.$ , at which point it carries a greater volume of water than the Ganges at Hurdwar; flows through the state of Nepal and the district of Purneah; and joins the Ganges, after a course of 325 miles, in lat.  $25^{\circ} 19' N.$  There is another but smaller river of the same name in India, entering the Hoogly from the right, just below Calcutta.

**Coot**, a name applied in America to several birds, chiefly ducks of the genus *Fuligula*. Among these are the box coot, or surf duck, of the E. and W. coasts of North America, the broad-billed coot, the white-winged coot, or velvet duck, and other species. In the South the name is given to the sora rail (*Ortygometra Carolina*). The name coot in England is generally applied to the *Fulica atra*, a wading bird allied to the rails. The *Fulica Americana*, found in nearly all parts of North America, is the bird to which the name coot should be restricted in this country.



In its habits the coot very much resembles the water-hen. It lives in lakes or large ponds, or along the quiet banks of calm rivers, feeding upon molluscs, insects, and similar

He was elected a Royal Academician in 1848. Among his works are "Lear and Cordelia" (1850), "Royal Prisoners" (1855), "Departure of the Pilgrim Fathers" (1856), and frescoes in the Parliament House.



Common European Coot.

creatures, which it finds either in the water or upon land. It is an excellent swimmer, swift and strong, its toes being fringed with a wide flattened membrane on the edges, which present a broad surface to the water. It walks quickly and not without a certain grace, and when it perches it grasps the branches firmly, owing to the contraction of the foot. In winter it often goes down to the sea.

**Coote** (Sir EYRE), K. B., an able general, born in Ireland in 1726, went to India in 1754, became governor of Calcutta (1757), fought at Plassey in the same year, took Pondicherry in 1761, became commander-in-chief in India (1769), and defeated Hyder Ali in 1781. Died April 26, 1783. His nephew, of the same name, served against the Americans in the Revolutionary war.

**Copaíba** [a word of Brazilian origin], **Balsam of**, a stimulant, diuretic, oleo-resinous drug, which has decided value in diseases of the mucous membrane, is obtained chiefly from Pará in Brazil, though the trees which produce it grow extensively in many parts of tropical America. These trees are of many species or varieties, belonging to the genus *Copaifera* and the order Leguminosæ.

**Copa'is** [Gr. *Kωράϊς*], the ancient name of a lake of Boeotia, now called **Topolias**. It receives the river Garios, the ancient Cephissus. The extent of the lake varies at different seasons, and in summer it nearly all disappears. It is drained by artificial and natural subterranean channels into the sea. The lake is, indeed, simply formed by the circumstance that the subterranean channels are not always capable of carrying away the volume of water which the Cephissus and its affluents bring down into the basin. It was once famous for its eels.

**Copal** [a term of Mexican origin], a name applied to several resins used in preparing varnishes. The copal of commerce is usually a nearly colorless, translucent substance, which is imported from tropical America, India, and Eastern and Western Africa. The American copal comes from leguminous trees of the genus *Hymenæa* and allied genera. Zanzibar copal is the best. It is from *Trachylobium Hornmannianum*.

**Copan**, a ruined city of Central America, in Honduras, on the Copan River, about 30 miles E. of Chuquimula. The remains, which extend nearly two miles along the river, comprise a temple 624 feet long and several pyramidal structures, with sculptured idols resembling those of the ancient Egyptians. (See STEPHENS, "Central America.")

**Copartnership**. See PARTNERSHIP, by PROF. T. W. DWIGHT, LL.D.

**Cope** [Lat. *capa*; Fr. *chape*], a sacerdotal cloak reaching from the neck to the ankles, and open in front. It appears to have been modelled by Pope Stephen in 286, on the Roman *lacerna*, or hood. It is one of the vestments of the English Church, but is now seldom worn.

**Cope** (CHARLES WEST), R. A., an English historical painter, born at Leeds in 1811, was the son of an artist.

**Cope** (EDWARD DRINKER), an American naturalist, a grandson of Thomas P. Cope, noticed below, was born in Philadelphia July 28, 1840. Before he reached the age of twenty he had distinguished himself in herpetology. In 1864 he was appointed professor of natural science in Haverford College, which position he resigned on account of ill health in 1867.

Professor Cope has made numerous contributions to the "Proceedings of the Academy of Natural Sciences of Philadelphia," to the "Transactions of the American Philosophical Society," to *Silliman's "American Journal of Science,"* and other similar journals. Among his most important publications are the following: "Primary Groups of Batrachian Anura" (1865); "Systematic Arrangement of the Lacertilia and Ophidia" and of the Class "Reptilia" (1864-70); "Systematic Relations of the Fishes" (1871)—the two former based on a careful examination of the specimens in all the principal museums of Europe; the last on the unequalled collection made by Professor Hyrtl of Vienna (now in the possession of Professor Cope)—"On the Origin of Genera" (1868); "Synopsis of the Extinct Batrachian Reptilia and Aves of North America" (1869-70); "On the Hypothesis of Evolution, Physical and Metaphysical" (1870); "Extinct Reptilia and Fishes of the Cretaceous Beds of Kansas" (1872); "Systematic Relations of the Tailed Batrachia" (1872), based on Doctor Baird's admirable preparations (the finest ever made in that department); and a work entitled "The Extinct Vertebrata of the Eocene Formations of Wyoming" (1873), describing many of the most remarkable types of Mammalia ever discovered, being the oldest known from the tertiary formations.

**Cope** (THOMAS PYM), a distinguished merchant of Philadelphia, born in Lancaster co., Pa., in 1768. He commenced business in Philadelphia in 1790, and in 1821 established the first line of packets between that city and Liverpool. To his energy Philadelphia was chiefly indebted for the supply of water from the Schuylkill and for the establishment of the Mercantile Library. He was a member of the Society of Friends. Died Nov. 22, 1854.

**Copeck**, or **Copeck'**, a Russian coin, the first ever used in that country as currency. The copecks were originally made of silver, but copper copecks were afterwards coined. As the ruble equals one hundred copecks, the value of the copeck varies with that of the ruble, the principal difference being between the silver and the paper ruble.

**Copenha'gen** [Dan. *Kjöbenhavn*, i. e. "merchants' haven"], the capital of Denmark, is situated partly on the eastern coast of the island of Seeland and partly on the island of Amager. It is a seaport on the Sound, near its junction with the Baltic. Lat. 55° 40' N., lon. 12° 34' 7" E. The site is flat, and very little elevated above the level of the sea. It was formerly a strong fortress, and the polygonal citadel on the north-eastern side of the city was deemed impregnable. But that was one hundred years ago. Now the walls are cut through and partially broken down; the ditches are filled, and where formerly stood a fortress, stands now a spacious, elegant promenade. In spite of its old age, Copenhagen is a thoroughly modern city, busy, gay, rapidly progressing in every respect. And in spite of its comparatively small size, it is a great city on account of the life led in it. Among its buildings must first be named Rosenbergh, the "Castle of Roses," which, on account of the audacious but perfect harmony of its lines, belongs to first-class architecture. The royal palace, Christiansborg, is an immense but somewhat clumsy pile of buildings. The university and the royal theatre, not yet finished, are very fine buildings; also the metropolitan church called Frue Kirke; St. Peter's, or the German church, with a spire 250 feet high; and the church of the Saviour, with a spire of 288 feet. The University of Copenhagen, founded in 1478, is well endowed, has eighty-three professors, about 900 students, and a library of about 250,000 volumes. A museum for natural objects has just been erected, and is one of the most elegant buildings in Scandinavia. Connected with it are two observatories and a botanic garden. Here is a royal library containing 482,000

volumes, besides 15,000 manuscripts. This city is the great centre of Northern literature and art, and has several museums and collections of antiquities. The Museum of Northern Antiquities is unique, and so is Thorwaldsen's Museum, a mausoleum consisting of four buildings, in the middle of which Thorwaldsen is buried under a rosebush, while all his works are exhibited in the halls around it. The city has a deep, spacious, and secure harbor, formed by the channel between the islands of Seeland and Amager. Here is the great naval station of Denmark. Copenhagen has some manufactures of woollen and linen cloths, porcelain, sail-cloth, watches, leather, etc. Steam-packets ply regularly between this place and the ports of the Baltic. This site was occupied by a small village when Bishop Absalon founded a town here in 1168, and erected a fort. It became the capital of Denmark in 1443. It stood a siege of several months by Charles X., king of Sweden, 1659-60, and by the heroism of its citizens it saved the independence of the Danish monarchy. It was most horribly bombarded, during three days, by the British fleet (1807), and suffered great damage. Pop. in 1860, 155,143; in 1870, 181,291; in 1880, 234,850 (with suburbs, 273,323).

**Copernican Sys'tem, The**, is that astronomical theory which represents the sun to be in the centre, and the earth and planets to move round it. The name is derived from Copernicus, who, though not the first suggester of the theory, contributed far more than any other astronomer to make it popular. The merit of having first formed the general idea of the system is believed to be due to Pythagoras; Copernicus, after the lapse of centuries, again drew attention to it, and greatly increased the probability of its truth by his calculations and arguments; the glory of having matured the idea belongs to Kepler, Galileo, and others, and especially to Newton, who, through the discovery of the law of gravitation, completely demonstrated its truth. Many who reverence the name of Copernicus in connection with this system would be surprised to find, on perusing his work "*De Orbium Revolutionibus*," how much of error, unsound reasoning, and happy conjecture combined to secure for him the association of his name with that system the complete development of which may be considered as the most wonderful achievement of astronomical science.

**Copernicus**, the Latinized form of **Kopernik** (NICOLAS), a celebrated astronomer, was born at Thorn, in Poland, Feb. 19 (O. S.), 1473. His father, a Polish merchant from Cracow, died early, leaving his children in the care of Lucas Watzelrode, their maternal uncle, who became bishop of Ermeland in 1489. Nicolas studied in the high school of his town, and then in the University of Cracow. He applied himself eagerly to mathematics under Albert Brudzewski for four years, and then went to Italy, visiting first Bologna, where Dominico Maria taught astronomy, and afterwards Padua, where he became doctor of medicine in 1499. He became intimate with Regiomontanus. Through his uncle he was appointed canon in Frauenburg, 1499. He remained in Italy until 1503, and was professor of mathematics at Rome in 1501. He then entered upon his office of canon, and is found (1517-19) entrusted with the conduct of the episcopal possessions in Allenstein, and on other occasions ably conducting the cathedral's concerns. He never refused the poor his advice and care as physician. His great discovery, that the planets move around the sun, he spent many years in observations and calculations in order to verify. It was Copernicus's idea by a comparative study of the various astronomical systems of the ancients to develop a new system containing all the truth of the others, but none of their errors. The Egyptians held that Mercury and Venus revolved around the sun, but they also held that the sun, with Mars, Jupiter, and Saturn, revolved around the earth. Most of the philosophers, however, of the Pythagorean school held that the sun was the centre of the universe, and Heraclides and Nectas even went so far as to explain the phenomena of the rising and the setting of the stars from a daily rotation of the earth around its own axis. From these various systems Copernicus drew his materials, the careful digestion of which finally led to his great discovery, which he expounded in his work "*De Orbium Cælestium Revolutionibus*," finished in 1530, but not published until 1543, from a fear of persecution. He dedicated his book to the pope, and cautiously propounded his system as a mere hypothesis. According to tradition, he received the first copy of his book on the day that he died. It was published in Nuremberg (1543), in Bâle (1566), and in Amsterdam (1617). His theory was rejected not only by the clergy, but by astronomers. "The whole weight of Aristotle's name," says Hællam, "which in the sixteenth century not only biased the judgment, but engaged the passions, connected as it was with general orthodoxy and

preservation of established systems, was thrown into the scale against Copernicus. It must be confessed that the strongest presumptions in favor of his system were not discovered by himself. One of the most remarkable passages in Copernicus is his conjecture that gravitation is not a central tendency, but an attraction common to matter, and probably extending to the heavenly bodies." Died June 11, 1543. (See GASSENDI, "*Vita Copernici*," 1654; WESTPHAL, "*N. Copernicus*," 1822; D. F. ARAGO, "*Éloge de Copernic*," L. PROWE, "*Zur Biographie von N. Copernicus*," 1852-55-60-65; SZULE, 1855.)

**Copia'po**, or **San Francisco de Sel'va**, a town of Chili, capital of the province of Atacama, is on the river Copiapo, 30 miles from its mouth. It is connected with Caldera by a railway. Mines of gold, silver, and other metals occur in the vicinity. Earthquakes are here of frequent occurrence, and have sometimes caused great damage. As the region is extremely dry, the water of the Copiapo is completely used up before the stream reaches the sea. Pop. 13,381.

**Cop'land** (JAMES), M. D., F. R. S., a Scottish physician and writer, born at Deerness, in the Orkneys, in 1793. He settled in London in 1821. His most important work is a "*Dictionary of Practical Medicine*" (3 vols., 1833-58). Died July 12, 1870.

**Copley** (JOHN SINGLETON), an historical and portrait painter, born in Boston, Mass., July 3, 1737. He visited Italy in 1774, settled in London in 1776, and became a member of the Royal Academy in 1783. "*The Death of Lord Chatham*" is called his masterpiece. Died Sept. 25, 1815. His son became Lord Lyndhurst and chancellor of England. Copley's portraits are among the few significant art-memorials of the past in this country. The possession of one of them, it has been said, is an American's best title of nobility. He was the only native painter of real skill which the New World could boast prior to the Revolution. The heads of leading families, especially in New England, sat to him, and the prices he commanded and the fame he reached were remarkable for the period. His chief defect was in his coloring, but he had the hand of a master. His knowledge was acquired under great disadvantages. Till he was thirty years old he never saw a good picture, yet his portraits are prized as heirlooms. They have a life which only genius could impart.

O. B. FROTHINGHAM.

**Coppée** (HENRY), LL.D., an American officer and author, born Oct. 15, 1821, at Savannah, Ga., graduated at West Point 1845, was lieutenant of artillery till he resigned, June 30, 1855. He served in the war with Mexico 1846-48, engaged at Vera Cruz, Cerro Gordo, La Hoya, Contreras, and Churubusco (brevet captain), Chapultepec, and the city of Mexico, and as assistant professor at the Military Academy 1848-49, 1850-55. Professor of English literature and history in the University of Pennsylvania 1855-56; author of "*Elements of Logic*," 1858, and of "*Rhetoric*," 1859, of "*Grant and his Campaigns*," 1866, and of several military works, 1858-73; editor of a "*Gallery of Famous Poets*," 1858, of "*Distinguished Poetesses*," 1861, and of the "*United Service Magazine*," 1864-66; contributor to the principal reviews and magazines of the U. S., 1848-73; compiler of "*Songs of Praise in the Christian Centuries*," 1866, and became president of Lehigh University, Bethlehem, Pa.

GEORGE W. COLLUM.

**Cop'per** [Lat. *cuprum*; Ger. *Kupfer*; Fr. *cuivre*], an elementary metallic substance, was known at a very early period. Before iron was used it was the principal ingredient in domestic utensils and weapons of war. The Romans obtained the best copper from the island of Cyprus, whence its Latin name, *cuprum*, was derived. Copper is distinguished from all other metals by its peculiar reddish color. It is very ductile and malleable, and requires a temperature somewhat lower than gold, but higher than silver (estimated above 2000° F.), for its fusion. Next to silver, it is the best known conductor of electricity, being in the pure state 93.08, while silver is 100. The specific gravity of copper is between 8.91 and 8.95; atomic weight, 63.5; its symbol is Cu. It is very hard, elastic, and tough, with a tenacity only less than that of iron. It crystallizes in the regular system, forming cubes, octahedrons, etc. The principal ores of copper, besides the native metal, are the sulphides of copper, either alone or combined with other metals, such as copper glance (Cu<sub>2</sub>S), indigo copper (CuS), copper pyrites (Cu<sub>2</sub>S, Fe<sub>2</sub>S<sub>3</sub>), variegated copper ore (3Cu<sub>2</sub>S, Fe<sub>2</sub>S<sub>3</sub>); Fahs ores, containing admixtures of sulphides of copper, iron, zinc, silver, mercury, etc.; enargite, containing sulphides of copper and arsenic; oxidized copper ores, such as red copper (Cu<sub>2</sub>O) and black oxide of copper; and copper salts, such as malachite (which is carbonate of copper), silicate of copper, diopside, chloride of copper, atacamite, phosphate of copper, and arseniate of copper. All these ores contain copper; it is found also in small quantities in

most soils, in seaweed, and in the animal body. Copper forms two oxides, the protoxide ( $\text{CuO}$ ) and the suboxide ( $\text{Cu}_2\text{O}$ ); the former is found native in dark steel-gray crystals, with a specific gravity of 5.9; the latter occurs in red, translucent crystals having a specific gravity of 5.8; prepared artificially, it forms a beautiful crimson powder. Protochloride of copper is brown in the anhydrous state, and green when hydrated; it is very soluble in water. There are several sulphides of copper, the principal being the protosulphide and the disulphide, corresponding in composition to the two oxides. They are both found native, and are worked as copper ores. The carbonate of copper is sold as a pigment under the name of blue verditer, and from the subchloride of copper Brunswick green is obtained. The blue and green verdigris of commerce are made by the action of acetic acid upon oxide of copper. The blue vitriol so extensively used in dyeing and calico-printing is sulphate of copper. The smelting of copper is not a complicated process when ores are used which do not contain sulphur, but when the latter is present the operation is very tedious and difficult. The alloys of copper are of great value. Brass is copper alloyed with from 28 to 34 per cent. of zinc; gun-metal consists of 90 parts of copper and 10 of tin; bell and speculum metals contain a larger proportion of tin. Bronze is sometimes made of 91 parts of copper, 2 parts of tin, 6 parts of zinc, and 1 part of lead. Copper is found in Great Britain, Australia, South America, and Cuba. It exists in great quantities on the shores of Lake Superior, where a mass of native copper was found weighing nearly 500 tons. Metallic copper is of very great value in the arts, being especially valuable for ships' sheathing and bolts, and is also the material used in the manufacture of a great variety of wares.

**Cop'peras**, the commercial name of the hydrated protosulphate of iron, sometimes called "green vitriol." It is composed of 28.9 per cent. of sulphuric acid, 25.7 of protoxide of iron, and 45.4 of water. It is used in medicine, in the dyeing of black, and in the manufacture of ink.

**Cop'perhead** (*Aneistron contortrix*), a venomous serpent of the rattlesnake family, furnished with loral plates on the head, but without rattles. When full grown it is about three feet long, of a light copper color, with darker transverse bars. It has many local names, is nowhere abundant, but is more common in the Southern than in the Northern States. Its bite is much dreaded and often fatal.

**Copperhead**, a name which was applied to a party in the Northern States of America supposed to favor the secessionists during the civil war which divided the U. S. from 1861 to 1865. The epithet was given because this party was regarded as an insidious and secret foe to the Union.

**Copper-Mines.** See MINES AND MINING, by PROF. F. L. VINTON, E. M.

**Copper-Smelting.** See METALLURGY, by PROF. J. A. CHURCH, E. M.

**Cop'rolite** [from the Gr. *κόπρος*, "dung," and *λίθος*, a "stone"], a name given to the fossil excrement of animals. It was originally applied by Dr. Buckland to certain deposits which he found in the lias, and determined to be the fecal remains of the gigantic saurians of that period. The term has since come into universal use, owing to the discovery of similar large deposits in rocks of various ages. The true coprolites of the lias are formed like kidney potatoes, of earthy texture, black or ash-gray color, and glassy fracture. They are twisted, showing the mark of the intestine. They are generally found in heaps in particular parts of the deposit. Besides the coprolites of the lias, phosphatic nodules bearing the same name, but far more abundant, have been found. The value of these minerals is derived from the phosphate of lime of which they are partly composed. It is used with great advantage as mineral manure, after having undergone cheap chemical treatment. It is converted into a soluble superphosphate by the action of sulphuric acid. The trade in Great Britain is of great importance, and the production large. Some specimens yield when washed and powdered over 85 per cent. of phosphates. The greensand varieties yield about 60 per cent. of phosphates. The annual yield of England is from 30,000 to 40,000 tons. These coprolites contain from 4 to 5 per cent. of organic matter and a little silica, but from 70 to 80 per cent. of their whole substance is a mixed phosphate and carbonate of lime. Coprolites are not very abundant in the U. S.

**Copse**, or **Cop'pice** [from the root of the word *chop*, and the Gr. *κόπρω*, to "cut"], a name given in Great Britain to plantations of trees which are occasionally cut down for firewood, charcoal, or other purposes. There is considerable rough and rocky land in that country which yields more profit as copse-wood than by any other plan. Hop-poles, hoops, tanner's bark, etc. are among the products of copses.

**Copt** [Arabic, *Ghipt* and *Koobt*; Coptic, *Kibt*; Fr. *Copte* or *Copte*; Ger. *Kopt*; probably derived from the root of the last syllable of *Egypt*.] The Copts are a Christian people of Egypt, descended from the ancient inhabitants of that country, whose blood, however, is mingled with that of Greeks, Arabs, Nubians, etc. According to an official estimate in 1868-69 they then numbered 500,000. They are largely employed as clerks and government functionaries, while others are merchants and mechanics, and some are peasants. All Copts but the very poorest class have the title of *moallim* ("instructors").

The Coptic Church is monophysite, holds seven sacraments, of which prayer and faith are two, practises trine immersion of infants, and also circumcises male children. The liturgy is in the Coptic language, which few even of the priests understand. Rosaries of beads are used in prayer. Cymbals are employed in public worship. This Church, with that of Abyssinia, is under the Coptic patriarch of Alexandria, who, however, since the eleventh century, has resided in Cairo. It has also thirteen dioceses, one of which, Khartum (embracing all Nubia), was established in 1834. The Copts are extremely intolerant towards Christians of other churches, except the Syrian Jacobites and the Abyssinians.

Monophysitism was first brought to Egypt by Jacob-el-Baradai, a Syrian monk, and, in spite of the synod of Chalcedon (451), which condemned it, and a number of imperial edicts, which forbade it under very severe penalties, it was adopted by nearly the whole Egyptian population. The orthodox party, called "Melchites"—that is, royalists—consisted only of officials, but they were protected by the government, they commanded the army, they had the power. Indeed, the hatred between the two parties was so intense that when the Arabs invaded the country, in 638, they were hailed by the Monophysites as liberators, and actually aided by them in the conquest of the country—a mistake of which, however, the latter soon repented.

Besides the above are the United Copts, who are Roman Catholics of the Eastern rite. They are nominally under the patriarch of Alexandria, who resides at Rome and is of the Latin rite. They are governed by a vicar-apostolic, and number about 13,000. The Greek Copts (Coptic Melchites) are under a patriarch of Alexandria and four nominal bishops. They are few in numbers. Their patriarch bears the title of "Holy and blessed patriarch of the great city of Alexandria, of all Egypt, of Pentapolis, Libya, and Ethiopia, pope and oecumenical judge." That of the Coptic patriarch is "Most holy father, archbishop of the great city of Alexandria, of Babylon, of the Nomes of Egypt, and the Thebaid." The American Presbyterian mission among the Copts has met with much success.

The Coptic language is supposed to be derived from the sacred language of ancient Egypt, with a pretty large admixture of Greek, and in its later form of Arabic words. It prevailed from the time of the Ptolemies till about the tenth century, when it was generally displaced by the Arabic, except in the monasteries. It had three chief dialects, the Memphitic, the Sahidic, and the Bashmuric. The Coptic literature consists to a great extent of homilies, the lives of saints, etc., with some Gnostic works and versions of the Scriptures.

The Coptic letters are chiefly taken from the Greek, though they have added to the Greek alphabet a number of characters representing sounds not found in the classic languages; among these may be mentioned one for *kh*, one for *sh*, and one for *j*. (Those seeking further information on this subject are referred to the Egyptian grammar of the celebrated Champollion, and Peyron's and Benfey's grammars of the Coptic language; to which may be added Quatremère's "Critical and Historical Researches on the Language and Literature of Egypt," 1808.)

**Cop'ula** [a Latin word signifying a "band"], in logic, is that part of a proposition which affirms or denies the predicate of the subject, or the word which unites the two notions of a sentence—viz. the subject and the predicate. In the sentence, "Art is long," *is* forms the copula.

**Cop'way** (GEORGE), a chief of the Chippeway tribe of Indians, published the "Acts of the Apostles" (in 1838), an autobiography, a "History of the Ojibway Nation" (1851), and other works.

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**Coqua'go**, the main branch of the Delaware River, rises in the Catskill Mountains in New York. It flows first south-westward, and then south-eastward, until it unites with the Popacton at Hancock, on the line between New York and Pennsylvania. Length, nearly 100 miles.

**Coquelein** (BENOIT CONSTANT), born at Boulogne, France, Jan. 23, 1841, entered the Conservatory in Paris 1859; studied under Regnier, and made his *début* in the Théâtre

François Dec. 7, 1860; in 1863 he became a *sociétaire*. Scagnavel, Scapin, Don Juan, and Figaro in the classical comedy, and in the modern drama Pierre Gringoire, Marcel in "Les Ouvriers," the duke in "L'Étrangère," and Leopold in "Les Fourchambault" are among his most brilliant creations.—His brother, ERNEST ALEXANDRE HONORÉ COQUELIN, generally known as COQUELIN CADET, is also a celebrated actor, and a *sociétaire* of the Théâtre Français since 1876.

**Coquerel** (ATHANASE LAURENT CHARLES), a Protestant minister, born in Paris Aug. 27, 1795. He preached in Paris, and gained distinction as a pulpit orator. In 1848 he was a moderate republican member of the Constituent Assembly. Among his works is "Modern Orthodoxy" (1842) and many volumes of sermons. He was liberal in theology. Died Jan. 12, 1868.—His son ATHANASE became an eminent Protestant pulpit orator, and the leader of the liberal party that seceded when a schism occurred in the Protestant synod in June, 1872. D. July, 1875.

**Coquil'la-Nuts** [Sp. *coquillo*, a diminutive of *coco*, "cocoa-nut"], the seeds of *Attalea funifera*, a South American palm. The shells of the seeds or nuts are hard, have a close texture, and are susceptible of a fine polish. This shell is much used in turnery for the heads or handles of umbrellas, for toys and ornamental articles.

**Coquim'bo**, a province of Chili, is bounded on the E. by the Andes and on the W. by the Pacific Ocean. Area, 19,113 square miles. It contains mines of copper and other metals. Capital, Coquimbo. Pop. in 1881, 164,565.

**Coquimbo**, or **La Serena**, a seaport-town of Chili, capital of the above province, is on the Coquimbo River near its mouth. It has a good harbor, six or seven miles distant, brick houses with gardens, and a serene climate. Copper, gold, and silver are exported from it. Pop. 7138.

**Co'ra**, an ancient city of Italy, in Latium, about 36 miles S. E. of Rome. Livy mentions it as being a *colonia Latina* in 503 B. C. Few cities of Latium have more considerable remains of antiquity than Cora. Here are relics of ancient walls built of massive polygonal blocks. The site is now occupied by the town of *Cori*.

**Coracoid Bone** [from the Gr. *κόραξ*, a "crow," and *εἶδος*, "form," "resemblance," referring to some fancied resemblance between the coracoid process and a crow's beak], a bone which exists in the skeleton of most birds, of the saurians and chelonians, and also in monotrematous mammals. In the higher mammals it exists as the *coracoid process* of the scapula or shoulder-blade. In transcendental anatomy it has been considered as the hæmapophysis of the fourth (occipital) cephalic vertebra. In birds the coracoid bone is firmly articulated with the sternum on the one side and the scapula on the other, and gives attachment to certain muscles used in flying.

**Coracoid Process.** See CORACOID BONE.

**Coral** [Gr. *κοράλλιον*, said by some to be derived from *κόρη*, a "maiden," and *ἄλς*, the "sea," i. e. "daughter of the sea," Lat. *corallum*; Fr. *corail*; Ger. *Koralle*], a hard, stony, or calcareous substance, chiefly of marine origin, consisting of the aggregate skeletons of various polyps (alcyonarians, actinarians, and madrepores), and of certain tabulate aculephs, all belonging to the Cuvierian subkingdom Radiata.\* The number of species is very great, and the variety of forms and hues is almost endless. Many of them rival in beauty the finest flowers. Carbonate of lime constitutes their principal chemical ingredient. Many kinds are found along the American coasts of the Atlantic and Pacific, especially about the West Indies and Florida (which, with its reefs, is based upon coral), and along parts of the coast of Brazil, where the reefs are very dangerous to navigation; but it is in the Pacific and Indian oceans that the coral formation is most important. Among the more remarkable kinds may be mentioned the red coral (*Corallium*



Red Coral.

\* Nothing could be more incorrect than the name "coral insects" often applied to these animals; and it is scarcely correct to speak of them as "builders" of reefs and islands; for instead of working, like the bee in building her cells of wax, the coral is a part of the growth of the polyp, which the latter no more builds than the oak tree builds its own wood. It is also incorrect to speak of the coral as the "home" of these little animals, for the coral is wholly produced inside the polyp, somewhat as bones grow in the higher animals.

*rubrum*) of the Mediterranean and Red Sea, which is of value in the manufacture of ornaments, having a shrub-like form, growing to the height of about one foot, and being capable of a very high degree of polish; the still more valuable black coral (*Antipathes*); the *Millepora*, etc. (produced by aculephs, and not by polyps); the tree corals; the Meandrinæ, etc., called brain corals, the Astræas or star corals, the Madrepores, and many others, all of greater or smaller mercantile value.

**Coral Islands** are among the most striking phenomena of the tropical seas. Whitsunday Island, in the Low Archipelago in the midst of the Pacific, may serve as an example. Rising a few feet above the surface of the ocean, it forms a narrow unbroken ring, nearly circular, which surrounds a central lagoon of shallow water. When approaching it from the windward side, the voyager first perceives the line of angry surf breaking on the white beach of coral sand, in strong contrast with the deep-blue color of the sea. Behind, a garland of luxuriant verdure, its tropical forms enhanced by the noble cocoa-nut palm, extends around the island, enclosing the quiet waters of the lagoon; beyond, the broad ocean again. The island of Natupe, in the same archipelago, is likewise unbroken, but elongated and much larger, the longer axis measuring some twelve miles. Usually, however, the ring is broken by numerous channels, affording entrances into the lagoon, and transforming the ring into a circular line of islands enclosing the lagoon. Such a group is called an *atoll*, a local name in the East Indies, which has been adopted to designate these curious structures. Soundings have proved that the lagoon is always shallow, seldom exceeding a few scores or hundreds of feet in depth, while outside of the atoll the depth rapidly increases to thousands of feet at a short distance from the shore, showing that such an atoll is only the top of a large submarine mountain. Atolls are often clustered together in great numbers, and form archipelagoes. That of Paumotu, or Low Archipelago, counts eighty coral islands, having nearly all central lagoons. The Caroline (together with the Tarawan and Marshall) Islands contain eighty-four atolls. The Laccadives and Maldives are two long series of atolls, in a double row, stretching 800 miles from north to south, from the southwestern extremity of India, and continued still farther south in the Chagos Archipelago. The chief of the Maldives calls himself the sultan of the Twelve Thousand Isles, and Admiral Owen says that, counting the single islands in the atolls, this is no exaggeration.

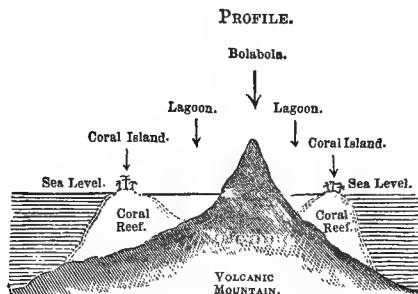
The low islands are associated with the high in a peculiar and very interesting way. A large number of volcanic islands in the Pacific are girdled by coral reef, forming either a fringe near the shore or a barrier around the island at a distance in the sea, leaving between a lagoon often miles broad, and communicating with the outer ocean by deep channels. Bolabola, one of the Society Islands, offers a beautiful example of such a combination. From its high volcanic top the eye, stretching over the quiet waters of the surrounding lagoon to the outer garland of green islands which separates it from the ocean beyond, beholds a spectacle as strange as it is lovely. Tahiti, in the same group, Hogoleu and Pouinipete Islands in the Carolines, and many others, show the same arrangement, which, in fact, differs from an atoll only in having the centre of the lagoon occupied by one or more mountain-tops.

The mode of formation of the coral islands readily explains all these peculiarities. Coral reefs are the work of minute marine animals called polyps which live in countless numbers in the tropical seas. Their structure is of the simplest kind. It is a cylindrical skin with an inside sac, the stomach, and a central opening surrounded by thread-like appendages on the top, which is the mouth, the lower end being attached to the ground. When expanded the animal resembles a flower in form and beauty of color. Between the two skins the coral substance, which is limestone, is secreted, as are the bones in the higher animals. Polyps multiply not only by eggs, but also by budding, like plants, and grow into large societies, in which generation succeeds generation, each leaving behind the solid limestone secreted by the living animal. Thus masses of organized rock are formed, which gradually expand and accumulate upward into a solid wall or reef, reaching the level of low tide. Soon, however, the process of disintegration begins. The more brittle branching corals which abound near the surface are easily broken and crushed by animals feeding on them. Boring shells and small sponges penetrate the solid reef and disintegrate it. Tidal currents and surging waves do their part in the work of destruction, and taking hold of these débris and of the coral sand, throw them on the top of the reef, thus forming the soil of an island which rises to eight or ten feet above the water, but rarely reaches fifteen feet.

Seeds of a few plants which from their hardy nature

escape being spoiled by sea-water are transported by the waves and washed on the shore, or are brought by birds, and under the influence of the warm and moist climate

*Bolabola, with Barrier, Reef, Lagoon, and Coral Islands.*



jestic cocoa-nut palms, are the most characteristic ornaments as well as the most useful representatives of the vegetable kingdom in the coral islands.

But all the conditions necessary for the formation of such an island do not exist in every part of the reef. Some portions remain covered by a shallow sea, which breaks in long, white lines over the invisible barrier. In others the reef is interrupted by deep channels, due to strong tidal currents or to the depth of the sea, which deprives the animals of a proper foundation for their structure, for it has been ascertained that the reef-building polyps cannot live in a depth greater than 100 or 120 feet. The coral reefs, therefore, cannot start from deep water; they need a foundation near the surface, and they find it in submarine mountain-peaks and volcanic cones which form most of the high islands. Growing upward, they repeat at the surface the outlines of the mountain-slopes on which they rest. To this cause the circular form of the atolls and barrier reefs is to be ascribed, and not to any organic law or instinct of the polyps, as was formerly believed, or to their situation on the brim of subaqueous craters.

The formation of the fringing reefs offers no difficulty; but it is not easy to understand why the barrier reefs are so far removed from the islands they surround. This fact, however, has been satisfactorily explained by Darwin. Having found by soundings that the base of the barrier reefs reaches sometimes as low as a thousand or fifteen hundred feet, while it is known that the polyps cannot live at such a depth, he justly infers that the mountains on which they stand have gradually sunk since the structure was begun. During the sinking process the reef, growing perpendicularly to the water's edge, preserves its form and extent, while the island is growing smaller and the surrounding lagoon larger at every step. Finally, the mountain disappearing, the growing reef becomes an atoll with an empty lagoon. Dana's extensive observations entirely confirm this view.

However full of interest and strange beauty the coral islands may be, they offer but scanty resources for man's support. They are still more deficient in means for the higher culture which is the true end of man's existence. With only one kind of rock and no metal for tools; a land without mountains, valleys, or rivers, the arable portion of which is hardly the hundredth part of its area; with a flora reduced to a few species, a fauna wanting in all large animals,—man in that isolated domain, depending for food upon the cocoa-nut and the animals of the sea, has indeed but a poor chance. Starvation, but too frequent, engenders infanticide, war, and cannibalism—evils which intercourse with civilized nations can partially prevent, but Christianity alone radically cure.

ARNOLD GUYOT.

**Cor'alline** [so called from their resemblance to the corals, to which they were formerly referred], the name of certain plants classed with the red algæ, and usually referred to the order Corallinacæ. They constitute the genus *Corallina*, and several other genera. These plants differ from all others in being of a rigid, stony character, and from the presence (in most species) of a large proportion of carbonate of lime. They are not abundant on our Atlantic coasts, but probably are of much more frequent occurrence in the Pacific. Their fructification and botanical characters are not well known. They occur abundantly as fossils. The *Corallina officinalis* is common on the northern shores of Europe, and also occurs on the Atlantic coast of British America and the U. S. The name

soon grow into a luxuriant vegetation. Variety, however, is wanting, as hardly more than a score of species compose the whole flora. Pandanus trees, and especially the ma-

coralline is often given to various marine polyps, but should be restricted to coral-like plants.

**Cora'to**, a town of Italy, in the province of Bari, 24 miles W. of Bari, is situated in a fertile plain. It has a fine church, several convents, and an orphan asylum. Pop. in 1871, 26,220.

**Coray**, or **Koray** (DIAMANT), [Gr. Ἀδαμάντιος Κοραΐς], a Greek philologist and patriot, born at Smyrna April 7, 1748. He studied medicine at Montpellier, in France, and became a resident of Paris in 1788. To promote the regeneration of Greece and the revival of the Greek nationality, he published editions of ancient Greek authors and wrote several political tracts. He was eminent as a Hellenist. Died April 6, 1833.

**Corbaux** (FANNY), an English painter and author, born in 1812, the daughter of a well-known statistician. She painted portraits and historical pieces with success, and wrote on Hebrew archæology. Died Feb. 1, 1883.

**Corbeil**, a town of France, department of Seine-et-Oise, on the river Seine and on a branch of the Paris and Orleans Railway, 18 miles S. S. E. of Paris. It has a public library, a theatre, and a corn-hall. It sends flour to Paris. Pop. in 1881, 6719.

**Cor'bel** [from the Fr. *corbeille*, a "basket;" Fr. *cor-beau*], in architecture, a projecting bracket, often sculptured like a modillion, sometimes in the form of a basket, for the purpose of supporting a superincumbent object or for receiving the springing of an arch. A corbel-table is a projecting battlement, parapet, or cornice resting on a series of corbels.

**Cor'bin** (THOMAS G.), U. S. N., born Aug. 13, 1820, in Virginia, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1866. He served as executive officer of the steam-frigate Wabash at the battle of Port Royal, Nov. 7, 1861, and is thus honorably mentioned by Flag-Officer Dupont in his official report of that battle: "I had also an opportunity to remark the admirable coolness and discrimination of the first lieutenant, T. G. Corbin. The good order, discipline, and efficiency, in every respect, of this ship are, to a great extent, the results of his labors as executive officer, and they were conspicuous on this occasion." Referring to the same action, Commander C. R. P. Rodgers writes: "It remains only for me to speak of the executive officer, Lieutenant Corbin, who has filled that post since the Wabash was commissioned. The admirable training of the crew may, in a high degree, be attributed to his professional merit; and his gallant bearing and conspicuous conduct throughout the whole action were good illustrations of the best type of a sea-officer." Retired Jan. 5, 1874.

FOXHALL A. PARKER.

**Cor'bulo** (CN. DOMITIUS), an able Roman general who flourished under Claudius and Nero. He commanded the Roman army in a war against the Parthians, whom he defeated. Nero, who was jealous of him, ordered him to be put to death in 67 A. D.

**Cor'coran** (MICHAEL), a brigadier-general of U. S. volunteers, born in Carrowkeel, Ireland, Sept. 21, 1827, died Dec. 22, 1863. He emigrated to this country in 1849, and settled in New York City. At the commencement of the civil war he departed for Washington with his regiment, the Sixty-ninth New York, and participated in the first battle of Bull Run, where he was taken prisoner and con-



fined at Richmond, Va., and Charleston, S. C., nearly a year. On being exchanged he organized the Corcoran Legion, and was made a brigadier-general of volunteers, to date from the day of his capture, July 21, 1861. He was thrown from his horse near Fairfax Court-house, Va., Dec. 22, 1863, and fatally injured. G. C. SIMMONS.

**Corcoran** (W. W.), born at Georgetown, D. C., Dec. 27, 1798, began banking business at Washington in 1823, amassed great wealth, and became famous for his magnificent charities and splendid gifts to the public. In 1847 he presented the Oak Hill Cemetery to his native city, and in 1857 the Temple of Art—generally called the Corcoran Gallery—to the city of Washington, where he also founded, in 1870, the Louise Home for indigent women. The building for the Art Gallery was begun in 1857, but during the war it was occupied by our government for the quartermaster's department. Upon its restoration Mr. Corcoran completed it, at a total cost of \$1,500,000. The Louise Home is a noble charity, and as an institution rather unique; it is designed for gentlemen tenderly reared, and who in their advanced years are left without means of support. M. P. JAMES.

**Corcy'ra** [Gr. *Κόρυφα*], the ancient name of an island in the Ionian Sea, now *Corfu* (which see). It was colonized by the Corinthians in 734 B. C., and soon became one of the chief maritime powers of Greece.

**Cord** [so called because it was originally measured with a cord or line] (of wood) is a quantity of wood equal to 128 cubic feet. Firewood is measured and sold by the cord; also tanners' bark and stable manure.

**Corday d'Armans, de** (MARIE ANNE CHARLOTTE), born in Normandy in 1768, and educated in a convent, was pious, intellectual, and enthusiastic. Her features were beautiful and her deportment dignified. She favored the popular cause in the Revolution, and sympathized with the Girondists, who were proscribed in May, 1793. Having resolved to kill Marat for the public good, she came to Paris, and with much difficulty obtained admission to his house. She found him in a bath, and plunged a knife into his heart July 13, 1793. She was guillotined a few days after this event. "In beholding her act of assassination," says Lamartine, "history dares not applaud; nor yet, while contemplating her sublime self-devotion, can it stigmatize or condemn." (See *CHÉRON DE VILLIERS*, "M. A. Charlotte de Corday d'Armans, sa Vie, etc.," 1865.)

**Cordeliers**, or **Cord-wear'ers** [from Old French *cordel*, a "cord" or "rope," so called from their girdles of knotted cord], a minor order of Franciscan or Gray Friars, was founded by Saint Francis of Assisi in 1223, and was sanctioned by Pope Honorius III.

**Cordeliers' Club**, a society of republicans formed at Paris in Dec., 1790, received this name because their meetings were held in a chapel which had been built by the Cordeliers. Danton was the first president, and among the more celebrated members were Marat, Camille Desmoulins, and Hébert. The Cordeliers clamored for the death of the king in 1793, and in conjunction with the Jacobins conspired for the overthrow of the Girondists in the same year. The society was dissolved in 1794.

**Cordia'ceæ**, a natural order of exogenous trees and shrubs, mostly natives of tropical countries. They have a drupaceous fruit, an inverted embryo, and plaited cotyledons. They are generally referred to the Boraginaceæ.

**Cór'dova**, a province of Spain, is bounded on the N. by Badajoz and Ciudad Real, on the E. by Jaen, on the S. by Malaga, and on the S. W. and W. by Seville. It is intersected by the Guadalquivir. The surface in some parts is mountainous. Area, 5189 square miles. Capital, Cór'dova. Pop. 335,582.

**Cordova** [Span. *Cordoba*, or *Cordova*; anc. *Colonia Patricia*], a city of Spain, capital of the province of its own name, is situated in a plain on the river Guadalquivir, 71 miles N. E. of Seville, with which it is connected by a railway. The river is here crossed by a noble stone bridge of sixteen arches built by the Moors in the eighth century, and defended by a Saracenic castle. The cathedral, which was originally a beautiful Mohammedan mosque, founded in 786 A. D., presents in the interior a labyrinth of columns of many orders and materials, brought from various ancient temples. Cordova contains a bishop's palace, three colleges, a city-hall, and numerous hospitals. It was formerly noted for the preparation of goat leather, called *cordovan*.\* Here are manufactures of silk fabrics, paper, silver-ware, hats, etc. The ancient *Corduba*, sometimes called *Patricia*, built 152 B. C. by the Romans, was second only to Gades among the cities of Hispania, and the birth-

place of the two Senecas, of the poet Lucan, and of the Arabic physician Averroes. This place was captured by the Moors in 672 A. D., after which it was for several centuries the splendid capital of the Western caliphs. In the tenth century it contained nearly a million inhabitants and 300 mosques. In 1236 it was taken and almost destroyed by Ferdinand III. of Castile. Pop. in 1877, 49,855.

**Cór'dova**, a town of Mexico, about 50 miles W. S. W. of Vera Cruz. It is well built, and has an active trade in sugar, coffee, and tobacco; also manufactures of cotton and woollen fabrics. Pop. about 7000.

**Córdova**, a province of the Argentine Republic, is bounded on the N. by Santiago del Estero and Catamarca, on the E. by Santa Fé and by the territory of the Indians, and on the W. by Rioja and San Luis. It is traversed by the Sierra de Córdova, from which flows the principal river of the province, the Tercero, an affluent of the Paraná. The province is celebrated for its superior pastures. Area, 54,000 square miles. Capital, Córdova. Pop. 210,508.

**Córdova**, capital of the above province, on the river Primero, 387 miles N. W. of Buenos Ayres. It has a fine Gothic cathedral and a university. Córdova exports hides and wool to Buenos Ayres. Pop. 28,523.

**Cor'dova** (José), a South American general, born at Antioquia, in Colombia, in 1797. He served under Bolívar in 1820, and fought against the Spaniards at Ayacucho in 1824. Having revolted against Bolívar, he was defeated and killed Oct. 17, 1829.

**Cordova, de** (FERNANDO FERNANDEZ), a Spanish general, born at Madrid in 1792. He was an opponent of Espartero in 1841, and became captain-general of Cuba in 1851. He was driven into exile by the revolution of July, 1854, and returned to Spain in 1856. Died Oct. 30, 1883.

**Corea**, though still maintaining certain feudal relations with the emperor of China, forms an independent kingdom of Eastern Asia, comprising the peninsula which, from Manchuria in the N. stretches southward between the Yellow Sea and the Sea of Japan, from lat. 34° to lat. 43° N.; area, 79,400 square miles; population, 8,500,000. The country is very mountainous, but well watered and, especially in the southern and eastern portions, very fertile. Along the eastern coast and in the higher mountain-regions the climate is somewhat inclement; as a general rule, the temperature sinks lower during winter and rises higher during summer than in Europe under the same latitude. Rice, wheat, millet, rye, tobacco, cotton, hemp, ginseng, and the common kinds of fruit are raised, generally of good quality, and often in great abundance; nevertheless, famines are not of very rare occurrence. The potato has recently been introduced, but is at present under a government interdiction. The fauna of the country presents cattle, horses (small, but strong), swine, dogs (a favorite article of food), a small species of tiger, the bear, and the wild boar. Sheep and goats may be reared by the king only. The country is said to be very rich in gold, silver, copper, iron, and coal; but the mining of gold is absolutely prohibited, copper is imported from Japan, and coal is very little used. The only kind of manufacturing industry in which the people really excel is that of paper.

The Coreans belong to the Mongolian race. In their artistic tastes they show much resemblance to the Japanese, while with respect to their moral sense they are more closely allied to the Chinese. They speak a Turanian language, but have adopted Chinese for literature, official business, and even in social intercourse, though they pronounce it in a manner which makes it unintelligible even to the Chinese themselves. The religion is Confucianism mixed up with various elements of native superstition. The government is an unmitigated despotism. The king has the power of life and death over every one of his subjects; to touch his person with an instrument of iron is high treason, and in 1800 a Korean king died from a harmless abscess because nobody dared apply the lancet to it. Foreigners were until recently rigidly excluded from the country. In the beginning of the present century Roman Catholic missionaries succeeded in entering the country, and in 1831 a vicar-apostolic was appointed for Corea; but in 1866 the last Europeans were expelled. In order to avenge the murder of the French missionaries a French expedition was sent to Corea, and some cities were destroyed, but no concessions were obtained. In 1875, however, the Japanese succeeded in concluding a treaty which allows them to have a permanent resident in the Korean capital, Sioul, and opened three Korean ports to their vessels, and on May 22, 1883, a similar treaty was signed with the U. S., and Lucius H. Foote was sent thither as envoy extraordinary and minister plenipotentiary. (See DALLEY, "L'Eglise de la Corée," 1874, and "The Hermit Nation.")

\*From this word are derived the old English *cordwainer* and the French *cordonnier*, a "shoemaker."

**Core'ila**, a town of Spain, in Navarre, on the Alama, 13 miles W. of Tudela. It has several oil-mills and liquorice-factories. Pop. 5023.

**Core'li** (ARCANGELO), an Italian musician and composer, born near Imola Feb., 1653. He produced, besides other works, "Concerti Grossi" (1712). Died Jan. 18, 1713.

**Coreop'sis** [from the Gr. *κόρις*, a "bug," and *ὄψις*, "appearance"], a genus of herbaceous plants of the natural order Compositæ, is named with reference to the form of the fruit. It has neutral ray florets and a double involucre. Many species of this genus are natives of the U. S., and are popularly called tickseed. The *Coreopsis tinctoria* grows wild in the plains beyond the Mississippi, and is commonly cultivated in gardens for the beauty of its flowers, which are yellow with a brown-purple centre.

**Corfû, or Korkyra**, one of the thirteen nomarchies into which the kingdom of Greece was in 1872 divided. It embraces the islands of Corfû, Paxo, Leucadia, and several smaller islands. Area, 427 square miles. Pop. 96,940.

**Corfû** [an Italian corruption of *Κορυφά*, the Byzantine name for the island, from the two "peaks" (*κορυφαί*) on which the citadel stands; modern Gr. *Κορφαί*; anc. *Κορυγία*], one of the Ionian islands, belonging since Mar. 29, 1864, to the kingdom of Greece, is separated from Albania by a channel which varies in breadth from two to twelve miles. It is 38 miles long, and has an area of 227 square miles. Pop. 75,466. The surface is hilly and picturesque, the highest points being about 3000 feet above the sea. The soil is very fertile. Olive oil is the chief article of export. Capital, Corfû. The people of ancient Coreyra waged war against Corinth. A naval battle which occurred between these powers in 665 B. C. is mentioned by Thucydides as the first sea-fight on record. Coreyra was in alliance with the Athenians in the Peloponnesian war.

**Corfû**, a fortified seaport-town, capital of the above island, is on the E. coast, 10 miles S. W. of Butrinto; lat. 39° 37' N., lon. 20° 6' 2" E. It has a safe and convenient harbor, and is defended by a citadel and two castles. It has a university founded in 1823, a cathedral, and numerous Greek and Roman Catholic churches, and a lighthouse. An archbishop of the Greek Church resides here. Corfû stands near the site of the ancient town of *Coreyra*. Pop. 16,515.

**Coriglia'no**, a town of Italy, in Cosenza, is four miles from the Gulf of Taranto and about 28 miles N. E. of Cosenza. It has a fine castle, and manufactures of woollen cloth and soap. It is near the site of the ancient *Sybaris*. Pop. 10,624.

**Corin'na** [Gr. *Κόριννα*], a celebrated Greek lyric poetess, born at Tanagra, in Boeotia, flourished about 500 B. C. She is said to have instructed Pindar in the art of poetry, and she was a successful competitor of that poet in five poetical contests. Only small fragments of her works are extant.

**Cor'inth** [Lat. *Corinthus*; Gr. *Κόρινθος*], an ancient and celebrated city of Greece, on the Isthmus of Corinth and near the *Sinus Corinthiacus* (Gulf of Lepanto), about 50 miles W. by S. from Athens. The isthmus is a sterile plain enclosed on several sides by mountains. It is subject to frequent earthquakes. Corinth commanded all the passes between the Peloponnesus and Northern Greece. It had a very favorable position for commerce, and seemed to be destined by nature to be a great maritime power. In consequence of its position it formed the most direct communication between the two principal Grecian seas—the Ionian and the *Ægean*—and became the emporium of the trade between the East and the West. It was one of the most populous cities of Greece. Its early history is obscure and mixed with fabulous legends. The family of the Bacchiadæ ruled here from 747 to 657 B. C. The Corinthians founded the colonies of Coreyra and Syracuse in 734 B. C. Periander, one of the Seven Wise Men of Greece, became tyrant (prince) of Corinth about 625 B. C., and reigned forty-four years. Soon after his death Corinth became an ally of Sparta, and was ruled by an oligarchy. The Corinthians were defeated by the Athenian general Myronides in 457 B. C. As the ally of Sparta, Corinth fought against Athens throughout the long Peloponnesian war (431–404 B. C.). In 395 B. C. Corinth united with other Greek states in a war against the Spartans, who defeated the allies in several battles. This war, called the Corinthian war, was ended by the peace of Antalcidas in 387 B. C., and Corinth then returned to the alliance with Sparta. Timophanes attempted to make himself tyrant of Corinth, but he was killed by his brother Timoleon in 344 B. C. The battle of Chæronea (338 B. C.) rendered Philip of Macedon master of Corinth, which was subject to his successors until it was annexed to the *Achæan* league in 243. At this period Corinth was the richest and most luxurious city of Greece, and abounded in statues,

paintings, and other works of art. The patron-goddess of Corinth was Aphrodite (Venus), who had a splendid temple on the Acrocorinthus. The numerous fine temples which the wealth of the Corinthians enabled them to erect gave an impulse to architecture, and the most elaborate order of ancient architecture derived its name from Corinth, which was one of the principal seats of Grecian art, but produced no eminent poets or orators.

Having been captured by the Roman consul Mummius in 146 B. C., Corinth was pillaged by his army, and nearly destroyed by fire. The most valuable works of art were carried to Rome. It remained in ruins for a century, and was rebuilt in the year 46 by Julius Cæsar, who planted there a colony of his veterans and freedmen. It soon rose again to be a populous and prosperous city, which was called *Colonia Julia Corinthus*. Saint Paul preached here, and founded a Christian church, to which two of his Epistles were addressed. Pausanias, who visited it between 150 and 200 A. D., says that it contained many things worthy of notice, some being the relics of the ancient city, but the greater part executed in the flourishing period after it was rebuilt by Cæsar. The principal monument of antiquity now remaining here is the citadel, built on a hill called Acrocorinthus, which rises 1886 feet above the level of the sea, and is abrupt and isolated. The view from its summit is singularly magnificent, and comprehends a greater number of celebrated objects than any other in Greece. The Parthenon of Athens is distinctly seen at a distance of nearly fifty English miles. According to Col. Mure, "Neither the Acropolis of Athens nor the Larissa of Argos, nor any of the more celebrated mountain-fortresses of Western Europe can enter into the remotest competition with this gigantic citadel. It is one of those objects, more frequently perhaps to be met with in Greece than in any other country of Europe, of which no drawing can convey other than a very faint notion." Among the few relics of the Greek city are seven Doric columns of a temple standing on the western outskirts of the modern town. These are five feet ten inches in diameter. Lechæum, the port of Corinth, on the *Sinus Corinthiacus*, was nearly one mile and a half from the city. The site of Corinth is occupied by a small town which the natives call *Goritho*. It was severely injured by an earthquake in Feb., 1858. A plan of digging a canal through the isthmus and connecting the Ionian with the *Ægean* Sea may, however, give it a new lease of prosperity. (See *SHIP-CANALS*.) Pop. 4248.

**Corinth**, capital of Alcorn co., Miss. (see map of Mississippi, ref. 3-H, for location of county), is at the junction of the great lines of railroads connecting the Atlantic with the Mississippi and Gulf of Mexico, and the key of the system of Mississippi and Tennessee railroad communications. Pop. in 1870, 1512; in 1880, 2275.

After the battle of Shiloh, April 6–7, 1862, the Confederate army retreated to Corinth. The national army being reorganized and strongly reinforced, Halleck, who had arrived and taken command, slowly advanced on Corinth by regular approaches, arriving May 21 to within 3 miles of the place, expecting to meet with an obstinate resistance; but Beauregard, deeming it impossible for him to successfully resist, commenced (May 26) secretly evacuating, and by the 29th had removed or destroyed everything of value, retreating with his army southward to Tupelo. Halleck occupied Corinth May 30, and pursuit was given to the Confederates, but without overtaking them.

After his defeat at Iuka, the Confederate general Price retreated to Ripley, Miss., where he was joined by Gen. Van Dorn, raising the force to about 30,000. Van Dorn assuming command, and an attempt to take Corinth by surprise or force was determined upon. This movement began Oct. 2.

Gen. Rosecrans was now in command at Corinth with 20,000 men; to the former extensive line of defences inner lines had been added. Grant's head-quarters were at Jackson, Tenn., Ord's division was at Bolivar.

Van Dorn moved northward to Pocahontas on the Memphis R. R., thence down to Chawalla. Rosecrans, apprised of this advance, deemed it a feint on Corinth, and that the real object was to attack Grant or Ord, but to meet any emergency threw his forces well out to the west, in and beyond the outer line of fortifications; Hamilton on the right, Davies held the centre, McKean on the left. Col. Oliver, with three regiments, held a strong position in advance. Gen. Mansfield Lovell, with one division, held the Confederate right, Price, with Maury's and Herbert's divisions, the left, Maury's division forming the centre.

On the morning of Oct. 3, Lovell's division encountered Oliver's advance; Gen. McArthur was sent forward to develop the Confederate strength, and being vigorously attacked, was reinforced by four regiments from McKean's division. A determined fight was maintained till a successful charge between McArthur's right and Davies' left

forced him from the hill, with a loss of two guns, Davies giving ground a little also.

No doubt now existing as to the design of the Confederates, Rosecrans prepared to resist. He had barely withdrawn and rearranged his line when a furious attack on the centre forced Davies back a short distance, darkness closing the engagement.

On the morning of the 4th the attack was renewed. The advance, which was made in column by division, was subjected to a most severe direct and cross fire, sweeping it through and through; but, undismayed, the advance steadily continued, the men marching "with their faces averted, like men striving to protect themselves against a driving storm of hail." At last they reached the crest of the hill, and, charging the right centre, Davies' division gave way. Fort Richardson, and even Rosecrans' headquarters, were taken; but Rosecrans rallying the troops in person, the fort was retaken, and Hamilton's division advancing on the right, Price's column was shattered and driven in confusion.

Van Dorn's attack was intended to be simultaneous with that of Price, but the nature of the ground over which he had to advance delayed him, and, besides, he was confronted by two batteries (Williams and Robinett). His advance was, however, made, under fire of these two batteries, in the most heroic manner, by the Texas and Mississippi troops. Advancing within fifty yards of Battery Robinett through a murderous fire of grape and canister, they were met by an overwhelming musketry fire from the Ohio brigade, which drove them back to the woods. They were re-formed, and, returning to the charge, led by Col. Rogers, Second Texas, reached the ditch, only to be met again by the deadly fire of the Ohio brigade, which again broke them, and a charge was now made by the Eleventh Missouri and the Twenty-seventh Ohio, which pursued their scattered columns to the woods. By noon the battle was ended. The heroic bravery here displayed called forth the admiration of all. The remains of the gallant Col. Rogers, who fell at the ditch, were carefully buried in a separate grave by his late foe.

The national loss in this sanguinary conflict was 315 killed, 1812 wounded, and 232 prisoners. The Confederate loss was much greater, but there is no definite or official record of it. One of the Confederate historians, Pollard, admits that the loss amounted to about 4500, and Rosecrans estimated it at 9363, of whom 1423 were killed and 2248 were taken prisoners. The Confederates had 38,000 men in the battle, and the National army less than 20,000.

**Corinth, Gulf of, or Gulf of Lepanto** (anc. *Corinthiacus Sinus*), an inlet of the Mediterranean, extends between Hellas proper, or Northern Greece, and the Peloponnesus (Morea). This gulf resembles a large inland lake. In beauty of scenery it equals or surpasses the most picturesque lakes of Northern Italy. "Its coasts," says Leake, "broken into an infinite variety of outline by the ever-changing mixture of bold promontory, gentle slope, and cultivated level, are crowned on every side by lofty mountains of the most majestic forms." It extends E. and W. nearly 80 miles, without including the part called the Gulf of Patras, which is connected with the other portion by a strait less than two miles wide.

**Corinth, Isthmus of**, a neck of land connecting Attica with the Morea, and separating the Gulf of Corinth from that of Ægina. Its width varies from four to eight miles. This isthmus was the scene of the celebrated Isthmian games and the site of a famous temple of Neptune. (See ISTHMIAN GAMES.) A ship-canal is now in progress through the isthmus. (See SHIP-CANALS.)

**Corinthian Order.** This order was said to have been invented by Callicrates, a Corinthian architect, whence its name. It is more probable that it was an importation from Asia Minor. It was not generally used in Greece before the age of Alexander the Great, and the few examples remaining there do not agree sufficiently with one another to enable us to deduce rules from them for its construction. In these examples volutes are sometimes used with the acanthus leaf, as in the Choragic Monument of Lysicrates, and sometimes not, as on the Tower of the Winds. In one example found in Asia Minor the acanthus leaf is found combined with the ancient honeysuckle ornament. In the Choragic Monument the column rests upon a spreading base, while that of the Tower of the Winds has no base. The Romans greatly affected the Corinthian order, and brought it to perfection. Yet even with them it was not always the same thing, and there are more than fifty varieties of the Corinthian capital to be found either in Rome itself or in various parts of the Roman empire, all executed within the three centuries during which Rome continued to be the imperial city. From these various but not discordant examples the following general rules may be

deduced: The capital resembles a vase covered with an abacus and surrounded by one tier of acanthus leaves above another, from amongst which stalks spring out, terminating in small volutes at the angles of the abacus and in the centre of each of its sides. The column is sometimes fluted,



Corinthian Capital.

as in the temple of Jupiter Stator in Rome, or as in the fine example here given from the Porta Aurea of Pola in Istria, and sometimes without flutings, as in the Pantheon. The flutings are separated by a fillet. The column stands upon a base. Its height varies from nine and one-third to ten and one-quarter times the diameter, and the capital from one to one and a half times. The entablature is variously decorated. The architrave is usually profiled with three fasciæ of unequal height, though sometimes there are only two. The frieze is often sculptured with foliage and animals, but it is sometimes left quite plain, as in the temple of Jupiter Stator. The cornice is richly decorated with modillions, dentils, and carving upon the mouldings. Among the principal remaining examples of the order at Rome are the temple of Mars Ultor and Jupiter Stator, and the Pantheon. The celebrated little temple at Nîmes in France, called the Maison Carrée, is a beautiful specimen of the Corinthian, though it probably owes its excellence to having been built by Greek hands. CLARENCE COOK.

**Corinthians, THE FIRST EPISTLE OF SAINT PAUL TO THE**, one of the canonical books of the New Testament, written from Ephesus in the spring of the year 57, to rebuke the church at Corinth for party spirit, disrespect to the apostle's authority, licentiousness, impropriety at public meetings (and especially at the Holy Communion), vanity, and self-seeking. The apostle also settles some cases of conscience as to eating idol-sacrifices, and a point of doctrine as to the resurrection.

**THE SECOND EPISTLE OF SAINT PAUL TO THE CORINTHIANS.** Before writing the first Epistle the apostle had sent Timothy to Corinth (1 Cor. iv. 17). Timothy probably brought back a bad report; Titus was then sent, and he reported discontent at the authoritative tone of the first Epistle. The second letter is a sober and conciliatory but earnest statement of the apostle's true and just authority. When he wrote he had reached Macedonia on his way to Achaia, late in the autumn of the year 57.

**TWO APOCRYPHAL EPISTLES (OF THE CORINTHIANS TO SAINT PAUL, AND OF SAINT PAUL TO THE CORINTHIANS)**, existing in the Armenian, are worthless productions. English translations are to be seen in Whiston's "Authentic Records."

**THE EPISTLE OF CLEMENT OF ROME TO THE CORINTHIANS** has been regarded as spurious by some, but without sufficient reason, and its genuineness is now conceded. The so-called Second Epistle of Clement to the Corinthians is doubtless a part of the pseudo-Clementine Homilies, to which it is now generally referred.

**Coriolanus (CAIUS MARCIUS)**, an ancient Roman and patrician hero, who, according to tradition, received the surname *Coriolanus* because he defeated the Volsci at Corioli about 490 B. C. During a famine he advised that grain should not be distributed gratis among the plebeians unless they abandoned the right or privilege of electing tribunes of the people. For this offence he was banished. Having obtained command of a Volscian army, he marched against Rome, the citizens of which were unable to resist

him. He was at length appeased by a deputation of Roman matrons, led by his mother Veturia and his wife Volturna. The story of Coriolanus forms the subject of one of Shakespeare's most celebrated dramas. (See ARNOLD, "History of Rome.")

**Corippus** (FLAVIUS CRESCONIUS), a literary man (*grammaticus*) who was born in Africa and flourished probably in the sixth century, is known as the author of an extravagant panegyric upon Justin the Younger, who was Byzantine emperor from 565 to 578 A. D., and of a poem called "Johannis," celebrating the exploits of Johannes, a proconsul in Africa in Justinian's time. It is believed by some, but without full evidence, that he was the same Cresconius who wrote large and important collections of the canon law, and who was an African bishop of uncertain age. Corippus was a writer of ability, and those parts of his work which are now perfect are highly prized. Much mystery formerly existed with regard to the authorship of his writings, but the discovery of a fairly preserved MS. in 1814 cleared away most of the difficulties which had beset this vexed question. The above works have been often reprinted.

**Cork** [from the Lat. *cortex*, "bark;" Sp. *corcho*], the bark of the *Quercus Suber*, a species of oak growing in Spain, Italy, and the south of France. The bark may be removed annually without injuring the tree. Cork is extensively used in the form of stoppers for glass bottles, and in the construction of life-preservers and life-boats. When rasped cork is digested in water and alcohol, it leaves about 75 per cent. of insoluble matter, called *suberine*. The cork tree has been introduced successfully in the Southern States, and cork might probably be grown there with profit.

**Cork**, the most southern county of Ireland, borders on the Atlantic Ocean. Area, 2873 square miles. It is drained by the rivers Blackwater, Lee, and Bandon. The surface is diversified, and presents picturesque scenery. The coast is deeply indented with several bays and inlets, which form excellent harbors. Among these are Bantry Bay and the harbors of Cork and Kinsale. The predominant rocks are old red sandstone and mountain limestone. Here are mines of copper and coal. Capital, Cork. Pop. in 1881, 495,607.

**Cork**, a city and river-port of Ireland, capital of Cork county, is on the river Lee, 11 miles from the sea and 136 miles S. W. of Dublin by rail. It is the third city of Ireland in population. It is partly built on an island of the river, which is here crossed by nine modern bridges. Many of the houses are built of limestone, red sandstone, and brick, and the main streets are wide and well paved, but the suburbs are mean. Among the principal edifices are the court-house, mansion-house, the exchange, a custom-house, a lunatic asylum, and an episcopal palace. It contains a Protestant and a Catholic cathedral and two large Roman Catholic churches, Queen's College, the Cork Library, a medical school, two or three theatres, a fever hospital, and several convents. Here are manufactures of glass, paper, gingham, iron, gloves, etc. Cork has a large, safe, and landlocked harbor, and derives much of its prosperity from commerce. It is connected by railway with Dublin and other cities. Steam-packets ply between this port and Dublin, Liverpool, Bristol, etc. Cork returns two members to Parliament. It is supposed to have been founded in the sixth century. It is regarded as a county by itself. Pop. in 1881, 78,642.

**Cork**, EARLS OF (1620), earls of Orrery (1660), Barons Boyle of Youghal (1616), Barons Broghill, Viscounts Kinalmealy, and barons of Bandon Bridge (Ireland, 1628), Barons Boyle of Marston, Somerset (Great Britain, 1711). —RICHARD BOYLE, ninth earl, K. P., P. C., master of the buckhounds, born April 19, 1829, succeeded his grandfather June 29, 1856.

**Cork** (RICHARD BOYLE), FIRST EARL OF, a British statesman, was born at Canterbury Oct. 3, 1566. He was made privy councillor for Ireland in 1612, raised to the peerage in 1616, became earl of Cork in 1620, lord justice of Ireland in 1629, and lord treasurer in 1631. Died Sept. 15, 1643. He is known as "the great earl of Cork," and was father of Robert Boyle, the philosopher.

**Cork Har'bor**, an excellent landlocked harbor of Ireland, is formed by the estuary of the river Lee. It is large and deep enough to contain the whole British navy. The entrance, which is one mile wide, is 11 miles from the city of Cork. The harbor expands to eight miles in width. Queenstown is on an island in this harbor.

**Corleo'ne**, a town of Sicily, province of Palermo, on a hill 21 miles S. of Palermo. It has a royal college, a hospital, and several churches and convents. Pop. 14,600.

**Cor Leo'nis** (i. e. "heart of the lion"), a name of the star  $\alpha$  in the constellation Leo. It is also called *Regulus*.

**Corm** [Gr. *κόρμος*, a "trunk" or "stem"], in botany, a short, roundish, bulb-like underground stem, solid, and not scaly; as in the crocus and gladiolus. Corms are sometimes called solid bulbs.

**Cormenin, de** (LOUIS MARIE DE LA HAYE), VICOMTE, a French political writer, born in Paris Jan. 6, 1788. He became in 1828 a liberal member of the Chamber of Deputies, and under the pseudonym of "Timon" wrote political pamphlets which were successful. He was president of the committee which formed a new constitution in 1848. Among his works "Droit Administratif" (1831; 5th ed. 1840) is the most important. After the *coup d'état* of Dec., 1851, he was a member of the council of state. In 1855 he was admitted into the Institute. Died May 6, 1868.

**Cormontaigne, de** (LOUIS), a French military engineer, born in 1696. He made improvements in the art of fortification, on which he wrote several treatises. He planned the fortifications which were constructed at Metz and Thionville in the reign of Louis XV. Died Oct. 20, 1752.

**Cormorant** [Fr. *cormorant*; It. *coromarin*, i. e. "sea crow;" Ger. *Wasserabe*], (*Phalacrocorax* or *Graculus*), a genus of aquatic web-footed birds of the family Pelicanidae, characterized by a bare dilatable membrane beneath the lower mandible, extending to the upper part of the throat. The cormorant has a compressed bill, with a strong hook at the point of the upper mandible, wings of moderate length, and stiff tail feathers, used in walking.



Cormorant.

The species are distributed along the coasts of various countries of Europe, Asia, and America, and feed on fish almost exclusively. They are proverbial for their voracity. They pursue their prey by swimming and diving, and, it is said, sometimes descend to the depth of 100 feet or more. The common cormorant (*Phalacrocorax carbo*) is found on the eastern coast of North America, is mostly of a black plumage, and is about thirty-three inches long. Several other species are found in the U. S. The cormorant is trained by the Chinese, who employ it in catching fish.

**Corn** [Anglo-Saxon, *corn*; Ger. *Korn*; Lat. *far* or *frumentum*], a general name given to various seeds, especially to cereal and farinaceous grains which grow in ears and are used for food, as wheat, barley, rye, and maize. In England, corn signifies "wheat," which is the grain most extensively used for breadstuff. In the U. S. the term is commonly applied to maize or INDIAN CORN (which see).

**Corn** (*clavus*), [from *cornu*, a "horn"], a horny accumulation of epidermic cells upon the surface of the human foot, produced by the pressure of the boot or shoe. Corns may be softened by hot water or poultices, and the horny part can be carefully removed with the knife. When painful, they may be generally much relieved by the occasional application of a solution of nitrate of silver. Various surgical appliances have been devised for the relief of corns, which when neglected may give rise to serious trouble.

**Cornaceæ** [from *Cornus*, one of the genera], a small natural order of exogenous plants, mostly trees or shrubs. They have four-parted flowers, the corolla valvate in the bud, and four stamens borne on the margin of an epigynous disk in the perfect flowers. The fruit is a one or two seeded drupe. The *Cornus florida* (dogwood) and some other species are indigenous in the U. S.

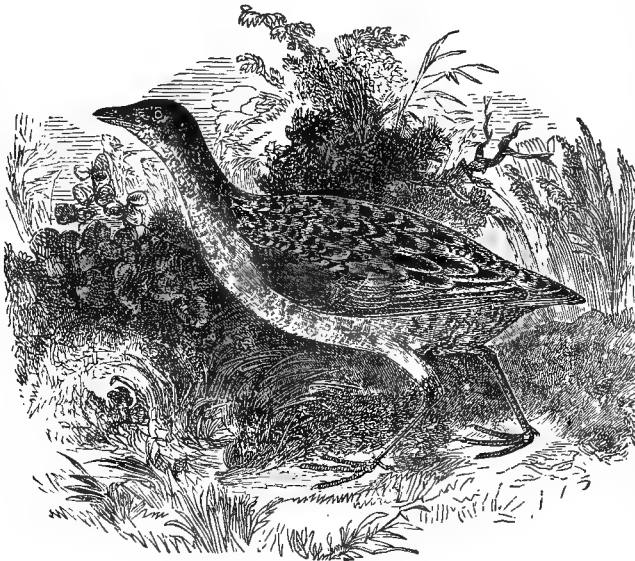
**Corn'arists**, a name applied in the sixteenth century to the followers of DIERICK CORNHEET (which see.) After the rise of the Arminian party in the Dutch Church, the Cornarists, who nearly agreed with them, disappear from history.

**Cornaro** (LUIGI), a Venetian nobleman, born 1467, died 1566, lived very freely up to his fortieth year, when he adopted an almost ascetic mode of life and put himself on a diet of twelve ounces of solid meat and fourteen ounces of wine a day. In his eighty-third year he wrote his "Sure Method of Attaining a Long Life," the English translation of which has run through more than thirty editions.

**Corn'bury** (EDWARD HYDE), LORD, afterwards third earl of Clarendon. He deserted the service of James II. in 1688, and became an adherent of the prince of Orange (William III.), who appointed him governor of New York in 1702. He was censured for rapacity and tyrannical conduct, and was removed in 1708. Died April 1, 1723.

**Corn-Crake, or Land Rail**, the *Crex pratensis*, a European bird, a rare visitant of the U. S. It is a wader, |

inspector of the picture-gallery of Düsseldorf, and from the boy was trained for artistic pursuits. | early youth



Corn-Crake, or Land Rail.

seven inches long, of a brown-gray color, haunting corn and grass lands and osier-beds. It is a game bird, quite hard to flush, as it runs rapidly away from a dog.

**Cor'nea** [*i. e.* "horny," from the Lat. *cornu*, a "horn"], the transparent horny membrane which forms the anterior part of the eyeball. In vertebrates it is simple; in insects it is divided into numerous hexagonal segments. (See EYE.)

**Corneille** (PIERRE), a celebrated French dramatic author, born at Rouen June 6, 1606, is called the founder of the French drama. He was educated by the Jesuits, and studied law, which he practised for several years without success. In 1629 he produced "*Mélite*," a comedy, which was performed with applause. Between 1629 and 1635 he wrote several comedies, which are inferior to his later works. His "*Médece*" (1635), a tragedy, although somewhat bombastic, contains eloquent passages and reveals the dawning of his genius. His reputation was greatly increased by the tragedy of the "*Cid*" (1636), an imitation of the Spanish drama of the same name. The "*Cid*" was performed with great applause, and surpassed everything that had appeared on the French stage. He produced in 1639 "*Les Horaces*" and "*Cinna*," which are excellent in invention and style. "*Cinna*" and "*Polyeucte*" (1640) are considered by some critics as his masterpieces. He was admitted into the French Academy in 1647. Among his other works are "*Le Menteur*" (1642), a comedy of character and intrigue, and an opera, "*Toison d'Or*" (1661). He died in Paris Oct. 1, 1684, and left several children. He was an uncle of Fontenelle. The French call him the "grand Corneille," partly to distinguish him from his brother Thomas. In the opinion of many critics he excelled other French dramatists in impressive declamation, sublime thoughts, and a condensed and noble style. (See FONTENELLE, "*Eloge de Corneille*;" GUIZOT, "*Corneille et son Temps*," 1852; TASCHEREAU, "*Histoire de la Vie et des Ouvrages de Corneille*," 1829.)

**Corneille** (THOMAS), a French dramatist, a brother of the preceding, born at Rouen Aug. 20, 1625. His first work was a comedy entitled "*Engagements du Hazard*" (1647). He produced in 1656 "*Timocrate*," "*Ariane*," the "*Earl of Essex*," and several encyclopædic works. Died Dec. 8, 1709.

**Cornelian.** See CARNELIAN.

**Corne'lius** (ELIAS), D. D., an eloquent and influential clergyman, was born at Somers, Westchester co., N. Y., July 31, 1794. As secretary of the American Education Society (from 1826 to 1832) he gave a notable impulse to the work of training men for the Christian ministry. Died at Hartford, Conn., Feb. 12, 1832. A few weeks before his death he succeeded Jeremiah Evarts as one of the secretaries of the A. B. C. F. M. His life was written by B. B. Edwards (1833).

**Cornelius Nepos.** See NEPOS.

**Cornelius, von** (PETER), born at Düsseldorf Sept. 23, 1784, died in Berlin March 6, 1867. His father was

the picture-gallery of Düsseldorf, and from the boy was trained for artistic pursuits. From 1811 to 1819 he studied in Rome, living in intimate intercourse with Overbeck, Schadow, Schnorr, Vogel, Wächter, etc., and thus he became one of the leaders of that revival movement which, on account of its abstract and exaggerated ideas of the glory of Germandom, is liable to provoke a smile, but which, nevertheless, has made Germany, in art as in politics, what Germany now is. After his return to Germany he settled at Munich as director of the academy, and there he decorated with frescos the Glyptothek, the Pinnakothek, and the Ludwigskirche. In 1840 he removed to Berlin, followed by a large staff of enthusiastic pupils, and there he decorated the Campo Santo. Of his frescos, the cartoons of which are widely known, the two most celebrated are "*The Last Judgment*," in the Ludwigskirche—probably the largest picture in the world, 64 feet by 30—and "*The Four Horsemen*," after the Apocalypse, in the Campo Santo. His paintings are accurate expressions of his principles. His colors are poor, his forms are often harsh, his arrangements are more or less overcrowded, and there is a general tendency in all his works to produce the effect by means of the colossal. Nevertheless, the sublimity of the conception and the energy of the execution never fail to impress the spectator, and his influence on German art has been great and lasting. His "*Life*" was written by Dr. Forster (Munich, 1871).

**Cornell** (ALONZO B.), b. at Ithaca, N. Y., Jan. 22, 1832, son of Hon. Ezra Cornell, founder of Cornell University; educated at the academy in Ithaca; telegraph-operator for some time; manager of Cleveland telegraph-office 1848, and 1855-59 of principal telegraph-office in New York City; 1864-69 cashier and vice-president of First National Bank of Ithaca; afterward first vice-president of Western Union Telegraph Co.; he became chief officer of American District Telegraph Co., and also connected with other telegraphic enterprises; chairman of Republican county committee 1859-66; 1866 member of State committee; in 1868 Republican candidate for lieutenant-governor of New York; surveyor of port of New York 1869-72; in 1870 was offered the position of U. S. assistant treasurer in New York, but declined; in 1870 was first elected chairman of Republican State committee; Speaker of assembly in 1873, 1875-76, and 1878; naval officer of New York in 1876. He was elected governor of New York Nov. 4, 1879.

**Cornell** (EZEKIEL), a brigadier-general of the Revolutionary war, born at Scituate, R. I., was a member of the Continental Congress from Rhode Island (1780-83). He founded a library in his native town.

**Cornell** (EZRA) was born at Westchester Landing, N. Y., Jan. 11, 1807. Soon after the invention of the telegraph he devoted his attention to that enterprise, became very wealthy, and in 1865 founded the CORNELL UNIVERSITY (which see). Died Dec. 9, 1874, at Ithaca, N. Y. "*Life*" published 1884.

**Cornell** (WILLIAM MASON), M. D., D. D., LL. D., a Congregational divine, was born at Berkeley, Mass., Oct. 16, 1802, graduated at Brown University in 1827. He left the ministry in 1839 on account of feeble health, studied medicine, and commenced its practice in 1845. He has contributed largely to periodical and other literature.

**Cornell College**, Mount Vernon, Ia., is an institution under the direction of the Upper Iowa and the Northwest Iowa Conferences of the Methodist Episcopal Church. The history of the school began in 1852, Miss C. A. Fortner being the first teacher. At the more formal organization as a seminary, Rev. Samuel M. Fellows, M. A., afterward president of the college, became the first principal. The school was founded and sustained during the earlier years of its existence by the self-sacrifice and earnest effort of the pioneer settlers of Mount Vernon and vicinity under the leadership of Rev. George B. Bowman, D. D.; now of San José, California. A college organization was effected in 1857, and since that time it has graduated 254 young men and women, the total number of students having been nearly 6000. There are four good buildings. The two large boarding-halls and the main college edifice, 60 by 100 feet, are of brick. The chapel is of stone, two stories high, built in the modern Gothic style of architecture; its dimensions are 75 by 106 feet. The cost of this structure was \$60,000, and it is superior to any building devoted to



educational purposes in the State. The president, Rev. W. F. King, D. D., has been at the head of the institution since 1863. The faculty consists of twenty professors and teachers, and the annual enrollment of students is over 500. For twelve years the general government has detailed an army officer to give military instruction to the students. Superior advantages are afforded for the study of music and painting. In addition to the general endowment, three chairs have been endowed by gifts of the late Bishop L. L. Hamline, the Hon. D. N. Cooley, and the alumni. The history of the institution has been marked on account of its high intellectual and religious standards, and its students have gone forth with thorough scholarship and good morals.

HAMLIN H. FREER.

**Cornell University**, a collegiate institution at Ithaca, Tompkins co., N. Y. In July, 1862, Congress granted to each State 30,000 acres of public land for every Senator and representative it was entitled to; the income to be applied for ever to colleges "where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, . . . in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." One-tenth of this may be used for experimental farms, but no portion for buildings. New York's share was 990,000 acres. By charter of 1865 and 1867 she established the Cornell University with a foundation of \$500,000, given it by Hon. Ezra Cornell of Ithaca, and secured to it the entire income of the land-grant so long as it should use the whole effectively in aid of the objects intended by Congress. It has since received over \$1,000,000 more, from the founder, from the president, Hon. Andrew D. White, and from Messrs. Henry W. Sage, John McGraw, Hiram Sibley, Dean Sage, Wm. H. Sage, Wm. Kelley, Goldwin Smith, and others; not counting funds of over \$800,000, chiefly for the library, but not yet available, bequeathed by Mrs. Jennie McGraw Fiske. It has a library of 50,000 volumes and 15,000 pamphlets, and extensive facilities for the study of physics and chemistry, natural history, and engineering (including mechanism). Its valuable collections and its library are rapidly increasing. Opened Oct., 1868, it had, Oct., 1883, 49 resident professors and instructors, 4 non-resident professors and lecturers, 423 students, including 13 resident graduates and 42 ladies, and 897 alumni.

By the charter no officer or student can be admitted or excluded for any political or religious opinions; but "at no time shall a majority [of the trustees] be of one religious sect or of no religious sect." All departments of study shall be open at the lowest rates consistent with efficiency. Each of the State's 128 assembly-districts may send yearly one student for four years' free tuition; the choice to be made by competitive examination from the best scholars, male and female, in the different academies and public schools, but subject to the usual entrance-examination at the university. Since June, 1872, both sexes are admitted on equal terms, except that lady students must be at least seventeen years of age, while boys may enter at sixteen, and must, unless excused, receive military instruction.

The university values "practical" and "scholarly" studies alike when the work is equally good. It aims to afford the best facilities for each, to encourage their combination, and, by giving large opportunity for choice among different courses, to secure the student's mental discipline through studies which, while of varied character, shall bear directly upon his chosen life-work. Especial provision is made for instruction connected with historical, political, social, and industrial science, and for laboratory, shop, and field work, both industrial and scientific; but advanced instruction is also given in the ancient and modern classics, in philosophy, pure mathematics, and the philosophy of the sciences. To promote variety of culture, and to guard against academic seclusion from the world's actual interests, the resident faculty is supplemented by non-resident lecturers distinguished for their contributions to literature, history, social or natural science.

There are five "general courses," the work in each being partly elective. The course in arts has the usual classical curriculum; those in literature and in philosophy replace Greek, and those in science and in science and letters replace both Greek and Latin, by other required studies, which always include both French and German. All these courses, and those in civil, mechanical, and electric engineering, architecture, agriculture, veterinary science, natural history, chemistry and physics, analytical chemistry, mathematics, etc., lead to bachelors' degrees. Masters' and doctors' degrees are given only upon one, two, and three years' additional study, with examinations and theses; and no merely honorary degrees are conferred. There are also "special students," candidates for no degree, aged twenty-one years

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or more, and each pursuing some single line of study in which he had made some attainment before admission.

Work equivalent to at least fifteen hours of recitation per week is required of every student. A certain proficiency, as shown by the frequent examinations, is necessary to continue him in his class, and a certain higher proficiency, to graduate him. There is no college police. Much is left to the student's earnestness and to free and manly intercourse between teacher and taught. If these fail, student is dismissed.

J. E. OLIVER, of the University.

**Cor'net** [It. *cornetto*, diminutive for *corno*; Lat. *cornu*, a "horn," because horns were anciently used as musical instruments], a musical instrument usually of brass, and originally of a curved, horn-like shape. Cornets are of various kinds, but the best form is that known as the *cornet-à-pistons* (a French term signifying a "cornet with pistons," because modifications of sound are produced by small pistons moved by the player's fingers). Cornet music is popular and brilliant, but is not considered "high art" by musical critics. Among the most famous cornet-players of the present time may be mentioned the celebrated Levy.

**Cor'net** [It. *cornetta*, a "small flag"], a commissioned officer of cavalry, corresponding in rank with the ensign of infantry. The standard was formerly carried by the cornet, hence the name. There are no cornets in the U. S. army.

**Cor'nice** [Fr. *corniche*; It. *cornice*], in architecture, the upper great division of an entablature, consists of several members, which vary in the different orders. (See ENTABLATURE.)

**Corniferous Period** [from the Lat. *cornu*, a "horn," and *fero*, to "produce," referring to the "hornstone" or imperfect flint found in its strata], in American geology, the second of the five great divisions of the DEVONIAN AGE (which see).

**Corn, Indian.** See MAIZE.

**Corn'ing**, on R. R., cap. of Adams co., Ia. (see map of Iowa, ref. 7-E, for location of county), 211 miles W. of Burlington. Pop. in 1880, 1526.

**Corning**, R. R. junction, one of the caps. of Steuben co., N. Y. (see map of New York, ref. 6-E, for location of county), 17½ miles W. of Elmira. It is the terminus of the Chemung Canal feeder, and has a school building costing \$70,000, a public library, several iron-foundries, flint glass-works, and a manufactory of railroad cars. Pop. in 1870, 4018; in 1880, 4802.

**Corning** (ERASTUS), born at Norwich, Conn., Dec. 14, 1794, became a wealthy iron-merchant and capitalist of Albany, N. Y., and was a member of Congress from the last-named State 1857-63 and 1865-67. He was one of the leading railroad capitalists of the U. S., was one of the regents of the university, and was greatly interested in the cause of popular education. Personally, he was greatly beloved on account of his genial and kindly disposition. Died April 9, 1872.

**Corn'ish Lan'guage**, a language closely akin to the Breton (Armorican) and to the Welsh. It ceased to be a spoken language about the beginning of the present century. Its use within historic times appears to have been limited to Cornwall and Western Devonshire, in England. Among the extant remains of this language are a poem on the "Passion of our Lord" (published in 1864 by the Philological Society), and a mystery entitled the "Creation of the World" (Berlin, 1865). (See NORRIS, "Cornish Grammar," Clarendon Press, 1859.)

**Corn Laws**, in England, the name given to certain former statutes for the regulation of the trade in grain. The corn laws are of ancient origin, dating as far back as 1360. There appears to have been no prohibition against importation till in 1463 an act was passed prohibiting it so long as the price at home was below 6s. 8d. a quarter. Soon after the accession of Charles II. the policy of increasing duties on importation, for protecting the agricultural and landed interest, began to prevail. An act was passed in 1670 prohibiting importation till the price had reached 53s. 4d. a quarter, and laying a heavy duty on it above that point. This law was of little benefit to the landed interest, for then and long afterwards Great Britain generally produced more grain than its population required. The price at which importation might begin was raised in 1814. There had been a tendency to what is called a "sliding scale" in the duties on importation, and this arrangement, by the act of 1823, reached what was regarded as a state of perfection. There were, however, writers and speakers who opposed the corn laws, while a powerful party maintained that they were identified with the interests of the country. They argued that protection was

necessary to keep certain poor lands in cultivation, and that it was desirable to cultivate as much land as possible, in order to improve the country. If improvement by that means were to cease, the country would be dependent on foreigners for a large portion of food. Such dependence would be fraught with great danger; in war, supplies might be stopped or the ports blockaded, the result being famine and bread-riots. Protection enabled the landed proprietors and their tenants to encourage manufactures and trade. If the corn laws were abolished half the shopkeepers would be ruined, and that would be followed by the stoppage of many mills and factories. These arguments had great influence over the shopkeepers, the laboring classes, and the learned professions. Ignorance and timidity were combined with selfishness for the support of the corn laws. Statesmen could introduce no change into the existing laws other than to reduce the import duty as the price of grain rose, in order virtually to prohibit importation when the price was low, and encourage it when high, so that at famine-prices grain might come in duty free. The effect of this fluctuation was to render the trade a gambling one; the supplies required being so irregular, foreign countries did not grow corn habitually for the British market. In 1843, Sir Robert Peel tried a modification of the sliding scale, which did not lessen the opposition to the corn laws, the nature of which was now better understood. The people, roused by Cobden, Bright, and other leaders of the Anti-Corn Law League, poured in petitions to Parliament, and at length Sir Robert Peel, now a convert to free trade, carried a measure in 1846 to abolish the corn laws. Every evil prognostication has proved false. There has been no stoppage of imports by war; manufacturers and tradesmen have been more prosperous than before the repeal; the rent of land has risen, and both tenants and proprietors are satisfied; the working-classes find more employment than before. The benefits arising from the repeal of these laws consist in the stimulus given to trade, the removal of anxiety as to the effects of scanty harvests, and less fluctuation of price. Another result was the decline of Chartism, and other schemes for radical social changes.

**Cornplanter** [Iroquois, *Garianoachia*, the "planter"], a half-breed Seneca Indian and chief of the Six Nations, born about 1732, was the son of John Abeel, a white trader. He fought the English at Braddock's defeat, and was a deadly foe to the colonists during the Revolutionary war, but afterwards became the steady friend of the white people. He was a man of great intelligence, dignity, and moral worth. Died in Warren co., Pa., Feb. 18, 1836. A monument was erected in his honor by the State of Pennsylvania in 1867. (See SNOWDEN'S "Historical Sketch of Cornplanter," 1867.)

**Corn Snake**, the *Scotophis guttatus*, a colubrine, non-venomous serpent of the Southern States, of a brown color, and often five feet long. It is generally not seen except mornings and evenings. It enters houses, devours young chickens and other small animals, but is of gentle and familiar disposition.

**Cornstone**, the lower member of the old red sandstone or middle palæozoic series of rocks, as developed in Herefordshire, England, and the adjoining counties. The name cornstone is said to have been given because the soil derived from this stratum is fertile and adapted to the production of corn (wheat).

**Cor'nu Ammo'nis**, in anatomy, a white prominence within the brain near the middle of each lateral ventricle.

**Cornucopia** [Lat. *cornucopiæ* (i. e. "horn of plenty"), from *cornu*, a "horn," and *copia*, the gen. of *copia*, "plenty"], in the fine arts, an ornament representing a horn, from which issue flowers, fruits, and leaves. The fable accounting for the origin of this emblem of plenty is, that Amalthæa, when one of her goats had broken off a horn, presented it to the infant Jupiter wreathed with flowers and filled with fruit.

**Cornutus** (L. ANNÆUS), a Stoic philosopher of some repute, flourished in the reign of Nero, was a native of Leptis, a city of Libya, resided for a long time in Rome, was the teacher and friend of Persius, but was banished by Nero, after which nothing more is heard about him. He was a voluminous writer, but the only work by him which has come down to us is his "De natura deorum," a compendium of Greek theology drawn up for the use of Stoic boys. It was edited by Frederic Osann (Göttingen, 1844). The book is curious, but deserving of attention. It contains many absurdities showing the undeveloped state of many branches of science at that time, but it also abounds in beautiful thoughts and has a particular interest as being the work of the teacher of Persius, who bequeathed his library to him.

**Cornwall**, a county forming the S. W. extremity of

England, is bounded by the ocean on all sides except the E. It constitutes a duchy, which is the appanage of the prince of Wales. Area of the county, 1786 square miles, but the duchy is larger, and includes a part of Devonshire. The surface is partly occupied by rugged hills, with some fertile valleys. The river Tamar forms the eastern boundary of Cornwall, which it separates from Devonshire. The extreme western point of the county is a promontory called Land's End. Cornwall is rich in metals, especially tin and copper. The annual average product of the tin-mines is 5000 tons. The quantity of copper obtained here annually is nearly 12,000 tons. The mining of kaolin and felspar is also important. Silver, lead, zinc, antimony, cobalt, bismuth, and iron are found here. The mines of Cornwall are deteriorating, however, both with respect to the quantity and with respect to the quality of their yield. The chief towns are Falmouth, Penzance, Bodmin, and Truro. There are in Cornwall many dolmens and other pre-historic remains. The ancient language of Cornwall, called the Cornish language, ceased to be spoken about the beginning of this present century. (See CORNISH LANGUAGE.) Capitals, Bodmin and Launceston. Pop. in 1881, 329,484.

**Cornwall**, a port of entry, capital of Stormont co., Ontario (Canada), on the N. side of the St. Lawrence River, at the foot of the Long Sault Rapids and Canal, 67 miles above Montreal, and on the Grand Trunk Railway. It has great water-power, and manufactures of woollen goods, flour, etc. Pop. in 1881, 5436.

**Cornwall (BARRY)**. See PROCTER (BRYAN W.).

**Cornwall's** (CAROLINE FRANCES), an English writer, born in July, 1736. She learned Latin and Greek, and attained a good proficiency in philosophy, history, and natural science. She published a series of twenty-two essays entitled "Small Books on Great Subjects," which are highly esteemed. Among her works, which were all anonymous, was "Pericles, a Tale of Athens" (1847). Died in 1858. A volume of her letters and remains appeared in 1864.

**Cornwallis** (CHARLES), MARQUIS OF, a British general, born Dec. 31, 1738, was the eldest son of the first earl, whose title and estate he inherited in 1762. He became a favorite aide-de-camp of the king, but he opposed the measures that provoked the American war. With the rank of major-general he took part in the battles of Brandywine and Germantown in 1777. Having obtained the command of an army in South Carolina, he defeated Gen. Gates at Camden Aug. 16, 1780. Mar. 15, 1781, he gained some advantage over Gen. Greene at Guilford Court-house, and invaded Virginia. He occupied Yorktown, which he entrenched, and remained on the defensive. Gen. Washington besieged Yorktown, and compelled Lord Cornwallis to surrender his army of about 8000 men, Oct. 19, 1781. He is regarded as the ablest of the British generals who commanded in this war. In 1786 he was appointed governor-general of Bengal and commander-in-chief of the army in India. He waged war against Tippoo Saib, whom he defeated at Seringapatam in 1792. Having returned to England in 1793, he was raised to the rank of marquis. He became in 1798 lord lieutenant of Ireland, which was then the scene of a rebellion, and he pacified the Irish by moderate measures. He negotiated the treaty of Amiens in 1802, and was appointed governor-general of India in 1805. He died in India in the same year, Oct. 5. His "Correspondence" was published by Ross (3 vols.; 2d ed. 1859).

**Cornwall on the Hudson**, Orange co., N. Y. (see map of New York, ref. 7-J, for location of county), has a public library, some manufactures, and is a place of summer resort. Pop. in 1870, 200; in 1880 not in census.

**Coro**, a province of Venezuela, is bounded on the N. and E. by the Caribbean Sea, on the S. by Carabobo and Barquisimeto, and on the W. by Maracaibo. Area, 11,250 square miles. The larger part of the province is a low plain. In the interior the Sierra de Coro rises to an elevation of 4250 feet. The form of the province is very irregular, owing to the large peninsula of Paraguaná in its northern part, which is connected with the mainland by a long, narrow isthmus. The soil is in general unfruitful, and in parts poorly watered. The more elevated portions of the mountains are covered with fine forests. The rivers are all small, except the Tocuyo and the Aroa. The chief employments of the inhabitants are cattle-raising and agriculture. It is the most sparsely peopled province of the republic. The principal products are cattle, coffee, cacao, and cotton. Capital, Coro. Pop. 72,321.

**Co'ro**, a maritime town of South America, in Venezuela, near the Gulf of Maracaibo, 155 miles W. N. W. of Valencia. It is the capital of the province of the same name. Pop. about 7000.

**Coræbus** [Κόραιβος], one of the half-mythical characters of early Greek history, an Elean chiefly noted for

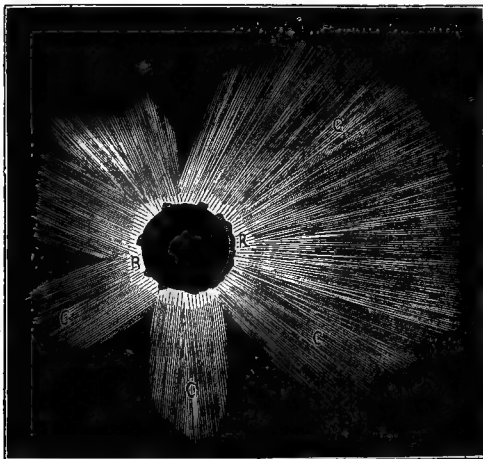
his victory in the foot-race at the Olympian games in 776 B. C. From this victory the Olympiads were reckoned. He slew the monster Pene, whom Apollo sent to afflict the Argives.—Another CORÆUS was a Phrygian hero of the Trojan war, and a suitor of Cassandra.—In Pericles' time there was a famous architect named CORÆUS.

**Corol'la** [a diminutive of the Lat. *corona*, a "crown"], in botany, the inner floral envelope of a plant. It is usually more richly colored than the calyx. Theoretically considered, the corolla is composed of modified leaves (called petals). Corollas are divisible into two classes, monopetalous and polypetalous, the latter of which have several distinct petals. The monopetalous corolla has only one petal, formed by the union of several modified leaves. The corolla is much employed by botanists in their systematic arrangements, and by the French school has been taken as the means of forming fundamental characters of the subclasses in the grand division of exogenous plants.

**Corollary** [Lat. *corollarium*, from *corolla*, a "little crown" or "garland" given in addition to wages, hence anything over and above], in mathematics, denotes something in addition to the demonstration—viz. an inference or consequence immediately deducible from the demonstration of a proposition. All the corollaries in our editions of Euclid have been inserted by editors; they may be said to constitute so many new propositions, differing from the original ones merely in the fact that the demonstrations have been omitted.

**Coroman'del Coast**, of India, extends along the E. side of the peninsula from Point Calymere to the mouth of the river Kistnah. It has no good harbor, and is heavily surf-beaten. The cities of Madras, Tranquebar, and Pondicherry are on this coast.

**Coro'na** [a Latin word signifying a "crown"], a term applied in astronomy to the glory of light seen around the sun when totally eclipsed. Halley regarded the phenomenon as owing to the existence of a lunar atmosphere, but this idea was rejected by Newton, and has since been entirely disproved. Delisle's theory, that it is due to the diffraction of the sun's light in passing tangentially by the moon's sphere, has been asserted by Sir David Brewster to



Corona as seen at Syracuse, in Sicily, Dec., 1870. R is the bright "inner corona," in which may be seen a "sierra" of glowing hydrogen. C is the "outer corona."

be untenable, since any diffraction ring thus occasioned would be too narrow to be visible from the earth. There remains only the conclusion that the corona is a true solar appendage. It appears probable, from various experiments, that the particles forming the corona are prevented from pressing towards the sun by their own motions. It is therefore supposed that they may be members of meteoric systems whose perihelia exist in the sun's neighborhood.

**Corona**, in architecture, the flat, square, massive member of a cornice, often called the drift or larmier, is situated between the cymatium and the bed-moulding. Its use is to carry the water, drop by drop, from the building.

**Corona, Coronet, or Crown**, a botanical term applied to certain appendages of the corolla, which are modifications of sterile stamens. The corona is in the interior of the corolla, and in some cases has the form of a cup, as in the narcissus. The five hooded bodies seated on the tube of the stamens of the asclepias are called the *corona*.

**Coro'na Austrā'lis, or Southern Crown**, a constellation of the southern hemisphere.

**Coro'na Borea'lis, or Northern Crown**, a constellation of the northern hemisphere.

**Cor'onach** [a Gaelic word], a dirge or lament, mingled with the shrieks and wailings of women, which is still often heard at wakes and funerals, especially in the more primitive parts of Ireland and Scotland. Traces of the same practice are found among many primitive peoples.

**Corona'tion** [from the Lat. *corona*, a "crown"], the act of crowning a monarch; the ceremony performed on the accession of a sovereign to the throne. In some countries of Europe it is customary for a bishop to place the crown on the head of the sovereign. The ceremony of coronation is a very ancient one, at least as old as King Solomon's time. Anointing often accompanies the coronation, and in Great Britain the sovereign also takes an oath to support the laws, customs, and statutes, the laws of God, the Protestant reformed religion, the Church of England, etc.; security for the Church of Scotland being promised in the oath of accession, which in some instances long precedes the coronation. For example, George IV.'s accession was Jan. 29, 1820, but his coronation was deferred nearly eighteen months—till July 19, 1821. The ceremony is performed in Westminster Abbey, but anciently took place at Kingston-on-Thames or at Winchester. The ancient customs have come down to our time with but little change.

**Coroner**, anciently **Crown'er** [Lat. *coronarius*, from *corona*, the "crown"], formerly an officer of high dignity, who served as a deputy of the Crown and as chief-justice of the king's bench in England. At present in England and most of the U. S. a coroner is an officer who in case of sudden or mysterious death summons a jury, which sits in sight of the body, to determine the cause and manner of death. Coroners may commit persons suspected of homicide after inquest, without warrant, for trial. They also hold inquests in regard to salvage from shipwrecks. They had anciently powers much greater than at present.

**Cor'onet** [from the Lat. *corona*, a "crown;" Ger. *Kranz*], in heraldry, an inferior crown belonging to the nobility. The monument of John of Eltham (second son of Edward II.), who died in 1334, is said to afford the earliest English representation of this ornament.

**Corot** (JEAN BAPTISTE CAMILLE), a French landscape-painter, born at Paris in July, 1796. Corot has produced many works, which, after having been long little esteemed, are now much sought after and command very high prices. His work is strongly individual, and in his own peculiar field Corot is unsurpassed. D. Feb. 1875. CLARENCE COOK.

**Cor'pi San'ti**, formerly belonging to the suburbs of Milan, now forms a separate city. Pop. 62,976.

**Cor'poral** [corrupted from the Fr. *caporal*, which is derived from the It. *capo*, "head," "chief"], a non-commissioned military officer, next in rank below a sergeant. He is distinguished by two chevrons worn on the arm. A "lance corporal" is a private soldier who is allowed to wear one chevron as a mark of distinction. He may or may not perform the duties of a corporal, but he has no increase of rank or pay.

**Corporal** [Lat. *corporale*, from *corpus*, the "body," i. e. the "Host"], in the Greek and Roman Catholic churches the altar-cloth used for covering the Host, and emblematical of the grave-clothes of our Lord. A "corporal oath" is an oath sworn upon the corporal. The name is retained by the ritualistic party of the Anglican Church.

**Corpora'tion** [Lat. *corporatio*, an "embodiment," the assumption of a form], in law, an artificial person, consisting of one or more individuals, having certain legal capacities, such as succession of members, powers to sue or to be sued, and to act, no matter how numerous its membership may be, as a single individual. This new person is to be thought of without reference to the members of which it is composed. It must be carefully distinguished from a partnership, in which there is merely a collection of persons, no artificial person being constituted. A contract made with the corporation is not made with the members, nor do they, in a legal point of view, own its property, though they may have an interest in its management on the theory of a trust. Corporations may be considered under the following divisions: I. Their various kinds; II. Their mode of creation; III. Their powers; IV. Visitation; V. Dissolution.

I. They may be variously classified, as regard is had to the number of members, their objects, and the fulness of their powers. When considered as to numbers, they are either aggregate (more than one) or sole. When regarded as to the objects to be accomplished, they are ecclesiastical or lay, while lay corporations are either civil or eleemosynary. It can scarcely be said that there are any "ecclesiastical" corporations in the U. S., in the proper sense of the term. They rather belong to the English law under

the rules of an established Church. Our corporations may be said to be lay. The term "eleemosynary" is substantially equivalent to "charitable," and embraces all that large class of corporate institutions established to promote religion or learning, to relieve the sick or the poor, and in general to accomplish meritorious public objects. Another division of corporations is public and private. A public corporation is designed for governmental purposes, as a city or a village. Others are private. The importance of this distinction lies in the fact that a public corporation, being a mere instrument of government, can be created or dissolved by the law-making power at will, while a private corporation only comes into existence by the conjunction of the will of the sovereign power and that of the corporators. Its charter is in the nature of a contract, and it can only be dissolved by an observance of the rules governing the dissolution or impairment of the obligation of contracts. When a corporation is regarded as to the completeness of its powers, it may be either one of full powers or imperfect in its character. In the last case it is termed a *quasi* corporation. Towns in the New England States are true corporations; in New York they are political divisions with certain specified powers, being *quasi* corporations.

II. A corporation may be created either by prescription, royal charter (see CHARTER), or by legislative act. It is said to be created by prescription when it has exercised corporate powers for an indefinite period without interference on the part of the sovereign power. By a fiction of law it is then presumed to have had a charter. The method of creating corporations by royal charter was formerly in use in this country as a branch of the English law. Of course the leading mode of creation is an act of the legislature. It is not necessary that each institution should receive a distinct and separate organization. There may be a general formula provided by the legislature with which any particular body of men desiring to become a corporation may comply, and thus become incorporated. In other words, corporations may be created under general laws as well as organized under special acts. It may be added that the legislature may act indirectly as well as directly. It may confer upon some intermediate authority the power to incorporate. In this way in New York an organization known as "The Regents of the University, etc." has the power under certain conditions to incorporate colleges and academies. To the existence of a private corporation the consent of the members is necessary. This consent may be shown either by an express act of acceptance, or by implication from the exercise of powers under the charter, technically called "user." It should have a name whereby to act or to contract, which may be from time to time changed either by special legislative act or by general law.

III. A corporation, being by fiction of law a person, may have the power to make contracts and to do most other acts possessed by natural persons. In general, however, it has capacity to do such acts as are necessary and convenient to carry forward the special ends for which it was created. At the present time it is usually formed to accomplish a definite object, and it is reasonable that it should have the authority necessary to achieve it. A corporation, like a natural person, may transgress the rules prescribed by law for its action. This fact has caused many perplexing questions to arise as to the effect of an unauthorized act. This subject is known as the doctrine of *ultra vires*—transgression of power. In such a case the better opinion would seem to be that the corporate act, considered as a contract, would be void, though the corporation might be liable to an individual injured by its negligent mode of performing an act which it had no legal authority to undertake. The ordinary powers of a corporation are to make such contracts as are necessary to the accomplishment of its purposes, to hold and acquire property, both personal and real, to have a common seal, to make by-laws for the government of its members or of others, and to elect new members or officers in the place of such as may resign, die, or be removed. The act of removing a member is termed *disfranchisement*; the same act exercised towards an officer is called *amotion*. From early times in England there have been statutes termed "mortmain acts" (see MORTMAIN) to restrain corporations from acquiring lands without license from the king. Such statutes do not, in general, exist in this country. The common practice is to limit in the specific act of incorporation the value of the land which may be acquired. If this restriction be exceeded, the title is still valid, unless the State intervenes and institutes proceedings for a forfeiture. It is a general rule that a corporation cannot acquire land by will except for charitable purposes. It is not uncommon, even in that case, for a State statute to limit the amount which a testator may bestow, or to require that the will shall be made a certain time before his death. A corporation may, like a natural person, act through agents beyond the limits of the State

where it is organized, unless restrained by law. It should be added that a corporation may commit a wrong for which it will be liable in damages, such as an act of negligence, publication of a libel, etc. It cannot, in general, commit a crime, except as resulting from a failure to perform a duty prescribed by law. In order to enforce its rights and to subject itself to its legal duties it may sue and be sued at home or abroad, although a proceeding *against* a non-resident corporation would in general be confined to the property within the jurisdiction. Corporations sometimes are made trustees for estates, guardians for minors, etc. In such a case they would be held accountable in a court of equity in the same way as other trustees or guardians.

IV. By "visitation" is meant the power of superintending the corporation and controlling its action. The subject is peculiarly applicable to the management of charitable corporations. The common law distinguishes between a founder of such a corporation, who supplies the funds for its practical working, and the sovereign power which gives it legal existence. The founder in the first sense is allowed to provide rules for the government and discipline of the college or other institution which he has established, and to designate some person or persons (visitors) who shall see that the rules are properly observed. The exercise of this power of visitation is summary, and in general without review by the courts of justice, though in extreme cases of manifest injustice it would be revised. This power in the U. S. is rarely lodged in a single person, as it frequently is in England. Boards of trustees are here entrusted with it. This doctrine does not prevent a court of equity from controlling the funds on the theory of a trust, so as to prevent waste, mismanagement, or perversion from the purposes intended by the donors. In this aspect a corporation is to be regarded as a trustee. The attorney-general, representing the State, may apply to the court to correct abuses in the management of funds which are in the eye of the law directed to public uses. When the case is sufficiently grave the charter of the corporation may be forfeited.

V. A corporation may be dissolved either by compulsory legislation, by surrender of its franchises, coupled with acceptance of it by the state, and by judicial decree. In England an act of Parliament is boundless in its operation, and a corporation may be arbitrarily dissolved by law. In the U. S. a distinction has been taken between private and public corporations. As has been already seen, a charter of a private corporation is a contract, and as, under the U. S. Constitution, no State can pass a law impairing the obligation of contracts, the power of the State legislature cannot be exercised so as to materially change the provisions of the charter without the consent of the corporators. This is the result of the celebrated "Dartmouth College case." (*Dartmouth College v. Woodward*, 4 Wheaton.) The effect of this decision is evaded in a number of the States by the insertion of a clause, either in the charter or some general law, or even in the State constitution, that corporate charters are to be held subject to alteration or repeal. This clause is valid as to all subsequent charters, which are of course accepted in reference to this legislative reservation of power. The most common mode of dissolving a corporation is by judicial decree. Every franchise is accepted on the implied condition that it shall be properly exercised. If there be abuse or neglect to make use of corporate powers, a proceeding may be instituted in behalf of the State to forfeit the charter. The abuse or neglect does not of itself destroy the charter, nor can the cause of forfeiture be presented to a court in an indirect manner. For example, it could not be urged by a debtor as creating an incapacity to sue, or by an heir as an incapacity to take an estate by will. A proceeding must be resorted to for the very purpose of forfeiting the charter. State law sometimes provides dissolution as a mode of enforcing the collection of debts, the property being regarded as a trust fund for that purpose, and a court of equity will administer it for the benefit of creditors. The U. S. statutes of bankruptcy are extended to business corporations. It was an old rule of the common law that a dissolution of the corporation extinguished its debts. Its claims could be no longer collected. Its personal property passed to the State, and its land reverted to the grantor. At present there is little room for the application of these rules. A court of equity would, in general, fasten a trust upon the property in favor of creditors, and in all business corporations for the stockholders. Charitable funds would be administered by other trustees.

(For further information consult the treatises of GRANT, ANGELL, and AMES; ABBOTT'S "Corporation Digest;" KYP "On Municipal Corporations;" DILLON "On Municipal Corporations;" KENT'S "Commentaries," lecture 33; MEREWETHER & STEPHENS, "History of Boroughs and Municipal Corporations;" REDFIELD "On Railways." Also the titles MUNICIPAL CORPORATIONS, STOCK CORPORATIONS, RELIGIOUS SOCIETIES, etc.)

T. W. DWIGHT.

**Corps d'Armée** [Fr., *kōr dar'mā*], or **Army Corps**, in the modern system of warfare, is the "tactical" unit of a large army. The Division, in the management of large bodies of troops, has been found to be too small, and hence army corps have been organized, each containing several Divisions. The management of tactical units in the field constitutes the branch of the military art known as "grand tactics." Each army corps has its own system of internal administration, and usually consists of infantry and artillery, the cavalry constituting one or more corps by itself.

**Corps Législatif**, or **Legislative Body**, was the name of the lower house of the French legislature during the Second Empire. It was established in 1852, and abolished in 1870. The deputies were elected, by universal suffrage, for a term of six years.

**Corpulency.** See OBESITY.

**Cor'pus Catholicorum** and **Cor'pus Evangelico-rum**, names given after the peace of Westphalia to the Catholic and Protestant divisions of the German empire. The elector of Mayence was the head of the Catholics, while the lead of the Protestant confederacy belonged successively to the rulers of Saxony, the elector palatine, and Sweden, and was restored to Saxony by the Diet of 1653. Both bodies were dissolved at the separation of the German empire in 1806.

**Cor'pus Chris'ti** [a Latin phrase signifying the "body of Christ," *Fr. fête Dieu*], a festival of the Roman Catholic Church celebrated in honor of the Host (which is held by that Church to be the veritable body of our Lord). It was first established by a bull of Urban IV. in 1264, and is observed on the Thursday after Trinity Sunday.

**Corpus Christi**, city, capital of Nueces co., Tex. (see map of Texas, ref. 7-H, for location of county), is situated on a bay of same name and on R. R., 8 miles below the mouth of the Nueces River, about 200 miles S. W. from Galveston. Its harbor is not surpassed on the coast, and in commercial importance it ranks among the first cities in the State. Pop. in 1870, 2140; in 1880, 3257.

**Cor'pus Doctrinæ**, the name of certain collections of theological writings which have had especial authority in the German Protestant churches. The chief collection was "Corpus Philippicum" (1560, fol.), containing the Apostolic, Nicæan, and Athanasian Creeds, the Confession of Augsburg, Melancthon's "Loca Communes," etc. The strict Lutherans reject it as leaning towards Crypto-Calvinism, and the elector of Saxony pursued with rigorous measures those who refused to teach it. This, with many other Corpora Doctrinæ, was superseded by the Formula Concordiæ.

**Corpus'cular Ac'tion**, the power or influence which the minute particles or *corpuscles* of matter exercise on each other, and which, according to some writers, is the cause of all chemical changes.

**Corpus'cular Mech'anism**, that branch of mechanical science which is concerned with the phenomena of cohesion. These phenomena indicate some relation between the centres of the particles cohering. The exact nature and cause of this relation are not known. (See COHESION.)

**Corpus'cular Philos'ophy**, a name sometimes given to the atomic philosophy of DEMOCRITUS (which see).

**Cor'pus Ju'ris Canon'ici** [Lat., signifying "the body of canon law"], a comprehensive name for the original collections of the CANON LAW (which see), including the "Decretum Gratiani" (1151), the "Decretalia" of Gregory IX. (1234), the "Liber Sextus" (1298), the Clementine Decretals (1313), etc. The best edition is that of Richter, Leipsic, 1833-39.

**Cor'pus Ju'ris Civi'lis** [a Latin term signifying the "body of civil justice"], the name applied to the legal compilations made by order of JUSTINIAN (which see), consisting of the "Institutions," the "Codex," the "Pandects," and the "Novellæ." One of the best editions is that of the Krieger Brothers, Leipsic, 1833-40.

**Corre'a de Ser'ra** (JOSÉ FRANCISCO), LL.D., a Portuguese botanist, born at Serpa in 1750. He visited the U. S. in 1813, and became Portuguese minister at Washington in 1816. He wrote several treatises on vegetable physiology, but his principal claim to literary fame is his "*Coleceno de Livros Ineditos da Historia Portugueza*" (1790-1816, 4 vols.). Died Sept. 11, 1823.

**Correg'gio**, da (ANTONIO ALLEGRI), a celebrated Italian painter, was born at Correggio, a small town between Modena and Reggio, most probably in 1494. His father, Pellegrino Allegri, was a small merchant, the owner of a moderate property in houses and lands. His mother, Bernardina Piazzoli, was of good family, belonging to the stock of the Ormani or Aromani. By his father's care Allegri was well educated, and afterwards put to study the arts of draw-

ing and painting—first, with Antonio Bartolotti, master of a school of painting in Correggio, and afterwards with an uncle, Lorenzo Allegri. From these teachers he learned the rudiments of his art, but whence came the influences that formed his peculiar manner is a question not yet answered. At one time he was said to have studied with Andrea Mantegna, but this is not now believed, though it is possible he may have lived in Mantua in his younger days, and have studied Mantegna's pictures there; among them, the magnificent "Victory" now in the Louvre. Bigi considers it proved by documentary evidence that Allegri was in Mantua in 1511, and thinks it possible that at this time he may have worked as an assistant under Andrea Mantegna's son, Francesco. But the influence of Mantegna was widely spread through the north of Italy, and it is not necessary that Allegri should have lived in Mantua to have been moved by him. Nor does he inherit as strongly from the great Mantuan as from Leonardo, and perhaps from certain Venetians, notably, as Signor Cavalcaselle thinks, from Cima, Palma, Lotto, and Pordenone. The stories first told by Vasari, and since repeated by successive biographers, of the poverty and misery of Correggio's life, of his painful efforts to support his family, of the obscurity and neglect in which he lived, and of his death, brought on by drinking cold water when overheated in consequence of carrying home sixty crowns in copper that had been given him for a picture—all these stories are now believed to be false; yet they were long credited, and it is difficult to account for the persistence of the tradition. He was well paid for his work, which was much sought after, and he was in great favor with the duke of Mantua, for whom he painted several of his most famous pictures—the "Education of Cupid" in the British National Gallery, the "Io" and the "Leda" in the Berlin gallery, the "Danæ" in the Borghese gallery, Rome, and the "Antiope" in the Louvre. Whether Correggio ever visited Rome is uncertain; his work bears no evidence of his ever having been there, and it is most likely that he never went so far from home. The story, too, that he visited Bologna, and there exclaimed on seeing the picture of Saint Cecilia by Raphael, "Anch'io son pittore!" ("And I too am a painter!") cannot be traced to any authority, and seems to have no foundation in fact. In 1519 he married Girolama Francesca Merlini, by whom he had a son, Pomponio Quirino Allegri, who also became a painter, but never attained any distinction (born 1521, died —?), and also three daughters. Correggio died in his native town suddenly of a malignant fever, Mar. 5, 1534, in the forty-first year of his age. The principal works of Correggio are the frescoes on the dome of the church of San Giovanni, and those on the dome of the cathedral at Parma, reckoned his greatest performances. The first was executed in 1520, and represents the ascension of Christ; the second, begun in 1522 and finished in 1530, represented the assumption of the Virgin. These works have given Correggio his splendid fame, but his smaller works have perhaps endeared him more to the world—his "Vierge au Panier," his "Education of Cupid" in the British National Gallery; the "Reading Magdalen" of the Dresden gallery; and the beautiful "Notte," or "Night," a picture of the Nativity, called so because the light all streams from the head of the infant Christ; the "Marriage of Saint Catherine" in the Louvre; the "Madonna and Child" in the Uffizi gallery in Florence; and the "Madonna" in the Naples gallery, called the "Zingarella," or the Gypsy, because of her singular head-dress. (VASARI, "Lives of Painters and Sculptors," "Life of Antonio da Correggio," with additional notices in his life of Girolamo Carpi; PADRE LUIGI PUNGILEONI, "Memorie storiche di Antonio Allegri," Parma, 1818; QUIRINO BIGI, "Discorso di Ant. Allegri," Parma, 1860, and a later work on the subject by the same author, "Notizi di Antonio Allegri e di Antonio Bartolotti, suo maestro," Modena, 1873. But chiefly for an exhaustive account of Correggio's life and works see the article (since reprinted as a separate work) "Antonio Allegri," by Dr. Julius Meyer, in his new edition of NAGLER, "Allgemeines Künstler Lexicon," Leipsic, 1870.)

CLARENCE COOK.

**Correla'tion** [from the Lat. *correlatio*, "mutual relation"] of **Forces** (otherwise called **Transmutation of Force or Energy**), a phrase of recent origin employed to express the theory that any one of the various forms of physical force may be converted into one or more of the other forms. The cardinal point in this theory is the doctrine of heat and its relation to other agents, especially to mechanical motion—the doctrine commonly known as the mechanical theory of heat, and which is of very recent date. In the number for May, 1842, of a German scientific journal (*Annalen der Chemie und Pharmacie*) there appeared a short article of only thirteen pages by Julius Robert Mayer, a physician of Heilbronn, entitled "Observations concerning the Forces of Inanimate Nature." In



this article it was affirmed, for the first time, that there exists a connection between mechanical work and heat by which the one could be converted into the other, mechanical work being obtained by the expenditure of heat, and heat being also obtained by the expenditure of work; there being, under all circumstances, one constant ratio between the quantity of heat and the amount of work. Soon afterwards, though apparently without any connection with the German statement, an English physicist (Joule of Manchester) experimentally demonstrated what Mayer had only asserted, and the scientific world came into possession of a new principle, now technically known as the principle of the equivalence of heat and work.

In the light of this principle it has been demonstrated that heat is nothing more nor less than a certain mode of motion. The heat manifested, *e. g.*, when we rub two flat surfaces briskly against each other, is only our own muscular motion checked by the friction, and changed thereby into the heat which the surfaces reveal. On the other hand, this muscular motion is only the heat of our bodily frame expending itself in this way. In either case the energy has not been annihilated, but only transferred, and appears in a new form. It has long been known that the actual force of a moving body may be changed into the molecular energy of heat. Pieces of dry wood when rubbed together will become so hot as to ignite; the boring tools of a carpenter become hot by being used; when a piece of metal is rubbed vigorously on a rough surface, it becomes too hot to hold. Again, when a train in motion is brought to a stand-still by applying a brake, the rails become hot, and sparks are seen to fly from the wheels. Bullets shot at a target sometimes show signs of fusion after impact. In all these cases the energy of visible motion is transmuted into heat. The amount of the one form of energy which will produce a given amount of the other has been accurately calculated. If a weight of one pound be raised to a height of 772 feet and be let fall, on striking the ground it will generate as much heat as will raise 1 pound of water 1° F.

By a conception of Carnot, a principle which may be termed the reversibility of force has been established. If a certain amount (A) of one form of force produce in disappearing an amount (B) of another form, then B is the quantity of the latter which must disappear in order to the production of an amount A of the former. By Carnot's principle, if an engine, by consuming a certain amount of heat, does a given quantity of work, by the consumption of a similar amount of work it would restore to the source the quantity of heat taken from it. This principle of Carnot is, however, only true in abstract theory. Its verification in practice would exact conditions which cannot be realized; for, though mechanical force can be wholly transformed into heat, it is not possible, by any kind of engine, to transform the heat received from a given source wholly into work. Every such engine abandons by far the larger portion of the heat which it receives, totally unchanged, to a recipient suitable to absorb it (the condenser in the Watt engine—the atmosphere in the case of the high-pressure steam-engine); and if any such engine were “worked backward,” to use Carnot's expression, it would not restore to the source all the heat drawn from it during the working forward, unless what was in the first instance an absorbent of heat should become in its turn a source, and should give up the large amount of heat previously abandoned, to be restored by transfer, and not as the result of transformed work. In the case of other forms of force, the process of reversal is attended with equal and sometimes with greater difficulties. The reciprocal interchange is perhaps best illustrated between electricity (dynamic) and chemical affinities.

Visible kinetic force is changed into the kinetic energy of electricity by a magneto-electric machine, and into the potential energy of electricity when a plate of glass is made to revolve against a surface of silk. Again, the actual energy of electricity is transformed into force (or energy) of visible motion when a piece of iron is drawn to the poles of an electro-magnet, when two wires conveying electric currents attract one another, or when a current is made to pass through a wire which is nearer a magnetic needle, and the needle is in consequence forcibly deflected by the current.

Suppose the strength of a current of electricity passing along a wire to be measured by its power to deflect a magnetic needle. Suppose the wire to be of copper, and the amount of deflection noted, and then let the copper be replaced by platinum, which offers a greater resistance to the current. It will be found that the wire becomes hot, and that the needle is deflected through a smaller angle. Energy of heat is here produced at the expense of the energy of electricity in motion. With powerful batteries all metals are fused, even iridium and platinum, which are the least fusible. A battery of thirty or forty Bunsen's

cells will volatilize fine wires of lead, tin, zinc, copper, gold, and silver.

When a bar of antimony and a bar of bismuth are soldered together at one extremity, and the free ends united by a copper wire, on the application of heat a current of electricity is found to circulate through the wire, and the strength of the current is an exact and delicate measure of the heat applied. When a crystal of tourmaline changes temperature, its extremities assume opposite electric states, thus affording an example of the change of heat into the potential energy of electric separation. The voltaic arc is a brilliant example of the conversion of electricity into the actual energy of radiant heat and light.

The force of chemical action, or separation, and heat are convertible. A given amount of chemical action produces a definite amount of heat, and this quantity of heat is required to reverse the chemical changes which have produced it. It is difficult to determine accurately the amount of heat equivalent to a given amount of chemical action, chiefly because it is very difficult to confine the transformation of energy to these two forms only; nevertheless, the relation between the amount of heat evolved and the quantity of chemical action has been determined by several eminent physicists; for example, Rumford calculated that 1 gramme of charcoal in combining with 2½ grammes of oxygen to make carbonic acid would evolve heat sufficient to raise the temperature of 8000 grammes of water 1° C. Andrew made the quantity 7900 grammes, and Favre and Silbermann 8080 grammes. Hence, the true quantity must be near 8000 grammes. One gramme of hydrogen, in combining with 8 grammes of oxygen to form water, evolves heat sufficient to raise about 34,000 grammes of water 1° C. (Andrews, 33,881; Favre, 34,462). Similarly, the quantities of heat evolved in the combustion of other elements have been found with equal precision.

The chemical action in a voltaic battery produces electricity. Just as a definite amount of carbon, by its union with oxygen, produces a determined quantity of heat, so the consumption of a definite amount of zinc in the battery produces a definite quantity of electricity, which in its turn gives rise to an invariable amount of heat. When the poles of the battery are connected by a very good conductor, such as a short thick wire, the heat produced is confined to the battery itself; but when a less perfect conductor is used, heat manifests itself in the conductor. In this case part of the heat is in the wire and part in the battery, but the whole amount of heat produced in all the parts of the current by the consumption of a given quantity of zinc is the same in this case as in the other. If the electric current be used to do other work, a corresponding amount of heat is withdrawn from the battery.

Suppose two tubes of glass, closed at one end, to have pieces of platinum wire fused into the closed ends, and to be filled with water and placed with the open ends under water in the same vessel. Let the poles of a battery be connected with the platinum wires. The water will be decomposed, oxygen collecting in one tube and hydrogen in the other. The amount of gas set free in a given time will be proportional to the strength of the current. If the battery be taken away, and the ends of platinum be connected by a copper wire, the gas will soon disappear; and while it is passing into water, a current will be found to circulate through the wire in a direction opposite to that which produced the decomposition. Here, then, electricity in motion produces energy of chemical separation, and the latter again reproduces the former.

Although we may estimate the exact equivalents of the various forms of energy, we are not always able to reverse a given transmutation. A given quantity of mechanical work will produce an equivalent amount of heat, and if all this heat could be changed into mechanical work the original amount would be produced; but we are never able to reconvert all the heat into work. Energy which cannot be reconverted to its previous form is said to be dissipated. Dissipation of energy is constantly going on throughout the universe. Thus, the energy of the sun's rays produces streams of water, winds, and currents. By its action on plants it separates carbon from oxygen—a process which is reversed when wood is ignited. The moon and the sun give rise to tidal energy. *Through all these channels energy is being constantly dissipated.*

Actual force, of all forms, may be transformed into potential force, and may remain in this state for an indefinite period of time. The energy of heat, which is derived from the combustion of coal, was originally derived from radiant heat and light received from the sun, but has been remaining in store for ages.

It is sometimes affirmed that there can be neither creation nor annihilation of energy; but the inexactness of this statement appears from the profound mathematical demonstrations which Clausius of Bonn has recently applied to

the mechanical theory of heat. He has shown that while motion may be converted into heat, and the heat, to a certain degree, may be reconverted into motion, yet in the latter process there is always a residuum of heat which cannot be reconverted. Now, as mechanical motion is all the while in the process of conversion into heat, and this at a prodigious rate through the universe, there is thus going on continually an increase of heat and a diminution of motion; and unless this tendency is checked by the interposition of some power other than the forces now acting in the universe, it must result in an equalization of temperature everywhere, and the cessation of all mechanical motion. But such a condition is not yet reached, therefore the universe cannot be eternal, and must therefore have had its existence through some source other than itself. The universe thus starts with a miracle, and it of course follows that miracles are possible at any stage of its continuance. (GROVE, "On the Correlation of Forces;" FICK, "Ueber die Naturkräfte in ihrer Wechselbeziehungen;" CLAUSIUS, "On the Mechanical Theory of Heat;" SIR JOHN HERSCHEL'S "Lectures.")

REVISED BY J. H. SEELYE.

**Corrèze**, a department of France near its centre, is a part of the former province of Limousin. Area, 2265 square miles. It is drained by the rivers Dordogne, Vézère, and Corrèze. The surface is hilly; the soil is mostly poor. The staple productions are grain, timber, coal, copper, lead, iron, and chestnuts. Capital, Tulle. Pop. 317,066.

**Cor'rie** (FREDERICK H.), U. S. M. C., entered the marine corps as a second lieutenant in 1861, became a first lieutenant in 1861, and a captain in 1870. He led the marines of the Powhatan in the assault on Fort Fisher of Jan. 15, 1865, and at the close of the war was brevetted a captain "for gallant and meritorious conduct."

FOXHALL A. PARKER.

**Corrien'tes**, a province of the Argentine Republic, is bounded on the N. by the river Paraná, on the S. E. by the Uruguay, which separates it from Brazil, and on the W. by the Paraná. Area, about 45,455 square miles. The surface is occupied by extensive forests and swamps; the soil is fertile. Capital, Corrientes. Pop. 129,023.

**Corrientes**, the capital of the above province, is on the right bank of the Río Paraná, here 2 miles broad, a few miles below the confluence of the Paraguay. It has a good harbor, and exports meat, wool, etc. Pop. 11,218.

**Corro'sive Sub'imate**, a name given to mercuric chloride (bichloride of mercury), (HgCl<sub>2</sub>), a virulent and corrosive poison. (See SUBIMATE.)

**Cor'rugated** [from the Lat. *con*, intensive, and *ruġo*, *rugatum*, to "wrinkle" (from *ruga*, a "ridge" or "fold")], **iron**, a name applied to iron in thin plates or sheets which are passed between rollers, producing grooves and ridges in the iron. In this manner the strength of the material is greatly increased, while the square surface of the iron is of course reduced. Corrugated iron is of great value in the construction of buildings, especially for roofs, where lightness and strength are to be combined. It is much used for covering the walls of frame buildings, both within and without. It is frequently "galvanized"—i. e. covered with a thin layer of zinc by dipping it in a bath of the fused metal.

**Corruption of Blood.** See ATTAINDER.

**Cor'ry**, a city and R. R. centre, Erie co, Pa. (see map of Pennsylvania, ref. 1-A, for location of county), 37 miles S. E. of Erie. It has a large oil refinery, and numerous large manufactories (making mowers and reapers, boring-machines, pails, furniture, barrels, brushes, and stationary engines), tanneries, blast furnace, etc. There are in the city a park and a library. Corry has grown up since 1860. Pop. in 1870, 6809; in 1880, 5277.

**Corseul** (anc. *Favum Martie*), a village of France, department of Côtes-du-Nord, 26 miles E. of Saint-Brieuc. Here are many Roman remains. Pop. about 4500.

**Cor'sica** [anc. *Cyros*, afterward *Corsica*; Fr. *La Corse*], an island in the Mediterranean, situated between lat. 41° 20' and 43° N., and lon. 8° 30' and 9° 30' E., 55 miles from Italy and 110 from France. It is separated from Sardinia by the Strait of Bonifacio, 9 miles wide. It is 110 miles long N. and S., and is 53 miles wide at the broadest part. Area, 3377 square miles. The W. coast is deeply indented by the Gulfs of Calvi, Porto, Ajaccio, and Valinco. The interior is traversed by a mountain-chain, the highest peaks of which are Monte Cinto (8889 feet), Rotundo (8609 feet), Paggiiorba (8284 feet), Padro (7846 feet), and D'Oro (7841 feet). To the W. and S. this mountain-chain sends forth a great number of rugged spurs, which fall off abruptly toward the sea. They are covered with immense forests of oak, beech, pine, cork, and chest-

nut trees, from which in olden times the Romans derived most of the timber for their fleets. But the indolence of the present population has left this source of wealth comparatively neglected. To the E. broad plains open between the mountains and the sea, and here are found large plantations of orange, fig, almond, olive, and lemon, and extensive vineyards. But agriculture is in a backward state, and most of the wine produced in Corsica is sent to France in a raw state to be used for liqueurs. The principal industry is the rearing of cattle, horses, asses, and mules. A peculiar breed of black sheep called *muf-fions* is raised on the mountain-pastures. The fisheries of tunny and pilchard are extensive. Among the minerals of Corsica are iron, antimony, lead, granite, porphyry, marble, and limestone. The chief towns are Ajaccio, Bastia, and Calvi. Corsica was first colonized by the Phœnicians, who called it *Cyros*, was conquered by the Carthaginians, and wrested from them by the Romans soon after 237 B. C. The Genoese became masters of it in 1481. It was ceded by the Genoese to France (of which it forms the eighty-sixth department) in 1768. Pop. 262,701.

**Corsica'na**, a city and R. R. junction, capital of Navarro co., Tex. (see map of Texas, ref. 3-I, for location of county), has military inst. Pop. in 1870, 80; in 1880, 3373.

**Cor'so**, an Italian word for a "race-course" [from the Lat. *curaus*, a verbal noun from *curro*, *cursum*, to "run"], is often used in Italy as the name of the principal streets of the larger towns. The Corso of Rome is famous as the scene of the diversions of the Carnival.

**Cor'son** (HIRAM), an American scholar, born in Philadelphia in 1828, became a teacher, and was (1849-53) connected with the Library of Congress and that of the Smithsonian Institution. He was professor of history and rhetoric in Girard College (1865-66), and held a similar position in St. John's College, Annapolis, Md., 1866-70, when he became professor of English language and literature, etc. in Cornell University. He has published Chaucer's "Legende of Goode Women," "Handbook of Anglo-Saxon and Early English," and other valuable works, and has also prepared with great labor a "Thesaurus of Early English."

**Cors'sen** (WILLIAM PAUL), an eminent German philologist and antiquary, born at Bremen in 1820, was for several years professor at the gymnasium at Stettin, and subsequently at the Landesschule at Pforta until 1866, when he resigned on account of his health. He published a highly important work on "The Pronunciation, Vocalism, and Accentuation of the Latin Language" (2 vols., 1858-59; 2d ed. 1867-69), which received a prize from the Berlin Academy of Science, and is regarded as the best work thus far published on this subject. His essays on the dialects of ancient Italy are also among the best that have been written. Died in 1875.

**Cort** (CORNELIS), a Dutch engraver, born at Horn in 1536. He opened a school in Rome, and produced many good engravings after Titian, Raphael, and other masters. Among his works is "The Transfiguration," after Raphael. Died in 1558.

**Corte**, a fortified town in the interior of Corsica, is situated on the Tavignano. Pop. 6094.

**Cort'es** [the plu. of the Sp. *corte*, a "court"], the name of the national assembly or legislature of Spain. The Cortes of Leon, Castile, and Aragon originated about the twelfth century, and were composed of the nobility, dignified clergy, and the representatives of the towns. In the fourteenth century the power of the Cortes seems to have been at its height, after which it gradually declined, and under the reign of Ferdinand and Isabella was reduced almost to a nullity. After the time of Philip II. the Cortes of Spain were only convoked occasionally on the accession of kings, and their sittings were a mere form. A Cortes elected by universal suffrage in 1869 adopted a new and liberal constitution. The Cortes at present consist of a senate, elected for twelve years, and a lower house of deputies, elected for three years, on the basis of one deputy for every 40,000 inhabitants. The number of senators is four for each province. The name is also applied to the legislature of Portugal.

**Cor'tez** (HERNANDO), the conqueror of Mexico, was born at Medellin, in Estremadura, Spain, in 1485. He studied law at the University of Salamanca, and sailed to the New World to seek his fortune in 1504. He served with distinction under Velasquez in the conquest of Cuba in 1511, after which he married Catalina Juarez, and became the owner of an estate in Cuba. In 1518 he was appointed by Velasquez to conduct an expedition against Mexico, which had recently been discovered. He sailed from Cuba with eleven vessels and about 700 men in Feb., 1519, his pro-

fessed object being the conversion of infidels. He defeated an army of the natives at Tabasco, and landed on the site of Vera Cruz, where he destroyed his ships, to induce his men to fight with more desperate courage when they knew that it was impossible to save themselves by retreat. He learned that he had entered the extensive empire of Montezuma, who reigned over Anahuac and possessed immense treasures of gold and silver. In Aug., 1519, he left the sea-coast and marched against Mexico or Tenochtitlan, the capital of Anahuac. Having defeated the Tlascalans in several battles, he entered Mexico without resistance in Nov., 1519, and was received with friendly demonstrations by Montezuma. The audacious Spaniard seized Montezuma in his own palace, kept him as a prisoner, and extorted from him a large quantity of gold. The captive prince was persuaded or forced to swear allegiance to Charles V., but he refused to adopt the religion of the Spaniards. Velasquez, who was jealous of Cortez, sent Narvaez with about 1000 men to supersede Cortez, or operate against him in case he should not submit. Leaving a part of his force at Mexico, Cortez marched with 250 men to encounter Narvaez, whom he defeated and took prisoner at Zempoalla in 1520. He persuaded the soldiers of Narvaez to enlist in his service, and he returned to Mexico, the people of which, during his absence, had revolted against the Spaniards. In the fight, which continued several days, Montezuma was killed by his own subjects, and the Spaniards were driven out of the city. Cortez gained a victory at Otumba in July, 1520, and took Mexico in 1521. He treated the vanquished with great cruelty. In 1522 the king of Spain appointed him governor and captain-general of the conquered country, called New Spain. Cortez returned to Spain in 1528, in order to vindicate himself against the accusations of his enemies, and was received with favor at court. He returned to Mexico in 1530, but he retained only the command of the army, the civil administration having been placed in the hands of a viceroy. This division of power gave rise to much haggling and jealousy. Cortez felt himself clogged in his activity, and in 1540 he once more returned to Spain. But this time he was coldly received by Charles V. He accompanied the emperor in the unlucky campaign in Algeria, and, although he distinguished himself, the imperial favor could not be regained. At last he lost patience, and said to the emperor, "I am a man who has added more provinces to your empire than your ancestors left you cities." He spent the rest of his life in obscurity, and died in Seville Dec. 2, 1554. Five letters which he addressed to the emperor on the subject of his conquest are still extant. They have been printed in "Historia de Nueva España," by LORENZANA (Mexico, 1770), and have been translated into English by GEORGE FOLSON (New York, 1843). (See PRESCOTT, "Conquest of Mexico.")

**Corthell** (E. L.), CAPTAIN, b. Sept. 30, 1840, broke off his studies in the Brown University, Providence, R. I., in 1861, and enlisted as a private soldier in the first three years' battery sent into the field; returned at the end of the war as commander of a light battery and with the full rank of a captain; resumed his studies in the university, and was graduated as a master of arts in 1867. After graduation he entered the office of Mr. S. B. Cushing, a prominent civil engineer in Providence, R. I., and was instructed, and practised, in office and field duties, on railroad, mill-dam, bridge, city, and other work. In 1868 he was appointed assistant engineer on the construction of the Hannibal and Naples R. R., in Illinois, and in 1871 chief engineer of the Sny Island levee, which led him into a comprehensive study of the subject of river embankment. In 1874 he was appointed chief assistant engineer in the construction of the jetties at the mouth of the Mississippi, and in 1881 published *The History of the Jetties at the Mouth of the Mississippi River* (New York). In 1881 he was appointed chief engineer in the construction of the New York West Shore and Buffalo R. R., and in 1883 chief engineer of the Tehuantepec ship-railway.

**Cortland**, R. R. junction, capital of Cortland co., N. Y. (see map of New York, ref. 5-G, for location of county), is on the Tioughnioga River, 36 miles S. of Syracuse. It has a State normal school, a lecture association and reading-room. It is in Cortlandville township. Pop. in 1870, 3066; in 1880, 4050.

**Corundum, Sapphire, Ruby, Oriental Amethyst, Oriental Topaz, Adamantine Spar, Salamstone, or Emery**, a mineral consisting, when pure, of native oxide of aluminum, which is, however, almost invariably mixed with magnetic oxide of iron. It occurs crystallized, massive, granular, in impalpable powder, and in layers. Mineralogically, corundum is divided into three varieties: (1) Sapphire, which includes the purer kinds, as sapphire, ruby, oriental topaz, etc.; (2) corundum proper,

the duller kinds crystallized or semi-crystalline, including adamantine spar; and (3) emery, the darker and coarser kinds.

The specific gravity of corundum is about 4, while in hardness it is next to the diamond. It becomes strongly electrical by friction. Its crystalline form is rhombohedral. The ruby or red sapphire is valued next to the diamond, and beyond a certain size (three and a half carats) as equal to it in value. Its color is supposed to be due to chromic acid, but the amount of coloring-matter is so small that it eludes the ordinary tests. The crystals are seldom above half an inch in length. Two crystals an inch in diameter and about two inches long are said to be in the possession of the king of Burmah. The largest ruby known came from China, and after having been in the possession of Prince Mentzikoff, was finally made one of the jewels of the Russian crown. The largest rubies come from the Capelan Mountains, Ava. Smaller ones are found in Saxony and Bohemia, and occasionally in other localities in Europe and the U. S. The blue sapphire occurs much larger, crystals three inches in length being sometimes found. The crystals sometimes exhibit a radiated interior with a play of colors, when it is known as asteria or asteriated sapphire. Sapphires are brought from Ceylon, India, and China, principally from the first-named country. Fine specimens are often found in the beds of streams, whither they have been carried after the decomposition of the rock originally enclosing them. The light-blue sapphires are often exposed to fire by lapidaries to render them more brilliant. With those from Epailly in France heating deepens the color. White sapphires are sometimes cut and passed for diamonds, which they much resemble. The Brazil sapphire is a blue tourmaline.

The Greek *σάπφειρος*, from which the name was derived, was, according to Dana, not our sapphire, but the stone now known as lapis-lazuli. Rubies and sapphires contain about 1 per cent. of magnetic oxide of iron.

Adamantine spar occurs in brownish crystals. It was used by the ancients as a polishing material, and continues to be used for fine work. The chief supplies are brought from China and the Ural Mountains. Salamstone occurs in pale reddish or bluish transparent crystals. Corundum is found abundantly in Chester co., Pa.

Emery, or "Armenian stone," is mined in Naxos at Cape Emiri, in the vicinity of Smyrna, Asia Minor, in Saxony, the Ural Mountains, Greece, Spain, etc., and in the U. S. at Chester, Mass., and in North Carolina. It occurs in gneiss, granite, mica slates, and in some cases in limestone rocks. Small specimens are also found in several other localities. It is used as a polishing material. The rock is broken up by hammers, and then reduced to powder and sifted, after which, for the preparation of the finer kinds, elutriation is practised. Emery stones and wheels are made by pressing the powder, made into a paste with water, into moulds, and then exposing them to a high heat, no cementing material being required. Emery vulcanite for polishing wheels is made by mixing emery with rubber and sulphur, and vulcanizing in moulds. (See INDIA-RUBBER.) Emery contains from 13 to 30 per cent. of magnetic oxide of iron. The Naxos emery contains about 24 per cent., and the Chester emery, averaging about the same, contains from 9 to 50 per cent. The value of the samples is determined by the amount of glass which a given quantity will wear away. The Ceylon sapphire, which is taken as a standard, wears away four-fifths of its weight of glass. The consumption of emery in the United Kingdom is put at 2000 tons per annum. (See EMERY; also valuable papers on emery by J. Lawrence Smith and C. T. Jackson in Silliman's "American Journal of Science" [2d series], vii. 283; ix. 289; x. 354; xxxix. 87; xl. 112, 123.)

C. F. CHANDLER.

**Corun'na**, a province of North-western Spain, forming the N. W. part of Galicia, having the ocean W. and N., Lugo E., and Pontavedro S. It has fine forests and pastures and arable lands, besides iron-mines. Area, 3079 square miles. Capital, Corunna. Pop. 595,585.

**Corunna** [anc. *Adrobricum*; Sp. *Coruña*], a fortified city and seaport of Spain, capital of a province of its own name, is on the Atlantic Ocean, 320 miles N. W. of Madrid; lat. 43° 22' N., lon. 8° 24' W. It has a safe harbor defended by two forts, and a lighthouse, which is called the Tower of Hercules, and is ninety-two feet high. It has a citadel, court-house, custom-house, arsenal, theatre, and the palace of the captain-general. Here are manufactures of linen and hats, cordage, canvas, and cigars. On Jan. 16, 1809, a battle occurred here between the French marshal Soult and the British general Sir John Moore, who was killed. Pop. 33,735.

**Corunna**, city, cap. of Shiawassee co., Mich. (see map of Michigan, ref. 7-J, for location of county), on R. R.

and the Shiawassee River, 75 miles N. W. of Detroit. It has iron foundries. Pop. in 1880, 1501; in 1884, 1451.

**Corval'lis**, city, on R. R., cap. of Benton co., Or. (see map of Oregon, ref. 6-A, for location of county), on Willamette River, 100 miles S. of Portland, contains the State Agricultural College, an academy, two public schools, three large saw and planing mills, and is surrounded by a rich agricultural country, which is very healthful. Steamboats visit the town during two-thirds of the year. The principal export is wheat. Pop. in 1880, 1128.

**Corvée** [etymology doubtful], a French term denoting, in feudal law, the obligation of the inhabitants of a district to perform certain services for the sovereign or feudal lord. Some of these services were performed gratis, others for wages below the value of the labor.

**Corvette** [from the Lat. *corbis*, a "basket," probably so called from some fancied resemblance in shape], a small vessel of war having three masts, flush decks, and one tier of guns on the upper deck. The masts are square-rigged. A corvette rarely carries more than twenty-six guns.

**Corvey**, the famous Westphalian abbey, was a colony from the monastery of Corbie, in the diocese of Amiens, and was founded in 815 by Abbot Adalhard. The first place selected, Sollinge, near the present city of Uslar, proved unfavorable, and after seven years of labor lost the colony had to be removed to Huxori, the present Höxter, on the banks of the Weser. But there it prospered so well that ere long it completely outshone the mother-institution. After Adalhard's death it obtained its own abbot and became independent of Corbie, and during the latter part of the ninth century large endowments poured in upon it. During the earliest period of its history it was the centre of the Saxon and Scandinavian mission; Ansgar, Riembert, Autbert, Nethard, etc. issued from its cells. Later on it became the centre of learning in Germany. It had an excellent library. It maintained at one time twenty-four professors. Not only was theology taught in its schools, but also the sciences. (See PAUL WIGAND, "Geschichte Corveys," Höxter, 1819.)

**Corvi'nus** (MATTHIAS) I., king of Hungary, a son of John Huniades, was born at Klausenburg in 1443. He was elected king in 1458. He waged war against the emperor Ferdinand III., the Turkish sultan, and the king of Poland. In 1485 he captured Vienna. He had superior military talents and was an able ruler. Died Apr. 7, 1490. (See WENZEL, "Matthias Corvinus," 1810.)

**Cor'vus** (M. VALERIUS), a famous Roman general, born about 370 B. C., was elected consul in 348. He defeated the Samnites in 343, and was chosen dictator in 342 and in 301 B. C. In the year 299 he was elected consul for the sixth time. Died about 270 B. C.

**Corwin** (THOMAS), an American statesman and orator, born in Bourbon co., Ky., July 29, 1794, removed to Ohio in early youth, and studied law, which he practised with distinction. He was elected a member of Congress in 1830, joined the Whig party, and advocated the election of Gen. Harrison in 1840 by effective public speeches. In the same year he was chosen governor of Ohio. He was elected to the Senate of the U. S. in 1845, and was appointed secretary of the treasury by President Fillmore in July, 1850. In 1858 he was chosen a member of Congress. He was sent as minister to Mexico in 1861, returned home in 1864, and died Dec. 18, 1865.

**Coryban'tes** [Gr. Κορύβαντες, the plural of Κορύβας; etymology doubtful], the name of the frantic priests of Cybele or Rhea. They were distinct from the Galli, who were eunuchs and priests of the same goddess. They celebrated the festivals of Cybele with orgiastic dances and loud cries, beating on timbrels, and cutting their flesh with knives.

**Cor'ydon**, capital of Harrison co., Ind. (see map of Indiana, ref. 11-E, for location of county), is on Indian Creek, 115 miles S. of Indianapolis. It has a furniture factory, two flour-mills, and an academy. It is a handsome place, has a sulphur spring, and is quite a summer resort. It was the capital of the State until 1824. Pop. in 1870, 747; in 1880, 763.

**Corydon**, on R. R., capital of Wayne co., Ia. (see map of Iowa, ref. 7-G, for location of county), about 65 miles S. by E. from Des Moines. Pop. in 1870, 618; in 1880, 801.

**Coryla'cæ** [from *Corylus*, one of the genera], a name given to a natural order of exogenous trees and shrubs, which some botanists call Cupuliferæ. It contains the oaks, chestnuts, beeches, hazels, etc.

**Corylus**. See HAZEL-NUT.

**Cor'ymb** [Lat. *corymbus*; Gr. κόρυμβος, the "top" of anything; also a "cluster of flowers or fruit"], in botany,

a form of inflorescence consisting of a central axis and lateral pedicels, of which the lower are longer than the upper, and the lengths of the pedicels are so graduated that the flowers are all on the same level, as in the *Spiræa*, *Kalmia*, and *Cratægus* (hawthorn).

**Cor'ypha** [from the Gr. κορυφή, "summit"], a genus of tropical fan-leaved palms, one of which, the *Corypha umbraculifera*, or talipot palm, grows in Ceylon to the height of sixty or seventy feet, and each leaf is about 30 feet in circumference.

**Coryphæ'us** [Gr. κορυφαίος], sometimes written in English **Corypheus**, the leader of the chorus in ancient dramas, by whom the dialogue between the chorus and the other actors of the drama was carried on, and who led in the choric song. The name is metaphorically applied to any great leader; thus Dr. Samuel Johnson is sometimes called "the coryphæus of English literature."

**Coryphodon**. See APPENDIX.

**Cos**, or **Kos** [Gr. Κῶς], called also **Stan'chio**, an island of Asiatic Turkey, in the Mediterranean, is separated from the coast of ancient Caria by a channel about three miles wide. It was called *Lango* in the time of the Knights of Rhodes. It is nearly 22 miles long and 5 miles wide. Area, 85 square miles. The surface is partly hilly, the soil is fertile, and the climate delightful. Among the products are cotton, silk, wine, and fruits. In ancient times it contained a celebrated temple of Æsculapius, and was the native place of Hippocrates, Apelles the great painter, and Ariston the philosopher. Cos is also the name of a seaport-town on this island. Its port is visited by many merchant-vessels. Pop. about 8000, two-thirds of whom are Greeks.

**Cosa'la**, a Mexican mining-town in the state of Sinaloa, 200 miles S. E. of El Fuerte. Pop. about 7000.

**Cosen'za**, a province of Italy, bounded on the N. by Basilicata, on the S. by Catanzaro, and on the E. and W. by the sea. It is mountainous, and produces rice, saffron, honey, oil, and wine. Its fisheries are still important, though they are not utilized with the same energy as in former days. Capital, Cosenza. It was formerly named Calabria Citeriore. Area, 2840 square miles. Pop. in 1881, 451,271.

**Cosenza** (anc. *Consentia*), a fortified city of Italy, capital of the above province, is at the confluence of the rivers Crati and Busento, 12 miles E. of the Mediterranean. It is the seat of a bishop, and contains a fine court-house, a cathedral, a royal college, a theatre, several convents, and an old castle which has been converted into barracks. It has manufactures of cutlery and earthenware, and an active trade in silk, wine, manna, rice, etc. *Consentia* was the ancient capital of the *Bruttii*. Pop. 16,686.

**Coshocton**, R. R. junction, capital of Coshocton co., O. (see map of Ohio, ref. 4-G, for location of county), is on the Muskingum River just below the junction of the Tuscarawas and Walhonding, on the Ohio Canal, 69 miles E. N. E. of Columbus. A bridge across the river connects it with Roscoe. Coshocton has iron and steel works for axles, springs, and iron bridges, and a paper-mill. Pop. in 1870, 1754; in 1880, 3044.

**Cosmog'ony** [Gr. κοσμογονία, from κόσμος, the "world," and γένω, to "originate"], the science or theory which treats of the origin of the universe. If we except the cosmogony of the East Indians, the earliest extant is that of Hesiod, which is delivered in hexameter verse. The first prose cosmogonies were those of the early Ionic philosophers, of whom Thales, Anaximenes, Anaximander, and Anaxagoras are the most celebrated. In modern times a "Theory of the World" has been produced by Burnet. We do not include in this list of cosmogonies the researches of modern geologists, or the systems to which they have led. The different theories of the origin of the world may be comprehended under three classes: 1st. Those which suppose the world to have existed from eternity under its actual form. Aristotle embraced this doctrine, and, conceiving the universe to be the eternal effect of an eternal cause, maintained that not only the heavens and the earth, but all animate and inanimate beings, are without beginning. 2d. Those which consider the matter of the universe eternal, but not its form. This was the system of Epicurus and most of the ancient philosophers and poets, who imagined the world either to be produced by the fortuitous concourse of atoms existing from all eternity, or to have sprung out of the chaotic form which preceded its present state. 3d. Those which ascribe both its matter and its form to the direct agency of a spiritual cause.

The account given in Genesis of the creation is obviously not a scientific cosmogony, which would not only have been out of place in a divine revelation intended especially to impart religious truth, but would, if given in a scientific

form (since science is constantly progressing and therefore changing), have been adapted to a single age or period only. Or, supposing the highest and ultimate facts of science had been given, it would have been so far in advance of all scientific thought yet reached, or that it will be reached perhaps for fifty thousand years to come, that it would be wholly unintelligible, and would in all probability appear utterly absurd even to the most advanced intellects. Therefore those few great facts which were necessary to be indicated in order to point out the relation between the Creator and his works have been presented in a popular rather than a scientific form. Nor can it be said that they are any the less true because not presented in scientific phraseology.\* An excellent exposition of the harmony between the Mosaic and the geological record of creation is given by Prof. Dana at the end of his "Manual of Geology," to which the reader is referred. (See also TAYLER LEWIS'S "Six Days of Creation.")

**Cosne** (anc. *Condante*), a town of France, in the department of Nièvre, on the Loire, 29 miles N. N. W. of Nevers. It has manufactures of hardware, cutlery, and anchors. Pop. in 1831, 7401.

**Cos'sack** [a term of Turkish origin, said to signify "robber"]. The Cossacks are a Slavic race intermixed with Kal-mucks and Tartars. They are divided into two classes—the Cossacks of the Don and the Cossacks of Little Russia, or Malo-Russian Cossacks. The latter were not known by the name of Cossacks until 1516. Stephen Bathori, king of Poland, formed them into regiments, under the control of a hetman or ataman, in 1592. They placed themselves under the protection of Russia in 1654, and revolted in 1708. The Cossacks of the Don entered the service of Russia in the sixteenth century. Their territory now constitutes a government (province) of European Russia, with an area of 59,654 square miles, and a population in 1867 of 1,010,135. Tscherkask, their capital, destroyed by fire in 1744, was rebuilt in 1805. They are extensively colonized in Siberia.

The principal hetman (ataman) of the Cossacks is the heir-apparent of the Russian empire. The Cossacks serve in the army both as irregular cavalry and as light artillery. In 1870 there were 183,007 Cossacks, including officers, enrolled in the Russian service. This enrolment includes all the males. More than 30,000 were in the latter year serving in the Russian line, chiefly in Siberia. They also serve to some extent in the Turkish army.

**Cos'ta** (Sir MICHAEL), a musical composer, born in Naples in Feb., 1810, manifested early a taste for music, and studied under Tritto. He became conductor of the London opera in 1831. He has written "Kenilworth" and "Sir Huon," ballets, "Malek Adel," which failed in Paris, and "Don Carlos," operas, and "Naaman" and "Eli," oratorios. Died Apr. 29, 1884.

**Costa-Cabral, da** (ANTONIO BERNARDO), count of Thomar, a Portuguese statesman, born May 9, 1803, became minister of state in 1839. He controlled the government, supported by the court, but by oppressive unconstitutional measures—the abolition of the irremovability of judges, the establishment of a rigorous censure, etc.—he brought upon himself the hatred of all parties. He was obliged to retire in 1846 in consequence of a popular insurrection, was recalled in 1849, but was obliged to flee the country in 1851. His brother Silvo led the opposition. From 1857 to 1861 he acted as ambassador to Brazil.

**Cos'ta Ri'ca** (*i. e.* "rich coast"), the most southern state of Central America, is bounded on the N. by Nicaragua, on the E. by the Caribbean Sea, on the S. E. by Panamá, and on the S. W. by the Pacific Ocean. It lies between lat. 8° and 11° 30' N. and lon. 83° and 85° 40' W. Area, 19,979 square miles, of which, however, only 1150 square miles are under cultivation. The surface is mountainous, the state being traversed by a range which is a continuation of the Andes or Cordilleras. Among the peaks of this range are several active volcanoes. Mount Cartago (or Irasu) rises about 11,480 feet above the level of the sea. The Atlantic coast is low and fringed with innumerable lagoons, among which is the Gulf of Chiriqui; the Pacific coast is higher and more accessible, presenting the gulfs of Nicoya and Dulce. The country is everywhere exceedingly fertile. On the table-land of the interior, which has a cool and healthy climate, coffee, rice, maize, barley, potatoes, etc. are raised; in the low coast-regions, which have a hot, sultry, fever-stricken climate, cocoa, vanilla, sugar, cotton, tobacco, etc. are cultivated. The forests which cover the mountain-declivities abound in excellent

timber and costly woods—mahogany, ebony, etc.—and swarm with humming-birds, deer, wild pigs, lizards, and rattlesnakes. The principal domestic animals are the ox and the mule. Capital, San José. The government is a republic, established in 1823. Costa Rica was one of the states of the Confederation of Central America, from which she seceded in 1840. Pop. 185,000. The overwhelming majority of the population is of Spanish descent, very little mixed with foreign elements. There are, however, within the limits of the republic about 5000 civilized Indians of pure blood and about 12,000 uncivilized Indians. The latter live almost in a state of savagery, roaming about in the forests of the wild mountain-regions, hunting with bow and arrow, and holding intercourse only with some adventurous traders from San Domingo. The state religion is Roman Catholic, but the constitution secures freedom of religion. Very little is done for popular education; the clergy has control over the schools, and neglects them. The state is bankrupt. The interest and the sinking fund of the loans contracted in London in 1871 and 1872 for the construction of an inter-oceanic railway are in arrears, and the annual budget shows a deficit of about £40,000.

**Coste** (JEAN JACQUES CYPRIEN VICTOR), a French naturalist, born in Castries in 1807. He published, besides other works, a "Voyage of Exploration along the Coasts of France and Italy" (1855).

**Cos'tello** (LOUISA STUART), an authoress, born in Ireland in 1815. Among her works are a "Summer amongst the Bocages and Vines" (1840) and "Memoirs of Eminent Englishwomen" (4 vols., 1844). She produced a collection of translations from Persian poets entitled "The Rose-Garden of Persia" (1845); also "Jacques Cœur, the French Argonaut, and his Times" (1 vol., 1847). Died April 24, 1870.

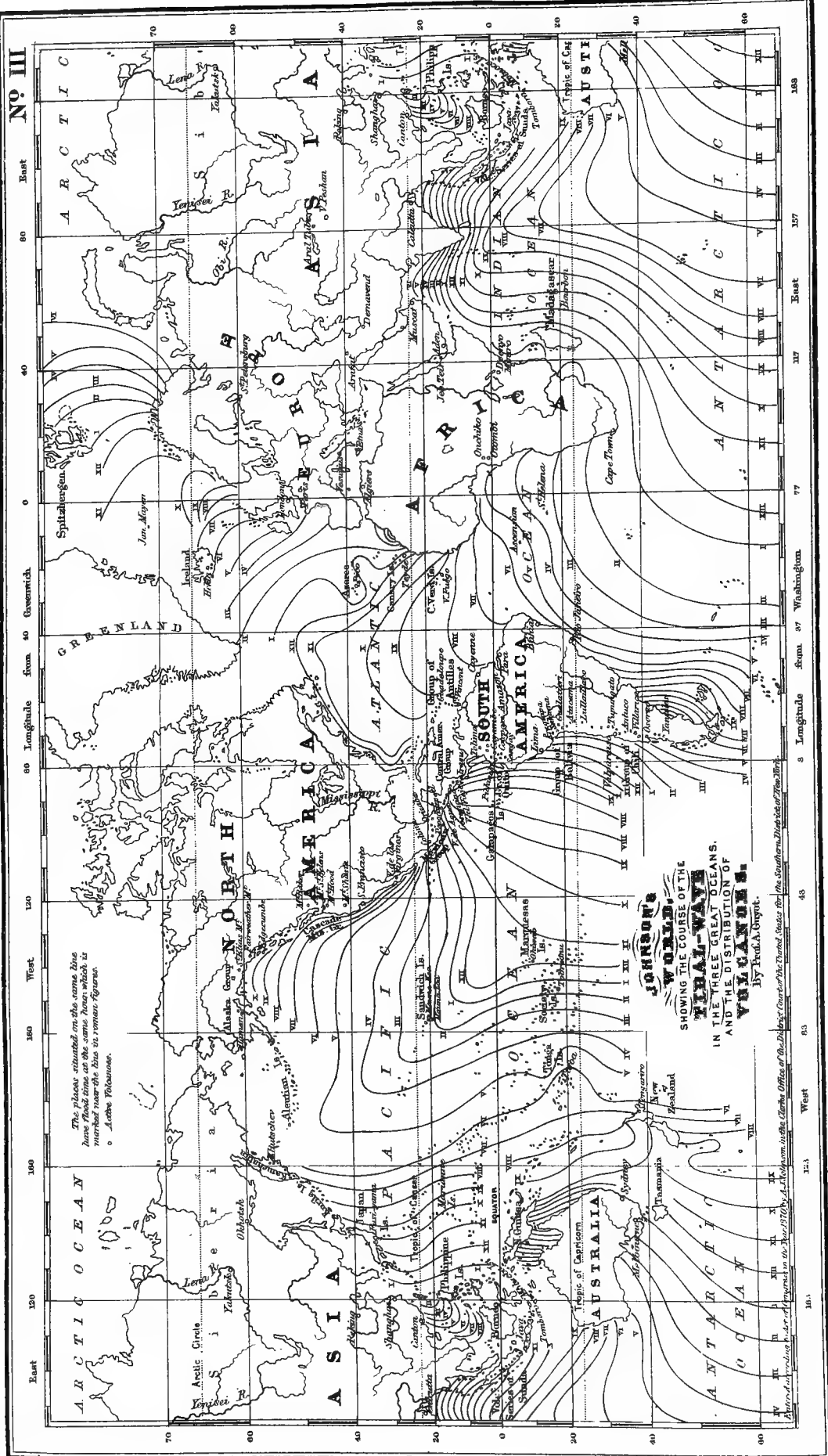
**Cos'ter** (LAWRENCE JANSEN), mentioned by Adrian Junius in "Batavia" (Leyden, 1588), an historical work written 1565–69, following an account current in Haarlem, as the original inventor of movable types. It was said that he first cut letters out of wood and printed from them the Dutch "Haispiegel," and that afterward (about 1440) he made his letters from lead and tin, and called in assistants, whom he swore to secrecy. This story has always been upheld by the Dutch. But in 1870, Antonius van der Linde demolished his claim to the invention of the art of printing. Coster died about 1440.

**Costume** [from the Lat. *consuetudo*, "custom," "usage;" Fr. *costume*] signifies, in its wider sense, the external appearance which the life of a people presents, and in its more usual sense the modes of clothing and personal adornment which prevail in any period or country. In both senses it plays an important part in art and literature. Homer brings it into view in narrating the achievements of his heroes. In modern times Sir Walter Scott has introduced the fashion of minute description of external costume. In the arts of the painter and actor attention to costume becomes indispensable. The sculptor has been sorely tried by the wigs and breeches of former times, and by the hats and other monstrosities of our own. One way of escaping from the difficulty was to discard the modern dress altogether, and substitute the ancient toga; another was to conceal the figure as much as possible in a cloak. The first of these expedients violates what artists regard as the laws of costume, by which they feel bound to represent every object with appropriate accessories; the second is often open in a less degree to the same objection. The great attention to costume in the earlier stages of art, though sometimes injurious to artistic effect, has been of great value for historical purposes. Among the old masters of the Italian and German schools there is a tendency to exhibit costume with painful minuteness. The mediæval custom of representing historical and sacred characters in the costume peculiar to the country and period of the artist prevailed in the most flourishing age of Italian art. We may learn from Paul Veronese the aspect presented by a feast in the palace of a Venetian grandee, but we can have little conception of the costumes at the marriage in Cana and in other scriptural subjects treated by the Italian painters. The effort to avoid anachronism by antiquarian study belongs almost entirely to the modern schools of art. In dramatic representations attention to costume becomes imperative. When the religious mysteries were brought upon the stage in the Middle Ages, the costume adopted was that of the age and country in which the representation took place; and this state of things continued during the time of Shakspeare, Lope de Vega, and Molière. About 1750 the French actress Clairon introduced a reform, but Talma was the first to bring on the stage a costume really true to history. Garrick and other eminent English actors followed his example.

\* When we remark in popular language, "The sun rises," who shall say that, though the expression is not astronomically true, we do not, for all practical purposes, utter as important a truth as when we say, "The earth by its revolution brings us to that point where the sun becomes visible"?







**Côte-d'Or** (*i. e.* "region of gold," named in allusion to the wealth of its vineyards), a department in the eastern part of France, formed of a portion of the old province of Burgundy. Area, 3383 square miles. The surface is diversified by hills and valleys, and partly traversed by a chain of low mountains called Côte-d'Or. It is drained by the rivers Seine, Aube, and Saône. Among its minerals are coal, iron, marble, and gypsum. A large part of this department is covered with forests. The soil is mostly fertile. It produces 18,500,000 gallons of wine annually. Here are raised the Burgundy wines. Capital, Dijon. Pop. 382,819.

**Cotelerius** (JEAN BAPTISTE), born at Nismes in Dec., 1627, died in Paris Aug. 19, 1686. He studied theology and philosophy in Paris, was in 1667 appointed assistant librarian in the royal library, and earned great literary reputation by his edition of the apostolic fathers (Barnabas, Clement, Hermas, Ignatius, and Polycarp, Paris, 1672, 2 vols.). Most of the copies of the original edition were destroyed by a conflagration, but new editions appeared in 1698 and 1724.

**Co'terie** [a word of French origin, supposed to be derived from the Lat. *quota*, a "share"], a word said to have been first applied to commercial associations in which each member contributed to the general fund. The name is now given to any circle of an exclusive character, whether social, literary, or political.

**Cotes** (ROGER), an English clergyman, born at Burbage July 10, 1682, was a fellow of Trinity College, Cambridge. He became Plumian professor of astronomy in 1706, and published the second edition of Newton's "Principia," with a learned preface (1713). He wrote "Harmonia Mensurarum" (1722). Died June 5, 1716. Newton had so high an opinion of his abilities that he exclaimed, "If Cotes had lived, we should have known something."

**Côtes-du-Nord** (*i. e.* "northern coasts"), a maritime department of France, formed of part of the old province of Bretagne. It is bounded on the N. by the English Channel, on the E. by Ile-et-Vilaine, on the S. by Morbihan, and on the W. by Finistère. Area, 2268 square miles. The surface is partly mountainous; the soil is mostly fertile. Many horses and cattle are reared here. Large quantities of grain and linen goods are exported. Among the minerals are iron, lead, and granite. Capital, Saint-Brieuc. Pop. 627,585.

**Co-tidal Lines**, a system of lines drawn upon a map, terrestrial globe, or chart, to illustrate the course of the tidal wave. They were devised by Dr. Whewell, and are given in the present work in Map No. III. Each of these lines passes through the places which have high water at the same hour, thus tracing the crest of the wave, and enabling the eye to follow its course with all the modifications that it experiences in each ocean.

A glance at the map of co-tidal lines, which gives the position and shape of the crest of the tidal wave at intervals of an hour, will show that the parent wave from the South Pacific moves on most swiftly in the open and deep ocean S. of the continents. There, also, its motion preserves its normal direction westward, and its crest extends from N. to S., while in the interior of the three oceans both are considerably deflected to the N., and even turned back to the E. (See TIDES, OCEANIC WAVES, AND CURRENTS, and CURRENTS, MARINE.)

ARNOLD GUYOT.

**Cotopax'i**, a volcano of South America, in Ecuador, in the eastern Cordillera of the Andes, 34 miles S. E. of Quito; lat. 0° 40' S., lon. 78° 39' W. Its form is almost perfectly conical. It rises 19,498 feet above the level of the sea, and 9800 feet above the adjacent valley, being the highest volcano in America that has been active in recent times. Its first recorded eruption occurred in 1532. In 1698 an eruption destroyed the city of Tacunga, and in 1738 the flames rose 3000 feet above the brink of the crater. A violent eruption occurred in 1768, when clouds of ashes and smoke darkened the air for a distance of many miles. During the eruption of 1803, Humboldt, who was at Guayaquil, about 135 miles distant, heard the explosions of this volcano. A belt about 4400 feet wide is covered with perpetual snow. It was first ascended in 1872 by Dr. W. Reiss.

**Cotro'ne** (anc. *Crotona*), a town of Italy, province of Catanzaro, on the Mediterranean Sea, 6 miles N. W. of Cape Nau. It is enclosed by walls and defended by a citadel. It is the seat of a bishop, and has a small harbor, a cathedral, and several hospitals and convents. Pop. 5807.

**Cotta** (JOHANN FRIEDRICH), BARON VON COTTENDORF, an eminent publisher, born at Stuttgart April 27, 1764, founded at Tübingen in 1793 the "Allgemeine Zeitung," an able daily journal, afterwards published at Augsburg. He was a friend and liberal patron of Goethe and Schiller, whose works he published. He established a steam press at Augs-

burg in 1824. He was for many years a member of the Württemberg Diet, and in 1824 was elected vice-president of the second chamber. Died Dec. 29, 1832.

**Cotta** (L. AURELIUS), a Roman senator, became prætor in 70 B. C. He was consul for the third time in the year 65, and co-operated with Cicero against Catiline in 63 B. C. He was an adherent of Cæsar in the civil war which began in 49 B. C.

**Cotta, von** (BERNHARD), an eminent German geologist, born at Kleinen-Zillah, in the Thüringerwald, Oct. 24, 1808, died at Freiberg Sept. 14, 1879. His father was director of the academy at Tharand, and he was from early youth made familiar with natural history, especially mineralogy and geology. He afterward studied in the mining-school at Freiberg and at Heidelberg, and was in 1842 appointed professor in the former place. Among his important works are a geognostic map of Saxony in twelve sections, published conjointly with Naumann; "Geognostische Wanderungen" (2 vols., 1836-38); "Anleitung zum Studium der Geognosie und Geologie" (3d ed. 1849); "Geologische Bilder" (4th ed. 1861); "Deutschlands Boden" (2d ed. 1858); "Geologie der Gegenwart" (3d ed. 1871).

**Cottabus**, a game of skill often spoken of by Greek writers (Anacreon, Æschylus, Euripides, Antiphanes, Aristophanes) and depicted on Greek vases. It consisted in throwing a portion of wine left in the drinking-cup in such a way that it passed through the air without its bulk being broken and fell with a certain noise into another drinking-cup. The performance of this feat required no small amount of dexterity, as the thrower was expected to retain the recumbent position usual while eating and drinking, and great excellence in the game was admired as much as excellence in throwing the javelin. The excitement of the game was often still further increased by bets and by the ominous character ascribed to it.

**Cot'tage City**, a noted camp-meeting ground and watering-place, on N. E. shore of Martha's Vineyard, Dukes co., Mass. (see map of Massachusetts, ref. 6-J, for location of county), 30 miles S. E. of New Bedford. Pop. in 1880, 672.

**Cottage Hill College**, for young ladies, is at York, Pa. The college grounds, upon which are several excellent springs of good water, contain nine acres, which are nicely ornamented with shade-trees and shrubbery. Cottage Hill College was founded in 1850 by Rev. J. F. Hey, who for a number of years conducted it as a female college with great success. In Jan., 1866, the property was purchased from Prof. Hey, and many important improvements have been made. On the 21st of Feb., 1863, the institution was chartered by the legislature of the State, with full collegiate powers to confer all literary degrees and academic honors which are usually granted and conferred by other colleges for the education of young women. In 1863, Rev. J. F. Hey resigned the charge of this institution, and Prof. L. B. Heiges conducted the school for the three succeeding years. In 1866, Rev. D. Eberly succeeded Prof. Heiges. In 1872, Rev. D. Eberly having resigned, Prof. J. Nelson Clark, M. D., was appointed president.

**Cott'bus**, or **Kottbus**, a town of Prussia, in Brandenburg, on the river Spree, 67 miles S. S. E. of Berlin, with which it is connected by a railway. It is enclosed by walls, and has a royal palace and a gymnasium; also manufactures of woollen cloths, linen goods, hosiery, tobacco, etc. Pop. 25,584.

**Cot'tidæ**, a family of acanthopterygian fishes characterized by the bony cheeks, short first dorsal, and more or less spiny head. It contains the "miller's thumb," sea-bullhead, sculpin, and other fishes, most of which are of rather repulsive appearance.

**Cotting** (JOHN RUGGLES), M. D., LL.D., born in Acton, Mass., in 1787, educated at Amherst, Dartmouth, and Cambridge. After spending fifty years of his life in New England, he was yet spared to enjoy thirty more in the valley of the Oconee, near Milledgeville, then the capital of Georgia, where he died, Oct. 13, 1867, and was buried, thus leaving the beautiful impress of that invisible but vital chain binding the hearts of this great people into one mighty nation. Dr. Cotting, having acquired reputation by his publications in chemistry and geology, was induced by cotton-planters of Georgia to make an agricultural survey of two or three counties of that State, the maps and drawings of which were magnificently executed, and were deposited in the museum of the medical college in Augusta; and their fame reached even Russia, whose emperor solicited a copy for the Royal Library of St. Petersburg. He was a Congregational minister, and had held professorships in Amherst College and at Pittsfield Medical School.

PAUL F. EVE.

**Cotton** [Fr. *coton*; Sp. *algodon*; Arab. *alqoton*], the fibre which surrounds the seeds of various species of cotton-plant, though the numerous cultivated varieties (mostly annual or biennial) are now referred to two or three species, the *Gossypium album*, *nigrum*, and perhaps *arborescens*, plants of the natural order Malvaceæ, to which an East Indian origin is assigned by the most recent authorities, though they have been grown from time immemorial in Africa and America. The first mention of cotton by any



Cotton-plant.

writer is by Herodotus, about 450 B. C. It is supposed that the cotton culture was first practised in India, but history furnishes no means of ascertaining when, or by what progressive stages of discovery and invention, cotton was first utilized by man. There is no record of any cotton being manufactured in Europe before the tenth century. Cotton is a tropical plant, and nearly all that is raised in the world is produced by the colored races. Its most northern limit is reached in Manchouria, where it is cultivated with success. Columbus found cotton in use among the natives of Hispaniola, but only in its most primitive form. In 1536 the cotton-plant was found growing in the country drained by the Mississippi and in Texas, but it was first planted as an experiment in the U. S. in the year 1621.

As early as the year 1736 the cotton-plant was known on the Eastern Shore of Maryland, in the lower counties of Delaware, and in other places in the Middle States, but it was chiefly regarded as an ornamental plant, and confined to gardens. It was not till after the Revolution that cotton culture was prosecuted with a view to export, though as early as 1739 it is reported that one bag of cotton was exported from Savannah, Ga., and about this time effort was made to bring cotton to perfection in South Carolina. In the year 1784 an American ship, which had on board eight bags of cotton for Liverpool, was seized, on the ground that so much cotton could not have been produced in the U. S. In 1785 the culture of short-staple cotton was commenced in the U. S., and 1,000,000 pounds in 1795 were exported from Charleston, S. C. Since that time the use of cotton, which previously had been for the most part limited to the hot climates where it grew, has marvellously extended, so that at present it constitutes not only the entire clothing of a large majority of the human race, but it has become a part of the material in which the people of all lands are clothed, excepting only the most debased and savage of races. For this great revolution the invention of improved machinery, and especially that of the saw cotton-gin, is the principal cause.

The green-seed or short-staple cotton (*Gossypium album*) is the kind principally used since the Revolution. The black-seed, or sea-island cotton (*Gossypium nigrum*), which is considered very much superior to the former, was introduced about the year 1788, though this can only be grown

successfully in certain localities, requiring low and moist land. The Peeler cotton-seed is in more general use at the present day. This is an upland cotton, but will do well on the lowlands. Several other kinds of cotton-seed have been introduced, and fabulous prices have been paid for some of them.

In 1791 only 2,000,000 pounds of cotton were raised in the U. S., and 189,500 pounds exported; while in 1803 the amount exported from the U. S. was over 41,000,000 pounds. In 1791 a cotton-mill was erected at Providence, R. I., supposed to be the first one in America, and from this time cotton was used in this country, though for a few years to a very limited extent. During the year 1800, 500 bales, of 300 pounds each, were consumed in the U. S. Ten years later (1810) 10,000 bales, of 300 pounds each, were used in our own country, and we exported nearly 94,000,000 pounds. Sixty-two mills were in operation during this year. In 1820 the U. S. cotton crop amounted to 369,000 bales, of 300 pounds each, and we exported nearly 128,000,000 pounds. Ten years later (1830) the export of cotton from the U. S. was 271,000,000 pounds, and the amount grown was over 1,000,000 bales. In 1840 over 1,500,000 bales were raised in the U. S. Ten years later (1850) the home consumption of cotton in the U. S. was nearly 600,000 bales, while the amount raised was over 2,000,000 bales. In 1860 the total cotton crop of the U. S. was 4,675,000 bales; consumed here, 978,000 bales.

From the year 1860 to 1870 there was a large decrease in the amount of cotton raised, owing to the civil war, which caused almost entire stagnation in all kinds of business in the southern part of our country, and the consequent liberation of the slaves. In 1870 the total cotton crop of the U. S. was only 3,000,000 bales, of which 2,000,000 were exported. By the census of 1880, the cotton crop of the U. S. was 5,755,359 bales, and we may look forward with confidence that under the new order of things the cotton-growing States will become more fully developed, and will astonish the world with their productions. Since the emancipation of the slaves in the U. S. a new impetus has been given to cotton-growing, and the business is so profitable that it is conducted very carelessly.

The extremes of the cotton-belt, where it may be grown with profit, may be included between the 28th and 40th degrees N. lat.; but the cotton States, properly speaking, are South Carolina, Georgia, Alabama, Mississippi, the northern part of Florida, the northern half of Louisiana, and the eastern half of Texas.

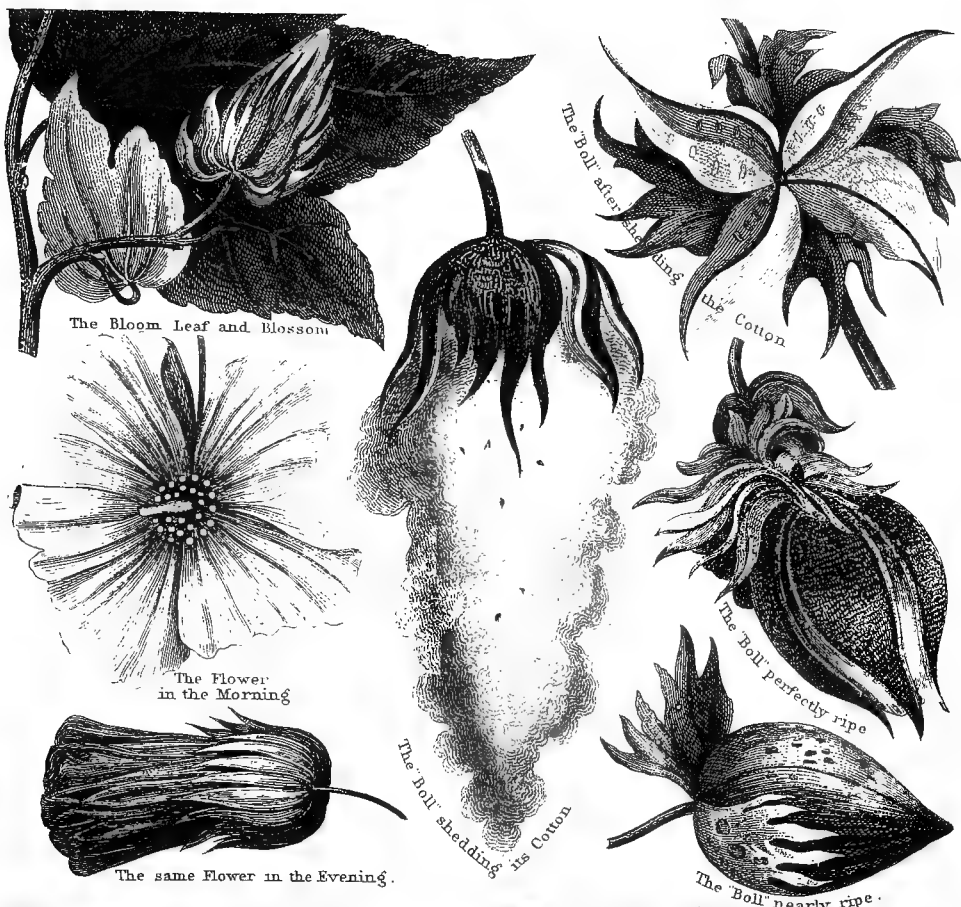
The principal cotton crop of the U. S., as of all other important cotton-regions, is of the short-staple variety. The long-staple sort is used for making the best sewing-thread, for mixing with silk, and for certain other special uses. It is very much higher priced than common cotton, but can be grown only in peculiar and very limited districts, such as the islands on the coast of South Carolina and parts of the mainland of Florida.

It is very unfortunate that better and more economical methods of planting, cultivating, and fertilizing cotton-lands have not been adopted in the U. S. Cotton is not naturally a very exhausting crop, but from the short-sighted policy of too many planters, great areas of what was once good cotton-land are now quite unproductive. A very serious drawback in the cultivation of cotton is the existence of so many insect enemies. In some regions the ravages of insects and their larvæ have led to the complete abandonment of the crop.

British India produces more cotton than any other country except the U. S., and there the industry is one of great importance; but the fibre is generally found to be inferior to that grown in the U. S. Egypt produces much cotton, its best product taking a high rank as regards quality and price. Brazil raises a considerable amount of fibre, and most other warm and tropical countries contribute more or less to the world's supply of the commodity.

Besides the uses of the cotton-fibre as a material for the manufacture of textile fabrics, and its secondary use in paper-making, the seed of cotton now furnishes a large supply of fixed oil obtained by expressing. The residue is useful for fattening stock, being used after the manner of oil-cake. It is also extensively employed in the South as a fertilizer. The cotton-seed oil and meal are exported to Europe in considerable quantities. The oil is used for soap-stock, for softening wool, lubricating machinery, dressing morocco, and for adulterating linseed and other more costly oils. It is considered to be a drying oil, and a small proportion may be used in paint. In the Southern States, when rectified, it is sometimes employed in pharmacy. Cotton-root is used to some extent in medicine, chiefly for its emmenagogue and abortifacient properties. In Brazil and other countries the leaves are believed to have highly important medicinal qualities.

A. T. LONGLEY, U. S. Agricultural Department.



COTTON





**Cotton** (Sir ARTHUR T.). See APPENDIX.

**Cotton** (JOHN), a learned English Puritan minister, born at Derby Dec. 4, 1585, preached over twenty years at Boston in England, emigrated to Massachusetts in 1633, was afterwards pastor of the First church in Boston (organized in 1630), and acquired such influence that he was called the patriarch of New England. Died Dec. 23, 1652.

**Cotton-gin**, a machine for freeing cotton from its seeds, which adhere to the fibre with considerable tenacity. Originally, the cotton-gin was an apparatus in which the cotton was passed between two rollers revolving in opposite directions. This, the "roller-gin," is still used for ginning sea-land or black-seeded cotton, which is quite easily freed from its seeds. But green-seeded, upland, or short-staple cotton, the species most generally grown, cannot be ginned by such simple means. In 1793, Mr. Eli Whitney, a native of Massachusetts resident in Georgia, invented the saw-gin, consisting of a hopper, one side of which is composed of parallel wires, between which revolve circular saws, the teeth of which drag the fibre through the wires, leaving the seeds behind. This invention, which brought Mr. Whitney small profit and much litigation, has immensely increased the cotton industry of the world.

**Cotton, Gun.** See GUN-COTTON, by GEN. H. L. ABBOT, U. S. A.

**Cotton Manufacture.** Although the employment of the fibres of the cotton-plant for the production of a rude species of cloth can be traced to a remote antiquity in India, China, and Egypt, and was considered by the Spanish Conquistadores as one of the most notable characteristics of the indigenous civilizations of Mexico and Peru, the great industry which now furnishes clothing to four-fifths of the human race and affords employment to many millions of human beings is essentially a modern one, having grown up within little more than a century. Prior to the inventions of Hargreaves and Arkwright, the manufacture was wholly carried on by hand, one thread alone being spun at a time, and that so weak as never to be employed as warp, but only as woof, in combination with wool or flax. The twisted condition of the cotton fibre, as cleaned from the seed by hand, was a serious obstacle to the production of perfect thread; and the first in the series of modern inventions relating to cotton manufacture were accordingly directed to the preparation of the fibre for spinning. Lewis Paul made the first practical improvement in 1748. James Hargreaves invented a carding-machine in 1760, and the spinning-jenny in 1767 (not patented until 1770), by which he produced eight threads at a time. Richard Arkwright patented in 1769 a "water-frame" or "throstle," for spinning by rollers, thereby producing with great rapidity a stronger, finer, and firmer yarn. In 1779 Samuel Crompton produced the mule-jenny, combining the leading ideas of Hargreaves and Arkwright, and in 1785 Dr. Edmund Cartwright, a clergyman of Kent, invented the power-loom, which did for the weaving what the jenny had done for spinning industry. The introduction of the CORROD-GIN (which see) by Eli Whitney in 1793, coinciding with the application by James Watt of the steam-engine to mechanical purposes, completed an extraordinary cycle of inventions, which laid the foundations for the leading industry of the world. Among the recent improvements in cotton machinery may be mentioned the "opening-machine" for disentangling the tufts of cotton and expelling the sand and dirt, comprising, picker, beater, and wire-gauge cylinders; the automatic "scutching-machine," which completes the opening of the cotton and spreads it out into a layer of uniform thickness; the "lapping-machine," which separates the fibres still more completely and arranges them in a uniform lap; the "improved carding-machine," which brings the fibres parallel to each other by means of steel or iron teeth fixed in a rotatory iron cylinder; the "drawing-frame," which takes the cotton from the carding-machine in strips, doubles them, draws them out many times, and equalizes them from all irregularities; the "slubbing-frame," which further equalizes them by many more doublings and drawings; the "intermediate-frame," which carries the same process still further; the "roving-frame," which brings the cotton to the state of "roving," a soft, slightly-twisted cord; and lastly, the new "spinning-machine," in which many improvements have been introduced, and which sometimes comprehends 1000 spindles.

China has an immense manufacture of cotton goods, but nevertheless imports them largely from England and Russia. A large part of the Chinese cotton is grown at home, but much also comes from India and Burmah. Except the now comparatively unimportant production of the fabrics in India, most of the cotton manufacture of the present

day is carried on in Europe and the U. S., Great Britain taking the lead, and France, Germany, Austria, Russia, Belgium, and Switzerland all having an extensive production of cotton goods. Many of the smaller European states have also considerable cotton manufacturing.

In the U. S. the first successful cotton-mill was that of Mr. Samuel Slater (an Englishman by birth), established at Pawtucket, R. I., in 1790, though at Beverly, Mass., there had been a cotton-manufacturing company in existence for several years, and similar attempts had been made, with small success, at East Bridgewater, Mass., and at Philadelphia. From these small beginnings this manufacture has grown to be one of the most important in the land. The chief seats of the American cotton manufacture are in the New England and Middle States, but the area of the manufacturing district is widening. Especially in Alabama, Georgia, and North and South Carolina there have been attempts made (and on the whole with very encouraging success) to organize a system of cotton manufacturing. If this attempt be fully realized, it would appear that the South, being the finest cotton-growing region in the world, and having abundant and constant water-power, might successfully compete with other regions which are obliged to transport the raw material for thousands of miles. The mills of the U. S. in 1880 were 1005 in number, employing 185,472 persons, considerably more than half of whom were females. The capital employed was \$219,504,794; wages paid, \$45,614,419; cotton used, 1,610,941 bales; total value of products, \$210,950,383. Since the census of 1870 the manufacture of cotton goods in this country has enormously increased. The industry is also very rapidly increasing in the Southern States, which have now (1884) 314 cotton-mills with 1,276,422 spindles and 24,873 looms, while in 1880, according to the census, they had only 180 mills with 713,989 spindles and 15,222 looms. The largest increase in the number of mills has been North Carolina—viz. 43 mills and 110,565 spindles; while Georgia gained 22 mills and 139,156 spindles. In 1880 the value of manufactured cotton produced in the South was a little over \$21,000,000, while in 1883 it was between \$35,000,000 and \$40,000,000. (See "Manufacturers' Record.")

**Cotton-Seed Oil**, from the cotton-plant, *Gossypium Barbadosense, herbaceum*, and allied species. The bolls of the plant contain cotton-fibre and seed in the proportion of one of fibre to 2½ or 3 parts by weight of seed. The cotton-seed has an irregular oval form, the longer diameter being about one-third of an inch; the shorter, a little over half that amount. As it comes from the cotton-gins the seed is covered with short adhering fibre, the "lint." A cross-section of the seed shows in the kernel numerous dark points, which consist of a resinoid body not very soluble in the ordinary solvents for resins, but soluble in the oil, to which it imparts a reddish-brown color, which deepens on exposure to air. The hulls, which constitute one-third to one-half of the weight of the seed, contain still more of this resinoid body; at least, such is the general belief, though the point has been questioned (Adriani). Three to four bushels of seed afford about one bushel of kernels. The proportion of hull to kernel varies, however, in different years. The percentage composition of the cotton-seed is given as follows:

Authority.....	Anderson.	Petermann and Warsage. Whole Seed.	Adriani.	Schneider.
Kind of Seed.	{ "Fresh Undried."	Thessallian.	Egyptian.	{ Decorticated. Egyptian. American.
Moisture.....	6.57	10.17	9.520	7.54 8.12
Oil.....	31.28	17.08	20.880	23.95 20.58
Albuminoids...	31.86	15.44	26.640	27.20 26.12
Crude fibre...	7.30	21.13	25.185	
Other organic constituents.	14.82	32.45	14.000	32.71 33.74
Mineral matter	8.91	3.73	3.775	8.60 9.44
	100.74	100.00	100.000	100.00 100.00
Soluble Phosphates.....				1.10 1.10

The average percentage of oil is put at 15 to 20, while 25 per cent. is regarded as high.

Although the cotton-plant has been cultivated for over a thousand years, no use has been made of its products, except the cotton-fibre, until comparatively recently. It has been found that the fibre of the plant-stalk can be made into a coarse bagging, that the root is susceptible of use in dyeing and pharmacy, and that the seeds will yield as a principal product the oil, besides several valuable by-products. In 1861 it was asserted by Mr. Edward Atkinson that the cotton-plant would be a valuable plant for cultivation even if it produced no cotton. In the preparation of the oil two difficulties presented themselves: the "lint," or short fibre surrounding the seed, retained much of the oil when the seed was crushed and pressed, and the oil, after expression, had a strong color. In 1785 the Society for Encouragement of Arts and Commerce offered a

prize for the manufacture of cotton-seed oil on a commercial scale. At the English exhibition of 1851, Burn of Edinburgh and De Gémigny of Marseilles exhibited specimens of cotton-seed oil and cake, for which prizes were awarded. In 1852 cotton-seed oil was exported from Egypt to France. The first attempts in the U. S. to extract the oil as a merchantable product were made at Natchez, Miss., in 1834, but both those experiments and others made in 1847 at New Orleans, La., were unsuccessful. In 1855 the decorticating machine of L. Klapp was introduced, by which the hulls were separated from the kernels; and since that time the industry has grown rapidly.

**Manufacture of Cotton-Seed Oil.**—In the U. S. the oil-mills prefer upland cotton-seed to any other; the Egyptian and Sea-Island seed cannot be so readily decorticated, and the manufacture is consequently attended with more difficulties. The "lint" is usually removed by one or more additional ginnings. The clean seed is then passed through a hulling or decorticating machine, in which the seed is cut open by knives of steel or chilled iron. This part of the machine consists of a solid cylinder revolving within a hollow one, the opposing surfaces of these cylinders, between which the seeds must pass, being armed with the knives alluded to. By a passage through inclined revolving wire-screens the kernels are separated from the hulls. The kernels are then crushed between iron rollers, when they are ready for pressing. The practice in the U. S. is to heat the ground kernels dry, by means of a jacket of superheated steam, to about 170° to 190° F., in order to cause the oil to separate more freely. In Marseilles and some other places across the water the seeds are first pressed cold, and then heated and pressed again. Hydraulic pressure is used, the intensity being 250 to 500 pounds per square inch. Fifteen to twenty per cent. of "crude" cotton-seed oil is thus obtained. This product is thick and turbid, has a deep brown-red color, and deposits a slimy sediment on standing. The oil is refined by agitation with dilute alkaline ley (containing 3 to 4 per cent. of potash or soda), heating, and allowing it to stand, when the ley, carrying the impurities, settles to the bottom, constituting what is known as "cotton-oil soap stock," while the clear golden-yellow oil is drawn off from the top. In some cases this treatment is repeated, a ley still more dilute being used. Processes involving heating with milk of lime or with oil of vitriol, either alone or with bichromate of potash, or simply steaming, have also been used in clarifying the oil, while some have recommended or used bleaching-powder or nitric acid and chlorate of potash to improve the color of the oil. By these processes of refining the oil loses about 10 to 15 per cent. of its weight.

The grades of oil found in our markets are crude oil, summer yellow and summer white oil, winter yellow and winter white oil. By cooling the summer oils to the freezing-point the palmitin (called by the manufacturers "stearine") crystallizes out, and the oil separated by pressing the solidified material constitutes the "winter oils."

**Properties.**—Cotton-seed oil (*Oleum Gossypii*, *Huile de Coton*, *Baumwollensamenöl*, *Baumwollensaatöl*) consists chiefly of palmitin and olein. It contains about 1.85 per cent. of a non-saponifiable hydrocarbon. The winter oils consist almost entirely of olein. The elementary composition is given as

Carbon.....	76.4 per cent.
Hydrogen.....	11.4 " "
Oxygen.....	12.2 " "
Specific gravity at 60° F.....	0.922 to 0.930 " "

It solidifies at about 32° F. or a little above. The removal of the palmitin in the preparation of the winter oils slightly reduces the gravity and materially lowers the solidifying point. The refined oil is almost odorless and has a slight nutty flavor. The fluidity of the crude oil is 28 to 30 times less than that of water; of the refined oil, about 17 times less (Adrian). The oil is insoluble in alcohol, but very soluble in ether, chloroform, etc. With nitric acid and copper-turnings (elaidin test) the oil assumes a reddish- or brownish-yellow color, and after standing for some time (twelve to twenty-four hours) becomes very thick and viscid. With strong sulphuric acid a dark-colored mixture forms, which, after heating, is soluble in water. With potash or soda ley the oil does not readily or rapidly saponify, but after saponification the mass assumes a bluish tint on exposure to the air. By treating the saponified mass with sulphuric acid, a blue-black compound may be obtained, which can be used as a dye, "cotton-seed blue" ( $C_{17}H_{24}O_4$ ). Nitrate of silver is but slightly reduced by the oil. Heated with chloride of zinc, it turns brown.

Cotton-seed oil stands midway between the drying and the non-drying oils. By some it is classified with the one; by others, with the other. It has some drying properties, but in this respect is far inferior to linseed oil.

**Uses.**—Cotton-seed oil is used as an adulterant or as a substitute for various oils, such as linseed, sperm, lard, olive and almond oil, etc. It is extensively used in cooking as a substitute for butter or lard in the Southern States and in other localities where the cotton-plant is grown. It also finds application in treating leather, in dressing wool, and as a lubricator and an illuminant, as well as in soap-making. Its use in pharmacy has been strongly recommended (Weatherby). It has been stated that nine-tenths of all of the "salad oil" consumed in the U. S. consists of cotton-seed oil. Recently (1881-2) the Italian government put a high import duty upon cotton-seed oil, evidently with the intention of thereby preventing the adulteration of olive oil. It is, however, asserted that this action of the government has failed of its purpose, since the adulteration is still practised, oils from other seeds and from nuts being used. Some division of opinion exists as to the advantages derivable from an admixture of cotton-seed oil with linseed in paints. Some assert that it affords a more elastic coat, which will not crack; others, that the drying-properties are very feeble, and that it is admissible only in the inferior grades of paints and varnishes.

**By-products** in the manufacture of cotton-seed oil:  
One hundred pounds of cotton-seed will afford—

"Lint" and hulls.....	49 to 46 pounds.
Cotton-seed cake.....	37 to 38 pounds.
Crude oil.....	14 to 16 pounds.

Next to the oil, the cake is the most important product. Frequent examinations have been made of the cake with a view to its utilization. The percentage composition has been found to be about as follows:

	From Whole Seed.	From Hulled Seed.
Moisture.....	12	9
Albuminoids.....	21	43
Oil.....	7	15
Crude fibre.....	23	4
Other organic constituents.....	29	22
Mineral matter (ash).....	8	7
	100	100

Phosphoric acid constitutes about one-third of the mineral matter present. The composition is somewhat variable, depending on the quality of seed used, the perfection of the machinery used in extracting the oil, etc.; so that for nearly all of the constituents the variation may be 2 to 3 per cent. above or below the figures here given. In Marseilles the cake is extracted with bisulphide of carbon, the oil thus obtained affording, when saponified, a greenish soap which is highly prized. A large proportion of the cotton-seed cake produced is, however, used as fodder for cattle, while a not inconsiderable proportion is used as a fertilizer. Experiments with the ground cake ("cotton-seed meal") as a packing for the axle-boxes of railway-cars, etc. have proved it to be an efficient and economical substitute for cotton-waste saturated with oil for such purposes.

As a fodder, it has been found that 74 per cent. of the albuminoids, 91 per cent. of the fat and oil, and 46 per cent. of the non-nitrogenous material are digestible. Cows fed with the meal show an improvement in the quantity and quality of their milk, while the beef from such cattle is excellent in quality. The droppings from stock fed with it constitute a valuable manure. It is, however, claimed that the effect of feeding pregnant cows with cotton-seed meal is to produce miscarriage or abortion.

With regard to the other by-products of the cotton-seed oil manufacture, the "lint" is used in the manufacture of paper of excellent quality; the hulls are used for fuel, or are ground in with the meal for fodder (some stock-raisers prefer a fair proportion of hulls in the feed for their stock); the residues from the clarifying of the oil ("cotton-oil soap stock"), palmitin, etc., are used in the manufacture of soap.

**Statistics.**—It is difficult to obtain absolutely reliable statistics regarding the cotton-seed industry. The growth of the industry in this country may be inferred from the increase in the number of mills engaged in crushing the seed. The numbers were as follows: In 1876, 24; in 1880, 45; in 1884, 119. The quantity of seed crushed in 1883 is estimated at 600,000 tons. Reckoning half a ton of seed to the bale of cotton, this would imply that only about half the seed grown had been utilized. The oil obtainable from the above amount of seed would amount to about 250,000 barrels, worth nearly \$4,000,000. The barrel of oil averages 45 to 48 gallons. The oil is usually sold by weight, 7½ pounds being reckoned to the gallon. The oil is largely exported to European ports. The amounts exported have varied very much in different years. The largest amount for any one year was in 1881, when the exports were put at about 150,000 barrels, over three-fourths of which was shipped to French and Mediterranean ports. Since that

time the annual exports have been not quite half that amount. The annual home consumption was estimated a few years ago at 2,000,000 gallons (over 40,000 barrels). The annual exports of cotton-seed cake and meal have also varied during the past few years from 100,000 tons to more than twice that amount. The value of this material has been put at about \$6,000,000 annually.

**Literature.**—For further information regarding the properties and uses of products from cotton-seed, consult A. ADRIANI, "On Cotton-Seed Oil" ("Chem. News," xi, 1865, 5); W. H. WEATHERBY, "Cotton-Seed Oil" ("Am. J. Pharm.," 1861, 208); R. REYNOLDS, "Pharm. Jour. and Trans." (2), vii, 226; "The Chemistry of Artificial Light" (London, 1859, p. 61); A. H. ALLEN, "Commercial Organic Analysis," ii, pp. 130, 144, 191; WATT'S "Dictionary," vol. iv., pp. 180, 181, and 3d Sup., ii, p. 1427; "Report of Conn. Agricultural Exp. Station 1879," p. 145; THEODORE CHATEAU, "Guide pratique, etc., Corps gras Industriels," p. 161 (Paris, 1864); ADOLPHE RENARD, "Corps gras. Huiles grasses," etc., p. 25 (Rouen, 1880); H. PERUTZ, "Die Industrie der Fette und Oele," p. 28 (Berlin, 1866); DR. C. DEITE, "Die Darstellung der Seifen," etc., p. 72 (Braunschweig, 1867); DR. C. DEITE, "Die Industrie der Fette," p. 163 (Braunschweig, 1878); LOUIS E. ANDRÉS, "Die Trocknenden Oele," p. 51 (Braunschweig, 1882); DR. CARL SCHAEDELER, "Die Technologie der Fette und Oele," pp. 37, 61, 401, etc. (Berlin, 1882); FEHLING'S "Handwörterbuch," i, pp. 989, 990. E. WALLER.

**Cottonwood Falls**, capital of Chase co., Kan. (see map of Kansas, ref. 6-H, for location of county), on the Cottonwood River, about 2 miles S. of Strong City, which is on R. R. 81 miles S. W. Topeka. Coal and ochre are found in the vicinity. It has good water-power and manufactures. Pop. in 1880, 518.

**Cot'tonwood Tree**, a common name of the *Populus monilifera*, a species of poplar which grows on the margins of streams of the Western U. S. to the height of eighty feet or more. The timber is soft and not very valuable.

**Cotulla**, Tex. See APPENDIX.

**Cotyledon** [Gr. *κοτυληδών*], in botany, the seed-lobe or seminal leaf of a plant. This organ forms a part of the embryo, and nourishes the plumule and radicle at the first period of their development. Exogenous plants have generally two cotyledons, and hence are called *dicotyledonous*, and endogenous plants, having a single cotyledon, are called *monocotyledonous*. Cryptogamous plants are *acotyledonous*—i. e. destitute of a cotyledon.

**Couch** (DARIUS NASH), an American officer, born July 23, 1822, in Putnam co., N. Y., graduated at West Point in 1846; and as lieutenant of artillery he served in the war with Mexico 1847-48, engaged at Buena Vista (brevet first lieutenant); at various posts 1848-55; and in Florida hostilities 1849-50; resigned April 30, 1855; merchant and copper-manufacturer 1855-61. In the civil war he resumed his sword as colonel of the Seventh Massachusetts Volunteers, and July 4, 1862, became major-general U. S. volunteers. He served in the defenses of Washington 1861-62; in Virginia Peninsula, engaged at Yorktown, Williamsburg, Fair Oaks, Oak Grove, and Malvern Hill; in the retreat from Manassas to Washington 1862; in Maryland campaign 1862, engaged at Harper's Ferry, and in pursuit from Antietam to the Potomac; in the Rappahannock campaign 1862-63, engaged at Fredericksburg and Chancellorsville; in command of the department of the Susquehanna 1863-64, engaged in defence of Chambersburg, which was evacuated; and in command of a division of the Twenty-third corps 1864-65, engaged in the battle of Nashville, and operations in North Carolina to effect a junction with Gen. Schofield. Resigned May 26, 1865, from volunteer service. He was the Democratic candidate for governor of Massachusetts in 1865, but was not elected; U. S. collector for port of Boston 1866-67, and has been president of the Virginia Mining and Manufacturing Company since 1867. GEORGE W. CULLUM.

**Couch'ant** [from the Fr. *coucher*, to "lay down" or "lie down"]. In heraldry, a beast lying down, with his head raised, is couchant. If the head is down, he is *dormant*.

**Cou'dersport**, on R. R., capital of Potter co., Pa. (see map of Pennsylvania, ref. 2-E, for location of county), has a tannery, a foundry, several mills, a public library, and graded schools. Pop. in 1870, 471; in 1880, 677.

**Coues** (ELLIOTT), M. D. See APPENDIX.

**Cougar**. See PUMA.

**Cough** [Lat. *tussis*], a physiological act or operation, which consists in the sudden expulsion of air from the lungs, at the beginning of which act the glottis is closed. Coughing is designed for the expulsion of foreign or secreted matters from the air-passages. It is largely a reflex

action, generally arising from local irritation. When the irritation is the result of disease, coughing may be a very important symptom. It is partly voluntary and partly involuntary. A cough may sometimes be relieved by expectorant remedies, by mucilaginous diluent draughts, by warm foot-baths, by stimulants, and very often by small doses of opium or of other sedatives.

REVISED BY WILLARD PARKER.

**Cough'lan** (LAWRENCE), an English Wesleyan preacher, born about 1760, was one of the principal founders of Methodism in Nova Scotia and the neighboring provinces. His labors were great, and he has been called the "Apostle of Nova Scotia." Died in that province in 1834.

**Coulin** (F—), D. D., born at Geneva Nov. 17, 1828, is a distinguished preacher and writer of the Swiss Free Church, residing at Genthod. He was a delegate to the meeting of the Evangelical Alliance at New York in 1873.

**Council Bluffs**, city, capital of Pottawattamie co., is an important R. R. centre, and the metropolis of Western Iowa (see map of Iowa, ref. 6-D, for location of county), 135 miles W. of Des Moines and 4 miles E. of Omaha. The city is built principally upon a plain at the base of the high bluffs from which it derives its name, although not a few of the finest residences are to be found in the numerous "glens" which intersect the bluffs in every direction. The town is connected with Omaha by an iron bridge almost a mile in length, over which street cars drawn by dummy engines, and regular passenger and freight trains, pass. Among the public buildings worthy of mention are the institution for the deaf and dumb, a large court-house, and an imposing high-school building. A horse railway connects the eastern, western, and southern extremes of Council Bluffs. Owing to its superior shipping facilities, it is fast becoming an important manufacturing centre. Steam engines in large numbers, milling and mining machinery, fanning-mills, agricultural implements of all kinds, cigars, cigar-boxes, and brooms are made here to good advantage. Pop. in 1870, 10,020; in 1880, 18,063.

**Council Grove**, a city, capital of Morris co., Kan. (see map of Kansas, ref. 6-H, for location of county), on R. R. and both sides of the Neosho River, 25 miles from Emporia, in one of the most fertile valleys of the State. It derived its name from the grove where councils for protection against the Indians were held, and is one of the oldest towns in the State. It ships large quantities of grain, cattle, and hogs, and manufactures lime celebrated for its excellence. Pop. in 1870, 712; in 1880, 1042.

A. G. CAMPBELL, County Superintendent.

**Coun'cil, Œcumen'ical** [from the Gr. *οἰκουμένη* (*γῆ*), i. e. the "habitable" (world); because the whole Christian world is, in theory, assembled], otherwise called **General** or **Universal Council**, a title given to certain great ecclesiastical assemblies, so called in distinction from diocesan, provincial, and national councils, which are more limited meetings of the same kind. The Greek and Latin churches acknowledge seven councils—viz.: (1) the first Council of Nice, 325 A. D.; (2) the first of Constantinople, 381 A. D.; (3) the first of Ephesus, 431 A. D.; (4) that of Chalcedon, 451 A. D.; (5) the second of Constantinople, 553 A. D.; (6) the third of Constantinople, 681 A. D.; (7) the second of Nice, 787 A. D. To these the Roman Catholics add the following: (8) the fourth of Constantinople, 869 A. D.; (9) the first of Lateran, 1123; (10) the second of Lateran, 1139; (11) the third of Lateran, 1179; (12) the fourth of Lateran, 1215; (13) the first of Lyons, 1245; (14) the second of Lyons, 1274; (15) that of Vienne, in France, 1311; (16) that of Constance, 1414-18 (in part); (17) that of Bâle, 1431-38; (18) the fifth Lateran, 1512-17; (19) that of Trent, 1545-63; and (20) that of the Vatican, 1869-70. The most important of these are noticed under their alphabetical heads.

**Council of War**, a conference of military or naval officers, called by the commander-in-chief to advise him in relation to some important business or movement. The commandant of a garrison often solicits the opinion of a council of war before surrendering to the enemy. But in the end the military code leaves these matters to the discretion of the commander.

**Counselloer**. See ADVOCATE and BARRISTER.

**Count** [from the Lat. *comes* (gen. *comitis*), a "companion;" Fr. *comte*; It. *conte*; Ger. *Graf*], a nobleman of an order of nobility inferior to dukes and marquises, but superior to viscounts and barons. Counts had an ancient territorial jurisdiction, but at present they are simply noblemen having this hereditary title. The use of the word *comes* in this sense dates from the reign of the Roman emperor Augustus, who conferred it upon the senators who immediately surrounded him, and was afterwards commonly applied to their companions by other Roman em-

perors. It was used in Spain about 650 A. D., and for a long period seems to have been of equal dignity with that of duke, no distinction being made till 1297. In the British empire the title of earl is always used instead of count.

COUNTS-PALATINE were originally "officers of the imperial palace" in Germany, who possessed high judicial functions. The term was afterwards applied to feudatories who had palatine jurisdiction (see PALATINE) over outlying territories, where they maintained a palace and the other machinery of a court. The term came still later to be applied as a title of honor by several princes, but is now obsolete.

**Coun'ter** [from the Lat. *contra*, "against;" Fr. *contre*], a word often used as a prefix to other words, and signifying "against," "corresponding to," or "in answer to." (See etymology of COUNTERFEIT.)

**Coun'terfeit** [Fr. *contre fait*; literally, "made against"], a term applied chiefly to spurious coin or bank notes, or other factitious currency. The uttering of such coin or notes is a felony punishable by imprisonment, or even by death in some countries. To guard against counterfeiting, bank notes are engraved with designs which cannot be reproduced except at great expense. There are also secret marks and combinations of letters and figures known only to the proper authorities. A peculiar ink and paper are used. Pamphlets called "detectors" are printed with lists and descriptions of counterfeit notes and coins. (See FORGERY, by Prof. T. W. DWIGHT, LL.D.)

**Coun'terfort** [Fr. *contresort*], in architecture, a buttress or pier built against or at right angles to a wall, to strengthen it and enable it to resist a particular thrust. In fortification, a mass of stone or brickwork added to the revetment of a rampart in such a way as to form a buttress.

**Coun'ter-Guard** is an outwork designed to defend the two faces of a bastion or ravelin from a direct fire, so as to retard a breach being made. The counter-guard consists of two lines of rampart parallel to the faces of the bastion or ravelin, and separated from them by a narrow ditch.

**Coun'ter-Mark**, in numismatics, a stamp often seen on ancient coins or medals, is generally a figure or inscription. Some antiquaries suppose this mark was struck on money taken from an enemy.

**Coun'terpart**, a correspondent part, a copy, a duplicate. In law, when the parts of an indenture are interchangeably executed by the several parties, that part which is executed by the grantor is termed the *original*, and the others are *counterparts*.

**Coun'terpoint** [Fr. *contrepoint*; It. *contrapunto*], the art of writing music in several distinct parts. The name is derived from the circumstance of the notes being placed one against or over the other on the score. (See MUSIC, by Rev. WILLIAM STAUNTON, D.D.)

**Coun'terpoise** [Fr. *contrepoids* (*i. e.* that which "weighs against" something else)], a weight sufficient to balance another in the opposite scale; equal force or weight acting in opposition to something. In mechanics, a mass of metal connected with an instrument or machine, either for the purpose of giving steadiness or diminishing the pressure on some particular point.

**Counter-Proof**, an impression obtained from a freshly-printed proof of an engraving, by laying it, before the ink is dry, on paper and passing it through the press. In this mode a reversed impression is obtained, which is useful in enabling the engraver to judge of the success of his work.

**Coun'terscarp**, in fortification, is the side of the ditch opposite the scarp. A *revetted* counterscarp is constituted usually by a wall of masonry called a counterscarp-wall; an *unrevetted* counterscarp is of earth at its natural slope.

**Coun'tersign**, a watchword given daily by the commander of an army, in order that friends may be distinguished from enemies by their knowledge of it. Sentinels require every person who approaches their posts by night to give the countersign.

COUNTERSIGN is also the signature of a public officer or secretary to the charter of a king, or to any writing signed by the principal or superior, as a certificate that the charter or instrument is authentic.

**Coun'ter-Ten'or**, in music, the highest adult male voice and the lowest female voice.

**Coun'ty** [Fr. *comté*], originally the territory of a count or earl. In modern usage it denotes a division of a state or kingdom. In England and Scotland the term is equivalent to a shire. The term shire in England is not applied to those counties which were originally distinct sovereignties, such as Kent, Essex, Norfolk, Cumberland, and Sussex. Lancaster, Chester, and Durham are called counties palatine. (See PALATINE.) The primary divisions of the provinces of Ireland are called counties. Each State of the U. S., except Louisiana, is divided into counties, each of

which contains a capital or county-town, in which the court-house is located.

**County Court**, in several of the U. S., is the title of a tribunal higher in rank than the municipal or local courts, and inferior to the supreme court of the State. In some of the States, courts of this grade are called courts of common pleas, and in others superior courts. (See COURTS.)

**Coup**, koo, a French word signifying a "stroke," a "blow," is a part of many phrases which are often used by the English and other nations; as *coup d'état*, a "stroke of state," a sudden, forcible political act, usually designed to subvert the constitution, or to increase the power of a ruler by encroachments on the constitution. *Coup de main*, in the language of war, means a "sudden, unexpected attack," a surprise. *Coup d'œil*, a "glance of the eye," is used in the fine arts to express the general effect of a picture or group at first sight. The term sometimes signifies a view, prospect, survey.

**Coupeville**, W. T. See APPENDIX.

**Coup'le of For'ces or Pres'sures**, in statics, denotes two equal pressures having precisely opposite directions, but applied at different points of a body. According to the ordinary method of the composition of parallel forces, the resultant of such a system would be a parallel force having the intensity zero, and applied at an infinite distance. In reality, two such forces have no single resultant, their tendency being to produce rotation about an axis perpendicular to their plane. The theory of couples, their composition, resolution, etc., was first given by Poinso, and now constitutes an essential branch of statics. The distance between the parallel forces is called the arm of the couple, and the product of either force into the arm the moment of the couple. The statical effect of a couple is unaltered by transportation to a parallel plane, or by any variation in the magnitude and direction of its forces and arm, provided the moment remains the same. On this account a couple, like a simple force, may be conveniently and perfectly represented by a line OA drawn from any origin O perpendicular to its plane, having a length OA proportional to its moment, and a direction such that to an observer at A, looking towards O, the rotation which it is the tendency of the couple to produce shall appear to be direct, like the hands of a clock. Such a line, limited in length and definite in direction, is called the moment-axis of the couple, to distinguish it from the rotation-axis, which is unlimited in length, and simply indicates the direction of the plane of the couple. This mode of representation being adopted, the composition and resolution of couples follow the same laws as those of concurrent simple pressures. Thus, if we regard the moment of a couple as positive or negative, according as the rotation would be direct or retrograde, we may say, The resultant of two or more coaxial couples is another coaxial couple, whose moment is the algebraical sum of the moments of the components. Again: the moment-axis of the resultant of any two couples is the diagonal of the parallelogram whose sides are the moment-axes of the components. The above two properties of couples being established, the general problem of the composition of any number of pressures acting on a body in different directions becomes greatly simplified.

**Coup'le of Rota'tions, or An'gular Veloc'ities**, two equal and opposite rotations around parallel axes. The term was introduced by Poinso, who first fully investigated the composition and resolution of rotations. A couple of rotations is shown to be equivalent to a translation of the whole body in a direction perpendicular to the plane of the rotation-axis, with a velocity equal to that which either axis possesses in virtue of its rotation about the other. The common velocity of all points of the body is expressed by the product of either of the equal angular velocities into the distance between the axes. This distance is called the arm of the couple, and the product its moment. A couple of rotations therefore may be represented perfectly by a single line, exactly as in the case of a couple of pressures, and the composition and resolution of both kinds of couples follow precisely the same laws. Velocities of rotation and translation are, as it were, reciprocal—a couple of either is equivalent to one of the other.

**Coupon** [from the Fr. *couper*, to "cut"], a cheque or slip of paper cut off from a bond. The term is applied mostly to a dividend or interest certificate, which is attached to the bottom of a bond or debenture, and is cut off when the interest is due, and is then presented for payment.

**Courbet** (GUSTAVE), a French painter of landscape, animals, and figures, born at Ornans (Doubs) June 10, 1819. His parents were people of moderate estate, who gave him the best education in their power. His father would have had him a lawyer, and in 1839 he went to Paris to study for that profession, but he hesitated between the law



and painting, and finally decided for the latter. On his first visit to the Louvre he was filled with enthusiasm for the works of the Flemish, Dutch, and Venetian painters, and repeated the legend of Correggio, by saying, when he saw Delacroix's "Massacre of Seio," "I could do as well as that if I wished." Although he studied at different times in the painting-rooms of three artists, Flageoulot, Steuben, and Hesse, he says truly of himself that he never had a master. He exhibited for the first time in the Salon of 1844. Characteristically enough, the picture was his own portrait. In the Salon of 1850-51, Courbet exhibited, among others, three pictures, "An Internment at Ornans," "Peasants of Flagey returning from the Fair," and "The Stone-Breaker," which made an uproar in the artistic and cultivated world of Paris, and divided it into two fiercely hostile camps. Courbet's party was strong, but so was that of his enemies; and, disgusted by the rejection of some of his most important pictures from the Salon of 1855, Courbet determined to appeal to the general public, and, erecting a building at his own expense on a piece of ground as near as he could hire to the Salon, he opened an exhibition of forty pictures, charging a fee for admission. The catalogue was prefaced by his declaration of principles. It was long before the war thus begun ceased, and when it ended Courbet's rank as a great but very unequal painter may be said to have been definitely fixed. Courbet made himself notorious all his life by his extreme opinions in politics and religion, and at the last by the part he played in the Commune. It was by his influence that the column of the Place Vendôme was destroyed. For this act of vandalism Courbet was tried, but, after a long imprisonment, was released. One of the first acts of the reactionary government that succeeded the rule of M. Thiers was to confiscate all Courbet's property, to help to pay for the new column which it was voted to set up on the Place Vendôme. After 1870, Courbet was not allowed to exhibit in the Salon, and his pictures, thus made a mark of, advanced greatly in price. Just before his death a sale was made of all the pictures that remained in his studio, but his reputation had declined, and the prices obtained were small. Since Courbet's death several of his pictures have been bought by the government and placed in the Louvre, among them the "Internment at Ornans." A few important works are owned in America. (See "Histoire des Artistes Vivants," by TH. SILVESTRE, Paris, 1856.) Died Dec. 31, 1877.

CLARENCE COOK.

**Courbevoie**, a town of France, department of Seine, on the left bank of the river Seine, 5 miles N. W. of Paris. It has large barracks, and manufactures of white lead and brandy. Pop. 9862.

**Courcelle**, a town of Belgium, on a railroad, 16 miles E. of Mons. It has linen and nail manufactures, and exports coal. Pop. 7463.

**Courier** [from the Fr. *courir*, to "run"], literally, a runner, a messenger or bearer of despatches, usually on public business. According to Xenophon, couriers were first employed by Cyrus the Great. Herodotus speaks of the Persian *cassids* or foot-messengers, who travelled with great rapidity. They were stationed, one man and one horse, for each day's journey; and by these messengers Xerxes sent the news of his defeat to Persia (480 B. C.). Gibbon bears testimony to the rapidity with which communication was carried on in the Roman empire by the regular institution of posts. The Mexican couriers, according to Prescott, travelled with incredible swiftness. The Peruvian chasquis or runners carried despatches at the rate of 150 miles a day.

**Courier, or Courier de Méré** (PAUL LOUIS), a French scholar and writer, born in Paris Jan. 4, 1772. He entered the army in 1792, and served with distinction. In 1809 he resigned his commission. He translated several Greek classics into French, and produced a good edition and version of Longus (1810). He was liberal in politics, and acquired a high reputation as a political writer. Among his writings, which display wit, eloquence, masculine sense, and genial satire, is the "Pamphlet des Pamphlets" (1824). He was assassinated on his estate in Touraine April 10, 1825. The most complete collection of his writings is "Mémoires, correspondance et opuscules" (1828).

**Courland, or Kurland**, a Baltic province, incorporated with Russia by the third partition of Poland, in 1795. It is bounded on the N. by the Gulf of Riga and on the W. by the Baltic, and lies between lat. 56° and 58° N. and lon. 21° and 27° E. Area, 10,556 square miles. The chief river is the Duna, which flows along the north-eastern border. The soil is in some parts very fertile, but there are many forests, lakes, and swamps. The greater part is occupied by Germans. Courland was originally an independent duchy, but from 1561 to 1795 was in feudal subjection to Poland. Capital, Mitau. Pop. 681,930.

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**Court** [Fr. *cour*; It. *corte*, perhaps from the Gr. *χώρας*, an "enclosed place;" Lat. *aula* or *regia*], originally an enclosure or yard; the residence of a sovereign; a royal or princely household. In England and some other countries the term usually denotes the family and attendants of the sovereign, regarded in a public capacity. Also a judicial tribunal, whether composed of one or more judges; sometimes the hall or room in which judges sit and try causes. The term "court circle" in England is applied to the nobles, bishops, ministers of state, and other persons who are in the habit of approaching the sovereign and of associating with the other members of the royal family.

**Court** (ANTOINE), born at Villeneuve de Berg, in the department of Ardèche, France, May 17, 1696, died at Lausanne June 15, 1760, began his activity as a travelling preacher under great dangers in 1714, formed congregations in Languedoc, Dauphiné, Provence, organized the "Church of the Desert," and retired in 1729 to Lausanne, where he founded a school for the education of Reformed ministers. His life was written by EDMOND HUGHES (Paris, 1872).

**Court de Gébélín** (ANTOINE), a French scholar and author, born at Nîmes in 1725, was the son of Antoine Court, celebrated as the reviver of French Protestantism. He devoted much attention to mythology and the affinity of languages. Among his works is "The Primitive World Analyzed and Compared with the Modern" (9 vols., 1773-84). He assisted Benjamin Franklin in editing a periodical entitled "The Affairs of England and America" (15 vols., Paris, 1776 *et seq.*). Died May 10, 1784.

**Courtenay** (EDWARD H.), LL.D., an American officer and educator, born in 1803 in Maryland, graduated at West Point in 1821. He served, while Lieutenant of engineers, as assistant professor at the Military Academy 1821-24; in construction of Fort Adams, R. I., 1824-26; as assistant to chief engineer 1826-28; and as acting professor of natural and experimental philosophy at the Military Academy 1828-29; appointed full professor Feb. 16, 1829, on the resignation of his lieutenantcy, and with great credit to the Military Academy and profit to his pupils held the chair of philosophy till Dec. 31, 1834, when he accepted the professorship of mathematics in the University of Pennsylvania, continuing in it till 1836; civil engineer New York and Erie R. R. 1836-37; at Fort Independence, Mass., 1837-41; and construction of dry-dock, Brooklyn navy-yard, 1841-42. He resumed his former vocation, for which he was admirably fitted, as professor of mathematics in the University of Virginia 1842-53; translator and editor of Bouchard's "Mechanics" 1833, and was author of a "Treatise on Differential and Integral Calculus, and Calculus of Variations." Died Dec. 21, 1853, at Charlottesville, Va., aged fifty.

GEORGE W. CULLUM.

**Courtland**, on R. R., Lawrence co., Ala. (see map of Alabama, ref. 2-C, for location of county), 45 miles W. of Huntsville. It has male and female academies and two steam-mills. Pop. in 1880, 580.

**Court-Martial**, in the army, navy, and marines, a tribunal for the examination and punishment of offenders against martial law or against good order and military or naval discipline. The subjects of courts-martial are usually officers or men in actual service, but when martial law prevails courts-martial sometimes punish offences committed by persons not in the service.

Courts-martial are called "general," "garrison," and "regimental." Summary and informal courts held in the field are sometimes called "drumhead courts-martial." The officers of military and naval courts are a president, a JUDGE-ADVOCATE (which see), and a clerk, all commissioned officers. The sentences passed by these courts are usually subject to the approval of department commanders or other high officers, or even to that of the President of the U. S. (See S. V. BENÉT on "United States Military Law," 1862; CLONE, "Military and Martial Law," 1872; SIMMONS, "On the Constitution and Practice of Courts-Martial," 1878.)

**Courtown**, EARLS OF, and Viscounts Stopford (1762), barons of Courtown (Ireland, 1796), Barons Saltersford (Great Britain, 1796).—JAMES GEORGE HENRY STOPFORD, fifth earl, born April 24, 1823, succeeded his father in 1858.

**Courtray** [anc. *Cortoriacum*; Flem. *Kortryk*], a fortified town of Belgium, on the river Lys, 26 miles S. W. of Ghent. It is well built and clean, has a castle, a fine old bridge, a noble town-hall, and a beautiful Gothic church founded in 1238. Here are manufactures of damasks and other linen fabrics, hosiery, lace, paper, cotton goods, soap, etc. This place was taken in 880 A. D. by the Normans, who fortified it. In July, 1302, the Flemings here defeated the French in the famous "Battle of the Spurs," so called from the great number of spurs taken from the fallen knights. Pop. 27,076.

**Courts** (in law), public tribunals established for the administration of justice and the interpretation and enforcement of the law. The protection of private rights, the punishment of criminal offences, the regulation of conflicting interests of individuals and states, the exposition and application of legislative enactments, and, in some nations, even of constitutional provisions, are the various important functions which are generally deputed to such judicial organizations. It cannot be said, however, that all tribunals which have been designated courts in various countries and at different epochs have enjoyed all these prerogatives, or have exercised them so exclusively as is understood to be the appropriate province of courts at the present day among civilized communities. In a primitive form of society the powers of the judiciary are usually much restricted, and subjected, to a greater or less degree, to executive and legislative interference. This remark applies also to despotic governments, even though a high degree of civilization be attained, as the history of France and Germany bears ample witness. In modern times, however, it has been recognized as a necessity to confer upon the courts the powers above enumerated, and to render their independence of the other departments of government as complete as possible. They are generally composed of distinct bodies of officials holding their positions during stated terms, and are under no supervisory control for decisions rendered or other legal acts performed but that of superior or appellate organizations of a similar nature. In the exercise of their powers courts do not attempt to ferret out and redress every evil and form of injustice that may exist within society, and determine the law of their own motion by the direct establishment of legal principles, but are confined to the decision of controverted questions presented to them by injured parties, and thus evolve the law indirectly and mediately. Criminal cases are presented by the government, while those of a civil nature are brought either by states or individuals affected therein, at their own option.

But while there is a general agreement among civilized nations at the present day in regard to the objects to be attained by the creation of courts, the modes by which the same results are sought are notably and strikingly diverse. The courts upon the continent of Europe and in Scotland administer a system of jurisprudence derived from the civil or Roman law, while in England and the U. S. they apply a system which they themselves have originated, called, by way of distinction, the "common law." In the latter the rule of precedent holds sway, in accordance with which principles determined in previous decisions are, in general, to be deemed authoritative in subsequent causes involving similar circumstances. In this system, moreover, the mode of trial by jury was developed as a safeguard against oppressive action by the courts, and has been sedulously maintained as far as its application is reasonably practicable. The judge does not examine witnesses nor decide any questions but points of law, so that every inducement may be removed which would lead him to act as advocate instead of arbiter, and awaken his personal interest in the cause. A broad distinction is also drawn between actions which are termed legal and suits which are called equitable, the latter dispensing with a jury, administering a more adequate relief in many instances, and in various ways supplementing the deficiencies of the proceedings applicable to the former. In the European courts, on the other hand, which proceed upon the doctrines of the civil law, the force of precedent is not recognized as a controlling principle. Jury trials have only been introduced as a foreign system, are employed in a comparatively small class of instances, and are looked upon with so little favor that any extension of their application is generally thought undesirable. The judges, moreover, may engage directly in the examination of witnesses and prisoners, and not infrequently, particularly in criminal trials, appear to become so strongly biassed in consequence as seriously to impair one's belief in the impartial administration of justice. And lastly, no distinction of causes and remedies as legal or equitable is attempted. In fact, the English practice in this respect has even excited the derision of continental lawyers, who charge that it presumes two different kinds of justice.

Besides these fundamental points of difference between the two systems, there are great diversities between the several countries in the number, the character, and the functions of the various courts which have been established, and their relations with each other, which will require an investigation into the judicial system of each of the more important modern nations specifically. England, Scotland, France, and the U. S. will be selected for this purpose, and reference made to their most important tribunals in detail.

**I. THE COURTS OF ENGLAND.**—By the English and American common-law system courts are distinguished as

those of record and those not of record. A court of the former class is provided with a clerk and a seal, and receives its name from the fact that its proceedings are required to be preserved in accurate records; courts of the latter class are inferior tribunals without clerk or seal, and their acts are not formally enrolled. Courts are said to have original jurisdiction before which causes are brought in the first instance; appellate jurisdiction when decisions rendered in inferior tribunals are transferred to them for review. Civil causes heard before a single judge, with a jury, are said to be heard at *nisi prius* or at circuit; when several judges sit to review causes on appeal they are said to sit *in banc*. Courts are also distinguished as civil or criminal, superior or inferior, as courts of law, of equity, of admiralty, etc.—distinctions which require no explanation. In the following synopsis of the English courts at the present time (Jan., 1874) an account will be given (1) of the superior common-law courts of record; (2) of the superior courts of equity; (3) of the courts of probate, divorce, and admiralty; (4) of the criminal courts; (5) of the appellate courts.

(1) *The Superior Common-Law Courts of Record.*—These are the Court of Common Pleas, the King's or Queen's Bench, and the Court of Exchequer. These several tribunals, which now enjoy very much the same jurisdiction, are considered to have been derived originally from a single organization, the *Aula Regis* (or King's Council), which was the only superior court in the realm during the early history of the Roman kings. This had both civil and criminal jurisdiction, and was ambulatory, or attendant upon the person of the king, holding its sessions in such different parts of the kingdom as he entered in the course of his journeyings. The present courts were, when first created, nothing more than subordinate branches or committees of the council, established for the more speedy transaction of business. The exchequer branch entertained questions relating to the royal revenue; that of the common pleas, civil suits between individuals except for forcible injuries; while there was left to the *Aula Regis* proper, jurisdiction in criminal causes and in civil actions for injury by violence, and a general controlling power over inferior tribunals.

In the reign of Edward I. (1272) the three bodies were constituted separate courts, were all fixed at Westminster, and their powers, as distinct tribunals, determined. Each retained, however, its previous particular jurisdiction. But in the course of time, by a gradual process of encroachment, justified by ingenious legal fictions, each court trenching upon the appropriate province of the others, assuming thereby similar powers, so that at the present day they all entertain co-ordinate jurisdiction in nearly all civil causes. The Court of Queen's Bench, however, still retains exclusive cognizance of criminal matters and the sole superintendence over inferior courts and civil corporations; the Court of Common Pleas has alone the right to entertain real actions—i. e. actions for the specific recovery of real property (actions now rarely brought); while the Court of Exchequer still exercises entire control over strict questions of revenue. In other cases the parties to the action may select any one of the courts they may prefer. As regards the organization of these common-law courts, the Queen's Bench and Common Pleas consist each of a chief justice and five puisne justices; the Exchequer, of a chief baron and five puisne barons. These judges hold office during good behavior, but may be retired on a pension after fifteen years' service. An appeal lies from any one of these courts to the Exchequer Chamber, which, when hearing a cause sent from one of them, is composed of the judges of the other two. A second appeal may also be taken to the House of Lords.

To remedy the inconvenience to suitors arising from the fixed establishment of these courts at Westminster, provision was made at an early period for the hearing of jury trials in every county one or more times during each year. The tribunals for this purpose are called *courts of assize* and *nisi prius*, are composed of two or more commissioners, of whom a superior court judge, a sergeant-at-law, or a barrister must be one, and in most counties they sit twice each year. Appeals from them, however, can only be heard at Westminster.

(2) *The Superior Courts of Equity.*—It was found at an early period that the common-law tribunals, determining causes as they did only through the instrumentality of juries in the first instance, and in all cases, where no demand was made for specific property, giving only pecuniary damages as relief, were totally inadequate to administer exact justice in a large variety of cases, and the separate system of equity jurisprudence was established to repair the deficiencies of the strict legal methods. These courts are likewise governed by the rule of precedent, but their modes of procedure are less technical, their forms of rem-

edy more diverse, and they employ no juries, though a practice exists of referring special questions to courts of law to be tried by a jury, whose verdict is reported to the equity judge to aid his future action. The equity judges consist, at present, of three vice-chancellors, a master of the rolls, two lords justices, and the lord chancellor. The vice-chancellors and the master of the rolls hold each separate courts at which causes are heard in the first instance; so that there are four equity tribunals of original jurisdiction. Appeals may be taken from either of them to the Court of Appeal in Chancery or to the lord chancellor.

The Court of Appeal in Chancery is composed nominally of the two lords justices and the lord chancellor, but almost invariably it is held by the lords justices alone. Any two of these three judges, however, are sufficient for holding the court, or even the lord chancellor alone. Moreover, each of the justices may, under certain restrictions, sit alone. The chancellor may, in addition, exercise an independent jurisdiction, without acting as a member of the court of appeals. This jurisdiction is ordinary when according to common-law methods; extraordinary, when equitable in its nature. An appeal may be taken to the House of Lords. The term of office of these judges is the same as that of the common-law judiciary, except in the case of the chancellor, who may be deprived of his position at the pleasure of the Crown.

(3) *The Courts of Probate, Divorce, and Admiralty.*—The Court of Probate and that of Divorce were established in 1857 to supersede the former ecclesiastical courts, and received more extended powers. Their names sufficiently define the nature of their jurisdiction. The judges of either of these tribunals may try questions of fact with a jury, or may order an issue to be tried by a court of law. Appeals may be taken to the House of Lords. The Court of Probate has only a single judge, who may, however, associate with himself a common-law judge or judges. The appropriate labor of this tribunal is facilitated by the establishment of district registries throughout the realm. These are forty in number, besides the principal registry in London, all having power to grant probate and administration.

The Court of Divorce consists of the judge of probate, the lord chancellor, and the judges of the superior common-law courts. The probate judge is made judge ordinary, and may act alone or with the other judges. The power to grant divorce, which has been conferred upon this court, was exercised till 1857 only by Parliament. Actions for criminal conversation may also be maintained in this court.

The High Court of Admiralty has cognizance of causes of action arising from the navigation of the seas, as, *e. g.*, claims for repairs of foreign vessels and for supplies furnished them, actions for pilotage fees, for seamen's wages, for personal injuries inflicted at sea or by collision, seizure, and the like; also to determine matters of prize in time of war, and decree the forfeiture of vessels of the enemy or of neutrals in proper cases. This court is held by a single judge, who is appointed by the Crown. He may be the same person as the judge of probate.

(4) *The Criminal Courts.*—These are divided into the inferior and the superior, the former including the general and quarter sessions of the peace, while the latter embrace the assizes, the admiralty sessions, the Court of King's Bench, and the Central Criminal Court. The assizes are held before commissioners twice a year in nearly all the counties. These officials act by virtue of various commissions, the most important of which are those of "oyer and terminer" and "general jail delivery." At oyer and terminer the judges can only act upon indictments found before themselves, and they have jurisdiction whether the offender is or is not in custody. The commission of jail delivery authorizes the delivery of the jail of a specified town. Indictments may be tried found before other justices, but the persons charged must always be in custody to give the court jurisdiction.

The King's or Queen's Bench is the highest court of criminal jurisdiction. This prerogative, as has been seen, it enjoys to the exclusion of the other superior common-law courts.

The other criminal courts require no particular mention.

(5) *Appellate Courts.*—(a) The Exchequer Chamber, to which appeals are first taken from the King's Bench, the Common Pleas, and the Exchequer, is composed, as already explained, of the judges of the two courts in which the action was not heard originally.

(b) The Judicial Committee of the Privy Council has exclusive jurisdiction of appeals in admiralty and ecclesiastical cases, and in those coming from the colonies. It is a court of record, and is composed of a lord president, all the equity judges, the three chief judges of the common-law courts, and certain other officials to the number of

twenty or more. Only four, however, are required to constitute a quorum. Four of the whole number of members receive a salary, are required to attend the sittings, and retain their positions during good behavior. But the members of the Council generally hold office during the pleasure of the Crown. There is no appeal to the House of Lords, and there is, consequently, danger of a conflict of authority between these tribunals of last resort.

(c) *The House of Lords.* Though, in theory, this entire body constitutes the appellate tribunal, and any of the lords might, if so disposed, assume to act as judges, yet the judicial functions are, in reality, entirely delegated to a few members of the legal profession, known as the "law lords." The services of the others are only available when they are needed to make up a quorum, for which three members are required. The organization of this court has several objectionable features, since the sittings are only held while Parliament is in session; there is no regularity of attendance required on the part of members; and a judge may sometimes sit in review of his own decisions. The decisions rendered, however, enjoy generally a great reputation from the eminence of those who usually act as judges.

There is a large number of other courts in England's present judicial system, but they are all of minor importance and need no specific mention.

The inconveniences arising from this complexity of court organization in England are so manifold that a reform has long been felt necessary. Accordingly, an act of Parliament has been recently passed, entitled "The Supreme Court of Judicature Act" (36 and 37 Vict., chap. 66), to come into effect in November of the present year (1874), by which a reorganization is to be effected. The chief tribunals now existing are to constitute in combination a single court, called the "Supreme Court of Judicature." This is, however, to be separated into two divisions—one to be known as "Her Majesty's High Court of Justice," exercising mainly original jurisdiction, while the other will be named "Her Majesty's Court of Appeal," with exclusive appellate powers except in some few classes of instances. There is to be no appeal to the House of Lords. The High Court is to consist of twenty-one judges—viz. all the present equity judges, with the exception of the lords justices, all the common-law judges (whose number, however, will be reduced in future to fifteen), the judge of the Court of Probate and Divorce, and the admiralty judge. Though the present lord chancellor will form a member of this court, his successor will not. The Court of Appeal will be composed of fourteen judges, of whom five will be judges *ex officio*, and nine *ordinary* judges. Additional members may also be appointed if desired. The *ex-officio* judges will be the lord chancellor, the master of the rolls, and the three chief-justices of the common-law courts. All these, as has been seen, are also members of the High Court. The ordinary judges will be the two lords justices in Chancery, the four salaried judges of the Privy Council, and three others to be hereafter appointed. These nine, and any additional judges who may be appointed, will be known as lords justices of appeal. All the judges of both tribunals will hold office for life, though they may be removed by the Crown on the address of Parliament.

For the more convenient despatch of business, the High Court of Justice is to be divided into five divisions, corresponding to the present tribunals, whose jurisdiction it has received. Thus, one division is to consist of the equity judges, who will be members of the High Court, and is to be known as the Chancery Division. In like manner, there will be the Queen's Bench Division, the Common Pleas Division, the Exchequer Division, and the Probate, Divorce, and Admiralty Division; the first three of which will consist of the judges of the present courts from which they derive their names, while the last will be composed of the two judges of the Courts of Probate and Divorce and the Court of Admiralty. Provision is made for a reduction or increase in the number of these divisions, or in the number of judges who may be attached to any particular division, by order in council of the queen. Judges may also be transferred from one division to another by Her Majesty when it shall be thought desirable. Each of these divisions is to possess very much the same jurisdiction as the present court of the same name, and will be in fact the same tribunal, though with some important differences of authority. For instance, the courts which now proceed entirely upon common-law principles will then be enabled to apply the doctrines of equity jurisprudence, for it is provided that in every civil cause or matter entertained in the Supreme Court of Judicature law and equity shall be concurrently administered, and that equitable rules shall supersede those of the law when any conflict arises. It is still true, however, that causes of action which in them-

selves have been hitherto considered distinctively equitable are to be brought before the Chancery Division, which takes the place of the four present chancery courts of original jurisdiction.

In a large number of questions several divisions, it is evident, will have co-ordinate jurisdiction. It is accordingly provided that any person commencing a cause may assign it to any proper division he may think fit by marking his documents with its name. If a wrong assignment be made, a transfer may be had, on proper application, by direction of the court or by a judge of the division in which the matter is brought, or the cause may even be retained if a transfer would be inexpedient. Such causes as may at present be heard by a single judge are to be heard in the same manner when this act goes into effect. Other matters are referred to divisional courts of the High Court, which are to be constituted of two or three judges. These divisional courts are not the same as the divisions already mentioned. Any number of them may sit at the same time, and they may consist of any of the twenty-one judges of the High Court. The divisional courts hear appeals from the decisions of single judges of the High Court and from inferior courts, decide various motions, etc. Appeals from inferior courts, such as the petty and quarter sessions, county courts, etc., here receive final determination. Other appeals may go on to the Court of Appeal.

Every appeal to the Court of Appeal shall be heard either by the whole court or by a divisional court consisting of any number, not less than three, of the judges thereof. Appeals may also be reheard before decision, or be reheard before final judgment, before a greater number of judges, if the Court of Appeal so direct. But no judge shall hear a case on appeal which he himself decided, or helped to decide, originally.

Provision is also made for the appointment of commissioners to hold circuit courts throughout the kingdom, as at present. Referees may also be appointed for the hearing of causes or the determination of much of the incidental business arising in the courts. The rules of practice and pleading are also to be considerably altered and simplified; but for all these minor details reference must be made to the Judicature Act itself. This synopsis of the general organization of the courts shows how fundamental a revolution is to be effected in the judicial system as at present constituted.

**II. THE COURTS OF SCOTLAND.**—Although both England and Scotland belong to one united kingdom and have but a single legislative body, the Houses of Parliament, their judicial organization is almost entirely diverse. There is one tribunal of supreme appellate jurisdiction, the House of Lords, which is common to both countries, but this is the only element of correspondence in the two systems. Scotland administers the civil law instead of the common. The courts of chief importance are the Court of the Sheriff, or sheriff-substitute, and the Court of Session. The Scottish sheriff differs from the English in not being confined to the performance of merely ministerial duties. He acts also as the chief local judge of the county to which he belongs. The jurisdiction he exercises is both civil and criminal, and is quite extensive in its scope. In civil causes it extends to all actions on contract and for damages, no matter how large the amount involved. In matters, however, relating to landed property his authority is much restricted. He has also a summary jurisdiction, conferred by statute, in small-debt cases, where the sum involved is not above £12. In most cases of this kind there is no appeal from his decisions. The sheriff also takes cognizance of bankruptcy, insolvency, and admiralty questions. His criminal jurisdiction extends to all cases which do not infer death or banishment. No jury is employed in the trial of civil causes, but only in those of a criminal nature. Though, however, these various powers are described as appertaining to the sheriff himself, yet in practice, so far as the capacity of hearing causes originally is concerned, they are delegated to a subordinate officer, appointed by the sheriff, and styled a sheriff-substitute. If it is desired to secure the review of a decision rendered by the substitute in the first instance, then the sheriff himself acts in the capacity of an appellate judge. From him also, in proper cases, an appeal may be taken to the Court of Session, and thence to the House of Lords.

The Court of Session is the highest civil tribunal in Scotland. It takes cognizance of all questions of a civil nature, whether legal, equitable, admiralty, or probate, and exercises both original and appellate jurisdiction. It was established in 1532, and, as originally constituted, consisted of fifteen judges, all of whom sat in a body to hear appeals. This arrangement occasioned great dilatoriness of procedure, but continued nevertheless for nearly three centuries, despite this and other commonly recognized inconveniences. The present organization is much differ-

ent. The number of members has been reduced to thirteen. Five of these are called "lords ordinary," exercise severally original jurisdiction, and constitute collectively what is known as the "Outer House." The eight remaining judges form the "Inner House," and have, as a general rule, only appellate jurisdiction. They are divided into two divisions of four each, either of which possesses the same authority, and may be selected by any party appealing, at his own option. One division is presided over by the lord justice clerk, the other by the lord president. In some few instances the Inner House may exercise original jurisdiction, and in cases of exceptional difficulty the whole body of thirteen judges may consider a question upon appeal; but such cases are very rare. In the trial of civil causes in the first instance before a lord ordinary juries have been employed since 1815, but by no means to so great an extent as in the English practice. The jury system was introduced as an exotic, and does not thrive very vigorously under the unfavorable conditions of a common prejudice against it on the part of clients and hostile criticism by able members of the bar. Juries may be dispensed with, in general, in the discretion of the court or by consent of parties; and, as might be supposed, a resort to these expedients is not infrequent. The constitution of the appellate branches of the Inner House in this system is evidently faulty. There may be an equal division of the judges in either body, so as to render the determination of any question impossible, or the decisions of one branch may directly contradict those of the other, so as to make the law fluctuating and uncertain. The first evil is remedied by calling in a lord ordinary or three judges of the other house to attend a rehearing of the cause, by which means the whole number of judges is made uneven and a majority rendered certain. In the second case the opinions of the whole court may be taken, but this mode of reference is discretionary, and therefore inadequate to meet the difficulty. The final appeal, which may be taken from the Court of Session to the House of Lords, has this peculiar consequence—that it refers questions arising under the civil-law procedure to jurists trained only in common-law methods as a general rule. It cannot be said, however, that any practical evils have resulted from this co-operation of systems.

There are several other courts in Scotland composed of members of the Court of Session. Only one, however, deserves mention—viz. the High Court of Justiciary, a tribunal exercising an important criminal jurisdiction. The other courts are of inferior importance.

**III. THE COURTS OF FRANCE.**—The most important courts are the Tribunals of the First Instance, the Courts of Appeal, the Courts of Assize, and the Court of Cassation. The Tribunals of the First Instance, as their name implies, entertain causes originally, and they exercise both civil and criminal jurisdiction. One of them is established in each of the arrondissements into which the whole country is divided. Each of these courts consists of from three to twelve judges, the number varying with the population of the districts. When their number is seven or more, they are formed into two chambers—one for the hearing of civil, and the other of criminal, causes. When there are twelve judges, three chambers are formed, two civil and one criminal. The tribunal at Paris is so large as to be divided into ten chambers. In civil cases three judges must concur in order to pronounce a decision, while in criminal actions the agreement of five is necessary. Appeals may be taken to the Courts of Appeal.

The Courts of Appeal are twenty-seven in number, and each of them is named from the city or place in which it is situated. They consist severally of at least twenty-four judges, who are generally divided into three chambers—one of civil jurisdiction, another of criminal, while the third hears appeals in police matters. Seven judges must concur in the determination of civil causes, five in criminal accusations. The Court of Appeal in Paris has six chambers and fifty-nine judges. Each chamber in all these courts has its own president. When momentous state questions are to be decided or causes of exceptional complexity two chambers may be united. This is called "the solemn hearing," and the concurrence of fourteen judges is required in order that a decision may be given. Appeals lie from these courts to the Court of Cassation.

The Courts of Assize are composed of judges of the Courts of Appeal, and exercise only criminal jurisdiction. One of these tribunals is established in each of the departments into which France is divided (about eighty in number), and their institution is peculiar, as compared with French courts in general, in that it exhibits the employment of the English jury system. The jurors, however, are not required to be unanimous in their verdict, a majority sufficing. The number of judges in each court is three, and sessions are held every three months. The large

amount of business in Paris, however, requires two sessions a month. Appeals may be taken to the Court of Cassation.

The Court of Cassation is the highest permanent court of appeal in France. It is composed of a first president, three presidents of chambers, and forty-five other judges called counsellors. It is divided into three chambers—one for the hearing of appeals in civil causes, another in those of a criminal character, while the third is termed the Chamber of Requests, and takes cognizance of petitions, determines whether appeals are admissible, etc. Appeals must be brought within three months after the previous decision was rendered. The judges, as in all the higher courts of France, hold office for life. The constitution and functions of the Court of Cassation differ quite essentially from those which are conferred upon appellate tribunals in England and generally in other countries, and even upon the subordinate French courts of appeal; for it possesses no power to affirm the judgment of the court below, but only, as its name indicates, to reverse a decision, and transfer the cause for another hearing to some tribunal having co-ordinate jurisdiction with the one in which judgment was first rendered. Moreover, notwithstanding the pre-eminent position of this court, its determination of the law is not considered authoritative upon inferior tribunals, but only as presumably correct and open to contradiction. Instances in which its views are disregarded, however, are of course very rare.

Other French courts of limited jurisdiction but great usefulness are the Tribunals of Commerce, established in all the commercial cities and towns, and the Courts of Prudhommes, existing in Paris and a few of the larger cities. The former consist largely of men experienced in mercantile pursuits, and take cognizance of questions arising in commercial transactions. The latter are mechanics' courts, consisting of manufacturers and artisans, and take charge of matters arising from the relations of employer and employed. They relieve the ordinary courts of much labor.

IV. THE COURTS OF THE UNITED STATES.—In accordance with the provision of the Constitution establishing a Supreme Court and conferring upon Congress the power to create inferior tribunals, a regular system of courts has been formed throughout the Union. The most important are the District Courts, the Circuit Courts, and the Court of Claims. Final appeals are taken to the Supreme Court at Washington. All these tribunals exercise both law and equity jurisdiction, and the judicial authority given by the Constitution is variously apportioned among them.

The District Courts are at present (1885) sixty in number. Each State generally constitutes a single district, though some of the larger ones, as New York, Pennsylvania, and a few others, are divided into two or three. New districts are formed by Congress as the population increases or new States are admitted, so that the number is subject to constant variation. Each court consists of a single judge, who must reside in the district for which he is appointed. Original jurisdiction is exercised in civil, criminal, and admiralty causes. The classes of questions of which these courts take cognizance are determined entirely by Congressional enactment, and are variously modified at different times. They entertain exclusively questions of admiralty or maritime jurisdiction in the first instance, including all seizures upon navigable waters under laws of imposts, navigation, or trade of the U. S., actions for injuries committed upon the high seas, suits to recover upon maritime contracts, actions for salvage, for injuries by collision, and matters of prize. They also have sole original cognizance of questions arising from seizures upon land, and of all suits for penalties and forfeitures under the U. S. laws, and also of actions against consuls or vice-consuls. In addition, they have original jurisdiction in all causes under the bankrupt laws. They exercise concurrent jurisdiction with the Circuit Courts of all crimes and offences against the U. S. the punishment of which is not capital, of patent and copyright cases, and of all causes, civil or criminal, affecting persons who are denied in the State courts their rights of citizenship under the U. S. laws. They also have concurrent jurisdiction with the Circuit Courts or with the State Courts of all causes where an alien sues for a tort in violation of the law of nations or a treaty of the U. S., and of all suits at common law where the U. S. or any officer thereof sue. The trial of issues of fact in the District Courts, except in civil causes of a maritime character, is by jury. No person can be arrested in one district for trial in another. Appeals are generally taken to the Circuit Courts, though sometimes to the Supreme Court.

The Circuit Courts are nine in number, and each circuit in which one of these courts is established consists of several States. The nine justices of the Supreme Court are allotted, by their own selection, each to a particular circuit,

and each is required to attend at least one term of such court to which he is appointed in each district of his circuit during every period of two years. There is also appointed a special circuit judge in each circuit, within whose limits he must reside. A circuit court is held by the Supreme Court justice thereto allotted, or by the regular circuit judge, or by the district judge of the district sitting alone, or by the Supreme Court justice and circuit judge sitting together and the former presiding, or, in the absence of either of these, by the other (who then presides) and the district judge. Such courts may be held at the same time in the different districts of the same circuit. Two sessions of each court are held annually within each district of the circuit. The circuit courts have both original and appellate jurisdiction. Their original jurisdiction extends, concurrently with that of the State courts, to civil suits in law or equity for more than \$500 when the U. S. are plaintiffs, or an alien is a party, or the suit is between a citizen of the State where the suit is brought and a citizen of another State. They also entertain causes arising under the revenue laws and some questions of a particular nature in bankruptcy procedure. Their important concurrent jurisdiction with the District Courts has already been mentioned. Provision is made, moreover, for the removal of certain causes—such as, *e. g.*, actions against revenue officers, suits on titles to land derived from other States, etc.—from the State courts to the Circuit Courts, on proper petition by the defendant and the entering of security. The appellate jurisdiction of Circuit Courts extends to admiralty and maritime causes, and to civil actions referred from the District Courts, where the matter in dispute exceeds the value of \$50; also to patent and some other questions. Appeals from the Circuit Courts are taken to the Supreme Court.

The Court of Claims is a tribunal established at Washington, consisting of five judges, of whom one is appointed chief-justice. It has jurisdiction to determine all claims founded upon any law of Congress, or upon any regulation of an executive department, or upon any contract with the government of the U. S., which are presented to it by petition. All petitions in regard to such claims introduced into Congress are required, unless that body otherwise orders, to be transmitted to this court. So the cabinet officers may refer certain claims made upon their departments. Demands which are adjudged valid are payable from the national treasury. The Court of Claims has a single annual session. Appeals are taken to the Supreme Court.

The Supreme Court is the highest tribunal of the U. S. It consists of a chief-justice and eight associate justices, and holds one term annually at Washington. Six justices are required to constitute a quorum. The jurisdiction exercised is both original and appellate, but chiefly, in practice, the latter. The original jurisdiction extends to all cases affecting ambassadors, other public ministers, and consuls, and those in which a State is a party, except that in the latter case no suit can be prosecuted against any State by the citizens of another State. In actions against ambassadors or other public ministers, and in many controversies where a State is a party, its jurisdiction is not only original, but exclusive. Its other original authority is shared with the inferior tribunals. In the exercise of its appellate powers the Supreme Court reviews the judgments or decrees of the Circuit Courts, of certain District Courts with Circuit Court powers, of the Court of Claims, and of some tribunals established in the Territories. Moreover, the decisions of the highest State tribunals which are repugnant to the Constitution, treaties, or laws of the U. S. may be re-examined by the Supreme Court, and reversed or modified as may be necessary. Questions also which fail of determination in the Circuit Courts by reason of an equal division among the judges may be transferred to this court for final decision. It has power to review both the law and the fact in any cause of which it takes cognizance on appeal.

The Federal tribunals in this way possess exclusive jurisdiction over subjects of such manifest national importance as patents, copyrights, admiralty causes, and questions of revenue, and have power to determine controversies between States, and to declare void all laws, whether of Congress or of a State legislature, which are in contravention of the provisions of the U. S. Constitution.

V. The judicial systems of the various States of the Union are so diverse that to give any account of them would be impracticable. They all agree in having a number of tribunals, some of original and others of appellate jurisdiction, and the determination of the law by the courts of each State, subject to the review of the Supreme Court of the U. S. in constitutional matters, is conclusive within its own boundaries. Reference must be made to the constitutions and statutes of the States severally for further details.

GEORGE CHASE, REVISED BY T. W. DWIGHT.



**Cous'cous**, called also **Spotted Phalan'ger** or **Sham'sham**, the *Phalangista maculata*, is a white marsupial with black and brown spots. It is about the size of a common cat, and has a prehensile tail and opposable thumbs

literally, an "agreeing" or "agreement;" Gr. *διαθήκη*; Lat. *foedus*; Ger. *Bund*), in theology, the promises recorded in the Scriptures, made by God on certain conditions of obedience, faith, etc. on the part of man. The old dispensation (or Old Testament) is called in Greek *ἡ παλαιὰ διαθήκη*, i. e. "the old covenant;" and the new dispensation (or Testament), *ἡ καινὴ διαθήκη*, "the new covenant."

The so-called "Theology of the Covenants" or "Federal System" began with Cocceius (1603-69), who taught: (1) the covenant of works before the fall; (2) the covenant of grace after the fall. And under this second covenant three economies: (1) prior to the law; (2) under the law; (3) under the gospel.

**Covenant** [remotely from the Lat. *convenio*, to "come together"], in law, is a promise under seal. There are several words appropriated to sealed instruments or promises contained in them, such as bond, covenant, deed, and obligation. The first, third, and fourth words are used to express the entire instrument, while "covenant" is commonly employed to designate a particular clause in a sealed instrument. Thus, there may be many covenants in a deed. The subject is fruitful in distinctions, covenants being

treated in the law-books as to their form, their nature, their relation to other covenants, their assignability, and the like. One of the most important of these is that which classifies covenants into those which "run with the land" and those which do not. To explain this subject it is necessary to state that in ordinary conveyances of land there are found certain clauses which affirm in substance that the grantor is owner in possession, actual or constructive (or seized), and has a good right to convey; that there are no encumbrances on the land; that the purchaser shall quietly enjoy the land without being evicted by any person having a superior title; that the grantor will warrant and defend the title; and that he will make such further deeds or conveyances as he may be called on to make to perfect the title. In brief terms and in technical language these are covenants of seisin, good right to convey, against encumbrances, of quiet enjoyment, of warranty, and of further assurance. The first three of these, it will be observed, affirm an existing fact; the last three concern the future, and are promissory in their nature. The first three do not run with the land; the last three do. The reason of the distinction is technical. The first three, if untrue at all, are so at the very moment when the deed was delivered, and accordingly then conferred a right of action. This immediate right to sue is in the nature of personal property, and closely resembles ordinary rights of action, such as a claim on a promissory note already due. Accordingly, if the grantee in the deed should convey the land, he would not by that act alone transfer these rights of action; they would not, in technical language, "run with the land." On the other hand, as to the three covenants in the future tense, it is clear that no action can be brought upon them until the event against which they are designed to guard happens, or, in other words, until the covenant is broken—that is, until the quiet enjoyment ceases or the grantee is evicted. Until that occurs the covenant will "run with the land," by which expression is meant that the mere conveyance to the second grantee transfers these covenants, as it would the houses, trees, and other additions to land. The distinction thus pointed out also applies to the case of landlord and tenant, and there are abstruse distinctions here to be noted which cannot properly be stated within the brief compass of this article. Some of the common covenants in a lease which run with the land are the agreement of the tenant to pay rent, or to make repairs, or to keep houses insured. It should be added that the rule respecting the assignability of covenants in leases applies to covenants binding either on the tenant or the landlord. There is a growing practice in conveyances of land in towns and cities to insert clauses binding the purchaser to use the land in a particular manner, as to build dwelling-houses upon it, and even such as are of a particular description. Although these clauses do not strictly fall within the technical doctrines of covenants running with the land, yet they are binding in equity law on a subsequent purchaser with notice. The record of the deed containing them will in general be sufficient notice to such subsequent purchaser. The covenant may be enforced through the medium of an injunction or other appropriate equitable remedy.

T. W. DWIGHT.



Couscous, or Spotted Phalanger.

on the hind feet. It is found in the Spice Islands, and is caught for its fur as well as its flesh, which is eaten. The animal has a disagreeable odor from a secretion of its anal glands.

**Coushat'ta**, on Red River, capital of Red River parish, La. (see map of Louisiana, ref. 7-B, for location of parish). Pop. in 1880, 488.

**Cousin** (VICTOR), a French philosopher, born Nov. 28, 1792, was the son of a watchmaker of Paris. After brilliant academic studies, though he had a strong inclination to music, his mind was directed towards philosophy under Laromiguière, Royer-Collard, and Maine de Biran. In 1815 he succeeded Royer-Collard as professor at the Sorbonne, and continued the teaching of the Scotch philosophy initiated by him, and promoted the reaction against the sensualism of Condillac and the thinkers of the eighteenth century. In a journey to Germany he became indoctrinated with the idealistic philosophy. In 1820 he was suspended on political grounds. He published editions of Proclus (6 vols. 8vo, 1820-27) and Descartes (11 vols. 8vo, 1827), and his celebrated translation of Plato (13 vols. 8vo, 1825-40). In 1827 he was replaced in his chair at the Sorbonne, and shared with Guizot and Villemain a popularity and power in the community unexampled in university annals. He was under Thiers (1840) minister of public instruction for eight months, and delivered in the Chamber of Peers his "Défense de l'Université et de la philosophie" (8vo, 1844). The revolution of 1848 called for him, in refutation of socialism, "Justice et Charité." "Du Vrai, du Beau, et du Bien" appeared in 1853. Of his numerous works have appeared in this country his "Course of Modern Philosophy" (1855) and "Lectures on the True, the Beautiful, and the Good" (1857), translated by O. B. Wight. But his chief work is his "Fragmens Philosophiques" (1826). His philosophy was eclecticism. (See Sir William Hamilton's criticism in "Edinburgh Review" for 1829.) He was more critical than systematical. He formed no school, but he exercised a very great influence, leading new and fertile streams of philosophical ideas into French civilization. On primary education he also exercised a decided influence. (See his celebrated "Rapport sur l'Etat de l'Instruction Publique," translated into English by Mrs. Austin, 1834.) Of great importance was also his edition of Abelard's works, accompanied with new, and in many respects exhaustive, researches of that period of scholasticism. Died at Cannes Jan. 13, 1867.

**Coutances** (anc. *Constantia*), a town of France, department of Manche. It was formerly fortified. It is the seat of a bishop, and has a handsome old cathedral, a public library, a theatre, and manufactures of druggets, worsted stuffs, hardware, etc. Pop. in 1881, 8187.

**Couture** (THOMAS), a French painter, pupil of Delacroix, born Dec. 21, 1815, exhibited first in 1840 "Jeune Venetien après une orgie." His works have brilliant color-effects; among them are "Trouvère," "Fauconnier," "L'Amour d'or," and the famous "Romains de la décadence." Died Mar. 31, 1879.

**Cov'enant** [Fr. *covenant* (from *convenir*, to "agree"),

**Cov'enant (National, of Scotland)**, an agreement to protect the Reformed religion in the Church of Scotland from the attempt of the English government to enforce the episcopal form of worship, was drawn up and published by the Four Tables in Edinburgh, Mar. 1, 1638. It professed to be based upon a document which James VI. had signed in 1580. The Four Tables, as they were called, consisted of—1, nobility; 2, gentry; 3, ministers; and 4, burgesses; and in their hands the whole authority of the kingdom was vested. They elected a general assembly which met at Glasgow in Nov., 1638, and abolished episcopacy; ordering that every person should sign the Covenant on pain of excommunication. The Covenanters prepared for war, and though a treaty of peace was concluded in June, 1639, they entered England in Aug., 1640. An agreement was signed at Ripon, Oct., 1640, by which commissioners were to be appointed, to whom the settlement of the points in dispute was referred. This covenant, under the name of the Solemn League and Covenant, was received by the Parliament of the Assembly of Divines, Sept., 1643. It differed essentially from the covenant of 1638, and according to Hallam "consisted in an oath to be subscribed by all sorts of persons in both kingdoms, whereby they bound themselves to preserve the Reformed religion in the Church of Scotland, in doctrine, worship, discipline, and government, according to the word of God and practice of the best Reformed churches; and to endeavor to bring the churches of God in the three kingdoms to the nearest conjunction and uniformity in religion, confession of faith, form of church government, directory for worship, and catechising; to endeavor, without respect of persons, the extirpation of popery, prelacy (that is, church government by archbishops and other ecclesiastical officers), and whatsoever should be found contrary to sound doctrine and the power of godliness; to preserve the rights and privileges of the Parliaments, the liberties of the kingdoms, and the king's person and authority in the preservation and defence of the true religion and liberties of the kingdoms; to endeavor the discovery of incendiaries and malignants who hinder the reformation of religion and divide the king from his people, that they may be brought to punishment; finally, to assist and defend all such as should enter into this covenant and not suffer themselves to be withdrawn from it, whether to revolt to the opposite party or to give in to a detestable indifference or neutrality." This document was signed by members of both houses and by civil and military officers. A large number of the beneficed clergy who refused to subscribe were ejected. Charles II. signed it very reluctantly at Spey in June, 1650, in the hope of recovering the English throne. After the Restoration a majority in the House of Commons ordered it to be burned by the common hangman in May, 1661. In the same year the Scottish Parliament renounced the Covenant and declared the king supreme. Under the reign of Charles II. the Covenanters were subjected to a fierce and cruel persecution, in which neither age nor sex was spared. It is in the standards of the Covenanters that we have to look for a true embodiment of the tenets held by the great body of English and Scottish Presbyterians of 1643. Others gave in to the Revolution settlement, and afterwards found cause to secede. The Covenanters never gave in, and of course never seceded. Although in point of fact an elder sister of the existing Church of Scotland and all its secessions, the Cameronian body did not assume a regular form till after the Revolution; and it was with some difficulty that it organized a communion with ordained ministers. The steadfastness of members was put to a severe trial by the defection of their ministers, and for a time the people were as sheep without a shepherd. After sixteen years they were joined by the Rev. John McMillan from the Established Church, in 1706. In 1743 they constituted a presbytery at Braehead, under the name of the Reformed Presbytery. Holding strictly to the covenants, the political position of the Covenanters is very peculiar, as they refuse to recognize any laws or institutions which they conceive to be inimical to those of the kingdom of Christ. The Reformed Presbyterians regard themselves as the modern representatives of the Covenanters.

**Cov'enanters**, a name given to the signers of the Covenant in Scotland. (See COVENANT.) The Covenanters were also called Cameronians, from Richard Cameron, the founder of the sect. (See REFORMED PRESBYTERIANS.)

**Cov'ent Garden** [a corruption of "convent garden," so called because it was once the garden of Westminster Abbey] is a square in London famous for its market of fruits and flowers. It was formerly a fashionable quarter of the town. Frequent allusions are made to this place in the old English comedies. The market originated about 1656. Covent Garden is one of the most interesting of London sights; it is seen to the best advantage about three

o'clock on a summer morning, Tuesday, Thursday, and Saturday being the principal days. The Covent Garden Theatre was opened in 1732, and has been several times burned. The present edifice was opened in 1858.

**Cov'entry** [Lat. *Coventria*], a city of England, in the county of Warwick, on the Sherbourne, 10 miles N. N. E. of Warwick, on the London and North-western Railway. The modern part of it is well built. Among the remarkable buildings are St. Michael's church, founded in 1313, which is a masterpiece of the lighter Gothic style, has a spire 303 feet high, and is said to be the largest parish church in England; Trinity church; Christ church, with a handsome ancient spire, belonging to the old Grayfriars' convent from which the town has its name; and St. Mary's Hall, built about 1450, an admirable specimen of ornamental architecture. The ancient cathedral was destroyed by Henry VIII. Coventry returns two members to Parliament. It has manufactures of ribbons, fringes, and watches, and is the greatest emporium for ribbons in England. It was formerly famous for the manufacture of broadcloth, caps, and blue thread. In 1044, Earl Leofric and his wife, the celebrated Lady Godiva, founded here a magnificent Benedictine abbey. In the fifteenth century religious mysteries were often acted here before the king. Pop. in 1881, 46,563.

**Coventry**, EARLS OF, Viscounts Deershurst (England, 1689).—GEORGE WILLIAM COVENTRY, ninth earl, born May 9, 1838, succeeded his grandfather in 1843.

**Cov'erdale** (MILES), an English bishop and Reformer, born in Yorkshire in 1488. An Augustine monk in his youth, he was one of the first Englishmen who adopted Protestant doctrines. In 1535 he published an English translation of the Bible, which was reissued in 1537 with the royal sanction. The version of the Psalms is that of the present Prayer-Book. This was the first entire Bible ever published in English. It is not a direct translation from the original text, but only a rendering from the German and Latin versions. It has, nevertheless, great merits, and its influence on the Authorized Version, especially in rhythm and style, is easily recognized. He edited the "Great Bible," or Cranmer's Bible (1540). In 1551 he was appointed bishop of Exeter. On the accession of Mary, in 1553, he was deprived of his office and imprisoned for two years. He was then permitted to take refuge on the Continent, whence he returned in 1558, and died in London in Feb., 1569. He also translated from the works of Luther, Calvin, Bullenger, and other Reformers. (See his "Writings and Translations," edited for the Parker Society, Cambridge, 1844.)

**Cov'ert Way**, or **Covered Way**, is a path outside the fosse or moat of a fortified place, between the counterscarp and the banquette of the glacis. It is about thirty feet wide, and is sunk so far below the crest of the glacis that soldiers standing upon it cannot be seen by besiegers; hence the name. Sentinels placed in the covert way prevent all access of the enemy's spies, and musketeers mounted on the side next the glacis can pour fire on the enemy over the crest. The covert way is broad enough to allow troops to form on it, either to act defensively or make sorties; and to increase this accommodation enlarged portions, called places of arms, are made.

**Covilhá'**, a town of Portugal, in the province of Beira, is situated among the mountains, 48 miles E. of Coimbra, and is perched like a collection of swallows' nests on the south-eastern slope of Serra de Estrella, at an altitude of 2186 feet above the level of the sea. It has thermal springs, and manufactures of a woollen cloth called *saragoca*, which is worn throughout the whole country. Pop. 9022.

**Covington**, on R. R., capital of Newton co., Ga. (see map of Georgia, ref. 3-H, for location of county), 41 miles E. by S. from Atlanta, is the seat of the Southern Masonic Female College. Pop. in 1870, 1121; in 1880, 1415.

**Covington**, R. R. junction, capital of Fountain co., Ind. (see map of Indiana, ref. 6-B, for location of county), on the Wabash River and Wabash and Erie Canal, 71 miles W. N. W. of Indianapolis, has a high school, foundry, and coal companies. Pop. in 1870, 1888; in 1880, 1920.

**Covington**, a city and R. R. centre, capital of Kenton co., Ky. (see map of Kentucky, ref. 2-H, for location of county), is on the Ohio River, opposite Cincinnati, and just below the mouth of the Licking River, which separates it from Newport. A noble suspension bridge across the Ohio connects it with Cincinnati. It has also a suspension bridge connecting it with Newport. Is the seat of a Roman Catholic bishop, has waterworks, gasworks, etc., orphan asylum, hospital, rolling-mills, and railroad-iron mill; also manufactures of stoves, tobacco, etc. The census of 1880 reported 181 manufactories; capital, \$3,182,141; average number of hands, 2925; wages paid during the year,

\$1,033,463; value of products, \$5,864,530. Pop. in 1870, 24,505; in 1880, 29,720.

**Covington**, capital of St. Tammany parish, La. (see map of Louisiana, ref. 10-F, for location of parish), 45 miles N. of New Orleans. Pop. in 1870, 585; in 1880, 567.

**Covington**, O. See APPENDIX.

**Covington**, on R. R., capital of Tipton co., Tenn. (see map of Tennessee, ref. 7-A, for location of county), on Big Hatchie River, 200 miles W. by S. from Nashville. Pop. in 1870, 447; in 1880, 799.

**Covington**, capital of Alleghany co., Va. (see map of Virginia, ref. 5-E, for location of county), on R. R. and Jackson's River. Pop. in 1880, 436.

**Covode** (JOHN), born in Westmoreland co., Pa., Mar. 17, 1803, was brought up as a farmer and blacksmith, but in the early days of the Pennsylvania coal trade he went into that business with success, and afterwards was also a woollen manufacturer and railroad stockholder and director. He was a member of Congress from Pennsylvania, 1854-70, and was distinguished for his energy and political influence. His freedom and impetuosity of speech made him many friends and enemies, and won him the title of "Honest John Covode." Died Jan. 11, 1871.

**Cow**. See CATTLE.

**Cow Bay**, a port and post-village of Cape Breton co. and island, 22 miles from Sydney, has mines of bituminous coal, and a breakwater for the protection of shipping. Pop. in 1881, 2117.

**Cow-bird**, or **Cow-bunting**, the *Molothrus pecorioris*, a bird of the U. S. belonging to the blackbird family. It takes its name from the fact that it associates with cattle in pastures, probably for the purpose of catching the insects which are aroused by the cattle. Like the European cuckoo, it lays its eggs in the nests of other birds, never hatching its own young. It often selects the nest of the summer yellow bird. As the latter has not strength enough to throw the big egg out of the nest, it has, nevertheless, invented a very ingenious device by which it avoids hatching it. It picks a hole in it and buries it in the bottom of the nest by building a new nest over it. Bird-catchers have found such nests, not only of two, but of three, stories, and examination has shown that in those cases the cow-bird has visited the nest—not at one time only, but twice.

**Cow-Boys**, a band of marauders, mostly consisting of Tory refugees, who during the Revolution adhered to the British interests and infested the neutral ground in Westchester co., N. Y., between the American and British lines, plundering the Whigs or those who adhered to the interests of the Continental Congress. They received the name of Cow-Boys because they stole many cattle. In the U. S. the name is now applied to men who take care of large herds of cattle in the W. and S. W.

**Cowes**, **West**, a seaport and watering-place of England, on the Isle of Wight, at the mouth of the river Medina, 10½ miles S. S. E. of Southampton. It is built on a steep slope, and presents a fine appearance from the sea. Here are many elegant villas and good hotels. Cowes has an active coasting-trade. Pop. in 1881, 6487.

**Cowhage**, **Cowitch**, or **Mucuna**, a drug which consists of short, slender, brittle hairs, which grow on the pods of twining plants of the genus *Mucuna* or *Stizolobium*, natives of the tropical parts of America and Asia. This genus belongs to the order Leguminosæ, and has a knotted, 2-valved pod, divided by transverse partitions. Most of the cowhage brought to market is from the *Stizolobium pruriens* and *Stizolobium urens*, natives of the West Indies. *Stizolobium pruritum* of the East Indies yields cowhage of similar quality. The hairs readily stick in the skin and cause intolerable itching. Cowhage is used in medicine, acting mechanically in killing and expelling worms, particularly the species of *Ascaris*. That it does not act on the inner surface of the intestinal canal is supposed to be owing to the mucous secretion. It is generally administered in syrup or honey. Before the pods of the cowhage plants are ripe they are used as a vegetable, like those of beans, and are very palatable.

**Cowl** originally meant simply the hood which the monk draws over the head in order to prevent the eyes from glancing either right or left, and thus shut himself up in solitude even while among the multitude; but, as the cowl is the most characteristic part of a monk's dress, the word came in course of time, and by an easy transition, to mean the whole monastic garment.

**Cowles** (HENRY), born at Norfolk, Conn., April 24, 1803, died at Janesville, Wis., Sept. 6, 1881. He graduated from Yale College, studied theology, and worked from 1828 to 1835 as a pioneer missionary on the Western Reserve in

Ohio. From 1835 to 1843 he was professor in Oberlin University, first in Latin and Greek, and then in Hebrew, and from 1843 to 1863 he edited "The Oberlin Evangelist." In 1863 he began his "Commentary on the Bible," which was completed in sixteen volumes shortly before his death. It covers the whole Bible, and may be recommended for soundness and strong practical sense.

**Cowley** (ABRAHAM), M. D., an English poet, the son of a grocer, born in London in 1618, entered Trinity College, Cambridge, in 1636. He said that he became a poet from reading a volume of Spenser that lay in his mother's parlor. He made verses at the age of ten, and his first volume, "Poetic Blossoms," he published at fifteen. He was ejected from college as a royalist in 1643. In 1646 he went to Paris with the queen, and remained ten years. He published in 1647 "The Mistress," a series of poems which abound in frigid conceits. He was imprisoned as a royalist, but was released through interest, and obtained the usufruct of one of the queen's estates, £300 yearly. He studied natural history, and issued "Liber Plantarum" (1662-78). The epic "Davideis," commenced in college, was never finished. His essays, as well as his anacronautics, evidence sensibility and refinement of thought, a facile imagination, a brilliant wit, and cultured mind, but are marred with the prevailing trivial love for glittering ingenuity of style. The most admired poet of his day, he is called on his tombstone "Anglorum Pindarus, Flaccus et Maro." His works were published in 1680 by Sprat, and by Aikin in 1802, 3 vols. Died July 28, 1667. He was buried in Westminster Abbey, beside the remains of Chaucer and Spenser, where the duke of Buckingham erected a monument in 1675. Cowley holds a high position as a prose-writer and an essayist.

**Cowley** (HENRY RICHARD WELLESLEY), FIRST EARL, a British diplomatist, a son of Sir Henry Wellesley, and a nephew of the duke of Wellington, was born June 17, 1804. He became minister to Switzerland in 1848, and was ambassador to Paris from 1852 to 1867. Died July 15, 1884.

**Cow-Pars'nip**, the popular name of certain plants of the genus *Heracleum*, of the order Umbelliferae, having petals bent in at the middle, and flat fruit. The *Heracleum lanatum* grows in the U. S., from North Carolina northward and westward. It is a coarse weed, from three to eight feet high, strong scented, and is said to be poisonous. One species is a native of Europe (*Heracleum sphynodidum*), the common cow-parsnip, a rank weed, with coarse, hairy leaves, and stem about three to five feet high. It is gathered in some parts of England for fattening pigs, and is said to afford wholesome food for cattle. Some Siberian species are much larger, and are valued for the abundant herbage which they yield very early in the season, particularly *Heracleum Panacea*, which sometimes attains a height of ten feet, and the root-leaves are three to five feet long. The species are mostly Asiatic.

**Cowpens**, a village of Spartanburg co., S. C., about 100 miles N. N. W. of Columbia. Here the American general Morgan defeated Colonel Tarleton Jan. 17, 1781. Sent by Greene, who stood E. of the Pedee, Morgan crossed the Broad River at the head of the Maryland regiment and Washington's dragoons of Lee's corps, in order to operate on the British left and rear, but was soon threatened by Tarleton, at the head of a superior force, with being completely cut off from Greene. As soon as he became aware of Tarleton's approach he retired behind the Pacolet, but Tarleton crossed the stream six miles above, and Morgan began a precipitate retreat. Preferring, however, to give battle on a ground of his own choosing rather than to be overtaken on his retreat, he stopped at Cowpens, made preparations for fight, and at eight o'clock in the morning a furious battle began. By a skilful movement counterfeiting a precipitate retreat, Morgan turned so suddenly on his pursuers that he brought them to waver; and, seeing this, Howard charged the British lines with the bayonet and broke their ranks. At that moment, Lieut.-Col. William Washington, who had been placed out of sight as a reserve with eighty dragoons, broke from the concealment and made a furious and completely successful attack on Tarleton's horsemen. Confusion now spread on all sides in the British army, and the battle ended with the complete route of the British force, which was sent flying in all directions. The British lost 300 killed and wounded, and 500 prisoners, 2 cannons, 800 muskets, and 2 standards; the Americans had 72 killed and wounded.

**Cowper**, **EARLS**, Viscounts Fordwich (Great Britain, 1718), Barons Cowper (England, 1706), Barons Butler of Moore Park (England, 1679), Barons Dingwall (Scotland, 1607), and baronets (1642).—FRANCIS THOMAS DE GREY COWPER, seventh earl, a prince of the Holy Roman Empire, captain of the corps of gentlemen-at-arms, born June 11, 1834, succeeded his father April 15, 1856.

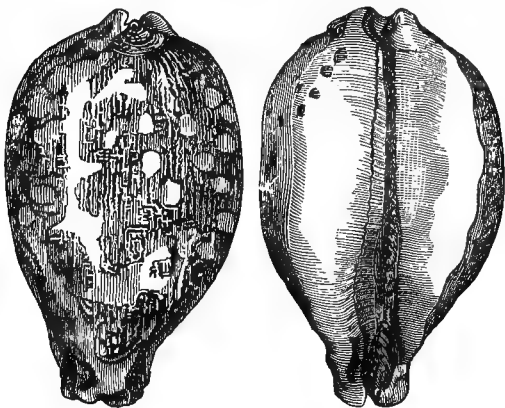
**Cowper** (WILLIAM), EARL, an eminent English judge and orator, born in 1664. He was called to the bar in 1688, and elected to Parliament in 1695. He became an excellent debater and the leader of the Whig party in the House of Commons. In 1705 he was appointed lord chancellor. He resigned the great seal when the Tories obtained power in 1710, but was reappointed in 1714. Having resigned office in 1718, he was then created an earl. Died Oct. 10, 1723.

**Cowper** (WILLIAM), an English poet, born at Great Berkhamstead, in Hertfordshire, Nov. 26, 1731, was the son of the rector, John Cowper, chaplain of George II., and nephew of Earl Cowper, noticed above. Deprived of his mother at the age of six, he was a tender, shrinking child, and a sensitive, melancholy boy at Dr. Pitman's school, made more so by the rough fagging at Westminster School, where he advanced in classical studies. First articled to an attorney, living in the Temple in 1752, and called to the bar in 1754, he never practised. Appointed clerk of the journals in the House of Lords, he could not bring himself to appear for nervousness. He determined on suicide, but wanted courage. Morbidly dejected, he was taken in 1763 to Dr. Colton's at St. Alban's. In 1767 he went to Huntingdon, and came to know Mrs. Unwin, "Mary" in his poems. The acquaintance grew into a tender friendship. Residing with the Unwins amid gentle and religious influences, where his spirit found repose and ease, he visited their friend, Rev. Mr. Newton, in 1773, whose gloomy religious views had the effect to bring back his mental malady. Tended by Mrs. Unwin through a long illness, in his convalescence he translated the hymns of Madame Guyon, and diverted himself with taming hares. Mrs. Unwin suggested a poem on the "Progress of Error" in Dec., 1780, and in three months he wrote "Truth," "Table-Talk," "Progress of Error," and "Expostulation," published in 1781. Lady Austen, whom he met in 1781, inspired him to write "The Task" (1785), and to translate Homer (1791), and first told him the story of John Gilpin. "The Task" met with great success. In his later life Cowper became more and more the prey of dejection and remorse, which sometimes deepened into insanity. His "Private Correspondence" (2 vols., 1824) is gentle, thoughtful, and pervaded with playful humor. Cowper gave to English taste a simpler and more earnest cast. Editions of his works are Giffillan's (Edinburgh, 1854, 2 vols.) and Southey's (15 vols., 1837-38). (See the Lives in SOUTHEY'S edition, and in that of Hailey.) Died April 25, 1800.

**Cowper's Glands**, two small and rather lobulated yellowish glands which in the male of the human species are found between the layers of the deep perineal fascia, under the anterior part of the membranous portion of the urethra. They secrete a mucus which flows into the bulbous portion of the urethra by a duct an inch long. The vulvo-vaginal glands (glands of Bartholine) are the analogues in the female.

**Cow-Pox Inoculation.** This species of inoculation, as a security against the smallpox, was introduced by Dr. Jenner, and it became general in 1799. The genuine cow-pox appears in the form of vesicles on the teats of the cow. It was first brought into use by Jenner, who first vaccinated from arm to arm in 1796. He had been studying and experimenting about it for a number of years before. (See INOCULATION and VACCINATION, by FRANK P. FOSTER, M. D.)

**Cow'ry** [Hindustanee], the shell of *Cypræa*, a genus of



Cowry.

prosobranchiate gastropodous mollusks, of the family Cypræidæ, to all the members of which the name cowry is

often extended. They belong to the Siphonostomata, have spiral, convoluted shells, the spire visible in the young, but entirely concealed in the adult, and the outer lip thickened and bent in. The aperture extends the whole length of the shell. The shells, often called "porcelain shells," are sometimes beautifully enamelled. They are most abundant and attain the largest size in warm seas. Many species occur as fossils. A few very small living species are found on the British coasts. Several species occur on the eastern and western shores of America. The name cowry is chiefly applied to the shells of *Cypræa moneta*, which have commercial value from their use as a substitute for coin in many parts of Asia and Africa. They are said to have been used by the ancient Assyrians, and specimens were found by Layard at Nimrod. They are not of great beauty, are yellow and white, often with a yellow ring; they are about an inch long, and nearly as broad as long. They are found in the Indian and Pacific oceans, and are one of the most important exports of the Maldivé Islands. In Bengal, 3200 cowries are counted equal to one rupee (fifty cents). Yet cowries to the value of \$100,000 are said to have been at one time imported annually into Bengal. Many tons of cowries are used in trade with the west of Africa. In 1849, 300 tons were brought to Liverpool for the African trade. (See CYPRÆIDÆ.)

**Cow'slip** (*Primula veris*), an herbaceous plant of the order Primulaceæ, is a native of England and other parts of Europe. It bears a beautiful and fragrant flower, which is a general favorite. The flowers, which are small and grow in an umbel at the top of a scape, have sedative properties, and are sometimes used as an anodyne and antispasmodic. American cowslip is a common name of the *Dodecatheon Meadia*, a plant of the same natural order, and a native of the U. S. It is cultivated in gardens for the beauty of its flowers. (See also CALTHA.)

**Cow Tree**, a name given to several trees of different natural orders, the bland juice (*latex*) of which is used instead of milk. They are natives of tropical climates. Some of them belong to the order Moraceæ, and are allied to the fig; others to the closely-related order Artocarpaceæ, one of which is the famous *palo de vaca*, or cow tree, of the Cordilleras (*Brosimum utile*). It grows in rocky situations, at an elevation in equatorial regions of about 3000 feet. It is a lofty tree, with leaves ten to sixteen inches long, and very small flowers. For several months in the year its branches appear dead, but as soon as the trunk is pierced there flows a full stream of sweet and nourishing milk. This juice flows most freely at sunrise. The natives then hasten from all directions with bowls to receive it. The milk has a pleasant odor, and a viscosity which does not belong to the milk of animals. It becomes yellow in a short time, and a cream rises to the surface, which gradually thickens into a cheesy consistency. This milk is much used by the negroes and Indians, but differs very much from the milk of animals, more than one-half being wax and a nitrogenous compound; a little sugar, a salt of magnesia, and water chiefly making up the rest. The hyalva (*Tabernaemontana utilis*, of the order Apocynaceæ) also yields an abundant thick juice, which is used in Guiana and elsewhere as a substitute for milk, and is harmless, agreeable, and nutritious. The *Gymnema lactiferum*, an asclepiadaceous plant of Ceylon, yields a milk which is used as food.

**COX** (ABRAHAM S.), M. D., born in New York in 1800, studied medicine, and attained great eminence in the practice of his profession. Resigning his large and lucrative practice, he accepted, at the commencement of the civil war, the appointment of surgeon in the army, was promoted to be surgeon-in-chief of a division, and at the time of his death was attached to the Army of the Cumberland. The labor and exposure incident to the active campaigns of that army undermined his health, and he died July 28, 1864, at Lookout Mountain, Tenn. G. C. SIMMONS.

**COX** (DAVID), an English aquarelle painter, born in Birmingham in 1793. "His foliage," says Ruskin, "is altogether exquisite in color, in its impressions of coolness, shade, and mass." He published a "Treatise on Painting in Water-Colors" (1814). Died June 7, 1859.

**COX** (GEORGE WILLIAM). See APPENDIX.

**COX** (JACOB D.), an American general and lawyer, born at Montreal Oct. 27, 1828. He became a major-general of Union volunteers in the autumn of 1862, and served under Gen. Sherman in Georgia in 1864. In December of that year he commanded a division at the battle of Nashville. He was elected governor of Ohio by the Republicans in Oct., 1865, and was appointed secretary of the interior in Mar., 1869. He resigned in Nov., 1870.

**COX** (MELVILLE BEVERIDGE), the first Methodist Episcopal foreign missionary, born at Hallowell, Me., in 1799, entered the ministry in 1822, and sailed as missionary to

Liberia Nov. 3, 1832. Here he labored with great zeal and success for some months. He died of the "African fever" July 21, 1833. (See STEVENS, "History of the Methodist Episcopal Church," vol. iv., pp. 43, 451.)

**COX** (RICHARD), bishop of Ely, born in 1499, was the tutor of King Edward VI. He translated for "the Bishops' Bible" the four Gospels, the Acts, and the Epistle to the Romans. Died July 22, 1581.

**COX** (SAMUEL HANSON), D. D., LL.D., a Presbyterian author and divine of Quaker parentage, born at Leesville, N. J., Aug. 25, 1793, was ordained July 1, 1817. He was pastor of the Spring street church, N. Y. (1820-33), professor of sacred rhetoric at Auburn Theological Seminary (1834-37), and pastor of the First Presbyterian church, Brooklyn, N. Y. (1837-54). He was an early and eminent advocate of temperance, anti-slavery, and other reforms, and was distinguished for his brilliancy and effectiveness as a platform speaker. He wrote "Quakerism not Christianity." D. Oct. 2, 1880.

**COX** (SAMUEL SULLIVAN), LL.D., a Democratic politician, born at Zanesville, O., graduated at Brown University in 1846, was a member of Congress from Ohio (1857-65) and from New York City (1869-85). He is a well-known editor and lecturer, and has published "Eight Years in Congress," "Why We Laugh," etc. Became U. S. minister to Turkey in 1885.

**Coxalgia, or Coxitis** (*Morbus coxarius*, "hip-joint disease"), a chronic inflammation of the hip joint, which may begin either in the head of the thigh-bone or the socket of the hip-bone, or else in the membrane (*synovial*) that lines its cavity, but which finally extends to all its tissues, cartilages, ligaments, and surrounding soft parts. Inflammation of the bones (*osteitis*), by far the most common origin of the disease in children, is chronic and insidious in its development, and is favored by the incomplete ossification and active nutrition of the bones in childhood. Inflammation of the lining membrane (*synovitis*) is the most frequent form of hip disease in adolescence, and then is often of rheumatic origin. Chronic infantile coxitis principally affects children between one and five years of age, and is often awakened by a fall or blow, especially when such accident occurs to children of a lymphatic or scrofulous constitution. The very first symptom is lameness, followed by pain, first felt in the knee, afterwards excited in the joint itself by direct pressure, by motion of the limb, or by the weight of the body resting upon it. To lessen this weight the patient rests on the ball of his toes, and drags the leg in walking, stiffly extending it. At this stage it is turned a little outward by spasmodic contraction of the muscles on the outer side of the joint. But very soon, in order to still further lessen the weight, the body bends over on the thigh, and the arm and lame part of the back, with the abdomen, are carried forward. When the patient lies down, therefore, a space is left between the body and the bed, and if the spinal column be forcibly straightened out and the curve flattened, the thigh in turn is bent on the body by dragging of the muscle that runs from the spinal column to the head of the thigh-bone (*psoas*). Still, for the purpose of lessening weight, the hips are tilted towards the painful side, and appear oblique, while the leg is thus apparently lengthened. Behind, the nates are flattened. It soon becomes impossible to glide the head of the thigh-bone in its socket; the whole hip moves with every motion communicated to the leg. This sign is most characteristic of the confirmed disease; it is due at first to the spasmodic rigidity of muscles—later to inflammatory adhesions.

In the second stage liquid is poured out into the cavity of the joint to increase the space of this cavity, the thigh is more strongly bent on the body (flexed), and drawn inward (adducted), so that the foot crosses the opposite leg. The affected limb is therefore apparently shortened. A swelling appears in the groin and at the outer aspect of the thigh; the pain becomes intolerably severe; standing and walking are impossible.

In the third stage the cavity fills with matter, the ligaments of the joint are relaxed, abscesses form in the neighborhood, and all the soft parts are swollen by inflammatory exudations. Dislocation occasionally though rarely occurs. More often the head of the thigh-bone separates from its shaft, and adheres to the socket of the joint, while the socket itself is enlarged. The patient's strength is severely undermined, hectic fever sets in, the emaciation is extreme, and death may occur gradually from exhaustion, or more rapidly from acute absorption of pus.

The diagnosis of *morbus coxarius* is only difficult in the first stage. The lameness may simulate that of muscular paralysis, from which it is distinguished by the freedom with which the head of the thigh-bone may be moved; or the pain in the knee may fix suspicion on the wrong joint; or the thigh may exactly imitate hysterical muscular con-

traction; but in this affection the limb relaxes completely under chloroform.

The prognosis for spontaneous cure is always very unfavorable. After suppuration death may be caused by pyæmia, by exhaustion, by general tuberculosis, or by amyloid disease. Appropriate treatment of the first and second stages offers about 50 per cent. of recoveries; operative treatment of the third stage has so far cured about one-third of the cases submitted to it. In a large number of cases, although the inflammation is arrested, and hence life is saved, the joint becomes permanently immobilized (ankylosis) by fibrous bands within and around its cavity, that hold the articular surfaces firmly together (false ankylosis). This result is to a certain extent favored by the treatment adopted for the cure of inflammations; it is important therefore that the stiffened limb be left in the most favorable position for use—namely, extension.

The treatment varies according to the stage of the disease. During the primary osteitis that so often precedes inflammation of the joint, and is indicated by the one symptom of lameness, constitutional treatment is to be adopted—cod-liver oil, iron, cinchona, nourishing food, fresh air, and salt-water bathing. As soon as the movements of the joint are compromised, local treatment becomes of primary importance. It aims—1st, to immobilize the joint, so as to prevent friction of the inflamed parts; 2d, to extend the limb, so as to separate as much as possible the folds of the lining membrane, to reduce to a minimum size the cavity of the joint, and thus favor the reabsorption of fluids; finally, to leave the limb in the best position for use should it become permanently stiffened. The limb can only be maintained in extension by a force sufficient to overcome the spasmodic muscular contractions. Many apparatuses are devised for this purpose, in which the limb is straightened out and fastened to an inflexible plane, and forcibly retained in this position by means either of a weight attached to the foot or a sliding screw at the knee. The simplest form of apparatus is made by swathing the limb in bandages stiffened by plaster of Paris or dextrine. These are only adapted to the earliest stage, or when cure is already progressing. It enables the patient to walk about. This facility is also afforded by steel apparatus that supports the limb at the waist and foot, and gradually extends it by continued traction at the knee. In other cases the patient is kept in bed, the leg fastened to a simple long splint, with a cross-piece under the foot, to which is attached the weight. A large double gutter, in which were laid the entire pelvis and both lower extremities of the patient, was formerly famous, but is now seldom used. During the employment of such apparatus, ice may be applied to the joint to subdue acute inflammation, occasionally blisters, where fluid has been rapidly effused, more often pressure by means of elastic bands, a powerful means of promoting reabsorption. Leeching is useless, as also are applications of iodine; while cauterization, formerly much in vogue, is now generally condemned.

When suppuration has occurred within the joint, and especially when pus has discharged externally by one or more fistule, it is necessary to amputate (resect) the head of the thigh-bone. Very extensive destruction of the hip-bone and certain general diseases, amyloid disease or general tuberculosis, with incoercible diarrhoea, contra-indicate the operation. After it, death may result from such complications or from surgical fever (pyæmia, septicæmia). When successful, however, the patient is rescued from an otherwise certain death, and the joint recovers its integrity, ankylosis being much less frequent than after treatment by immobilizing apparatus.

MARY C. PUTNAM JACOBI.

**Coxe** (ARTHUR CLEVELAND), D. D., LL.D., a son of Dr. S. H. Coxe, noticed above, American Episcopalian bishop, born at Mendham, N. J., May 10, 1818, graduated at University of New York in 1838, and took holy orders in 1841. He wrote, besides other works, "Christian Ballads" (1840); "Athanasian and Other Poems" (1842); "Saul, a Mystery, and Other Poems" (1845); "Thoughts on the Services;" "Impressions of England" (1856), etc. He became rector of Calvary church in the city of New York in 1859, and bishop of Western New York in 1865.

**Coxe** (JOHN REDMAN), M. D., born at Trenton, N. J., in 1773, received his medical education in Europe, settled in Philadelphia in 1796, was a professor in the University of Pennsylvania (1809-35), and was the author of several medical, scientific, and literary works. Died Mar. 22, 1864.

**Coxe** (WILLIAM), an English historian, born in London Mar. 7, 1747. He was appointed curate of Denham in 1771. He published, besides other works, "Travels in Russia, Poland, Sweden, and Denmark" (1784), a "History of the House of Austria" (1792), "Memoirs of Sir Robert

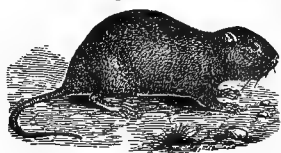


Walpole" (3 vols., 1798), and "Memoirs of the Kings of Spain of the House of Bourbon, 1700-88" (1813). He became archdeacon of Wilts in 1805. Died July 8, 1828.

**Coxsack'ie**, on R. R., Greene co., N. Y. (see map of New York, ref. 6-J, for location of county), near the Hudson River, 22 miles S. of Albany. It has an academy and important manufactures of brick. Pop. in 1880, 1661.

**Coyo'te** [a Spanish-American name, probably derived from the Mexican *cayotl*, "wolf"], a popular name for the small barking or prairie wolf, of which several varieties occur in the U. S. and Mexico. (See WOLF.)

**Coy'pu**, the South American name of the *Myopotamus Coypus*, a quadruped allied to the beaver, with which it agrees in its teeth, limbs, feet, and in some of its habits; but it differs from the beaver in the form of the skull, having a more elongated muzzle and a contracted palate; and in the tail, which resembles that of a rat. It is the only known species of its genus, and inhabits South America



Coypu.

on both sides of the Andes, burrowing in river-banks, and sometimes near the seabeaches. It is nearly as large as the beaver, has small ears, very long and stiff whiskers, long hair mixed with dense, soft short hair, the upper parts beautifully pencilled with shades of yellow, the sides and under parts lighter and more uniform in color. The fur has become an important article of commerce under the names of ragondin and nutria, the latter name (signifying in Spanish an "otter") being that chiefly in use in the U. S.

**Coz'zens** (FREDERICK SWARTWOUT), an American writer, born in New York Mar. 5, 1815, was a wine-merchant. He contributed to the "Knickerbocker Magazine" and "Putnam's Magazine," and for many years published a periodical connected with his business and called the "Wine-Press," in which he wrote interesting articles on grape-cultivation and wine-making. Among his works are "Prismatics" (1853), "Sparrowgrass Papers" (1856), "Acadia; or, A Sojourn among the Bluesnoses" (1858), "Stone House on the Susquehanna," etc. In 1858 he attended the copyright congress of Brussels as delegate of the New York Publishers' Association, and partook with great interest in its proceedings, which, however, led to no result. Died Dec. 22, 1869.

**Crab** [Lat. *cancer*; Gr. *κάραβος*; Ger. *Krabbe*; Fr.



Hermit Crab (with shell).

*crabe*], a name popularly applied to many decapod crustaceans, arranged in the sub-orders Anomura (irregularly-tailed crabs) and Brachyura (short-tailed crabs). Among the very numerous species the following are important:

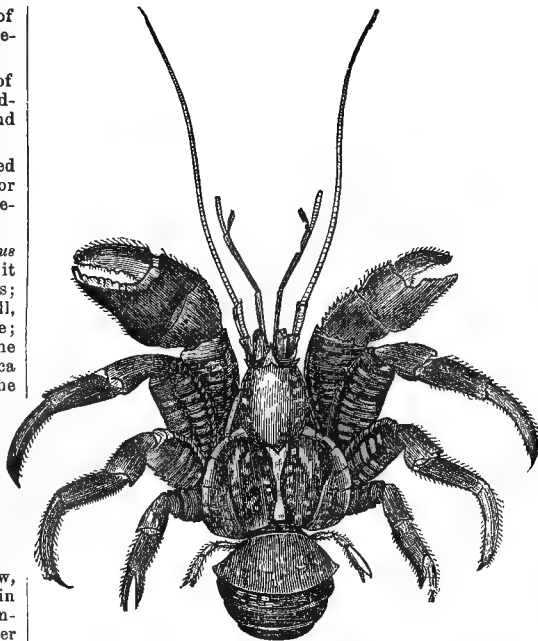
1. Sub-order Anomura.—

The *Pagurus Bernhardus*, the European hermit crab, has a hard shell, while the abdominal portion is soft, forming a fleshy mass behind the cephalothorax. The comfort of the animal requires some shelter for this appendage, and for this purpose he selects the empty shell of some mollusk.



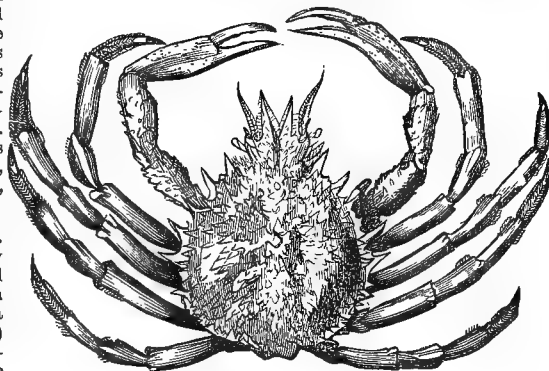
Hermit Crab (without shell).

He coils himself in this shell, and secures his position by a sucker at the extremity of the tail, and by several feet on the abdominal sac. He adheres so firmly to this home that he will be destroyed rather than loosen his hold. By protruding his body with his three pairs of legs, he is able to walk in search of prey, but if danger approaches he hastens into the shell, the orifice being filled by one of his claws. He changes his residence as often as he needs a larger one, and may be seen crawling in and out of shells cast upon the beach, in search of a suitable home. He returns to his old home after each trial until he finds one fitted for his comfort. There are many species of the hermit crab, one or more of which



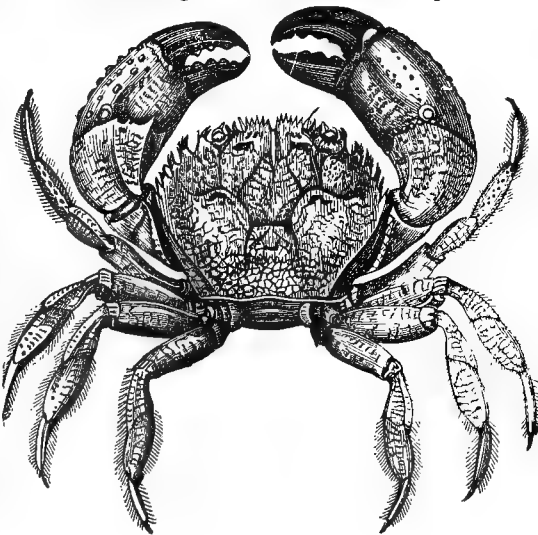
Purse Crab: *Birgus latro*.

are found on the American coasts. The purse crab (*Birgus latro*) is a hermit crab of Amboyna and some other islands.



Spinous Spider Crab: *Maia spinado*.

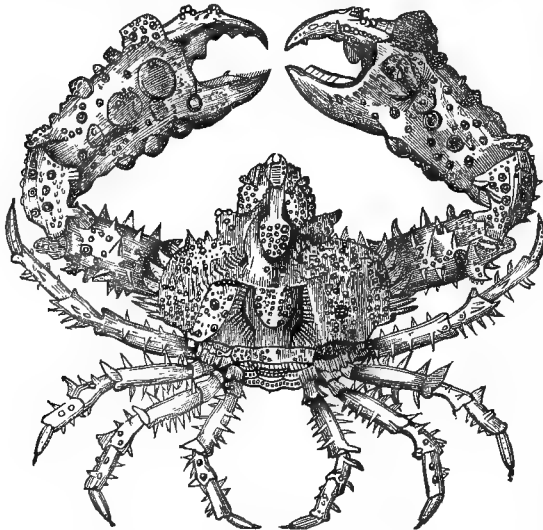
It inhabits the fissures of rocks, and seeks its food along the beach at night. When observed, it snaps its claws



*Eriphia spinifrons*.

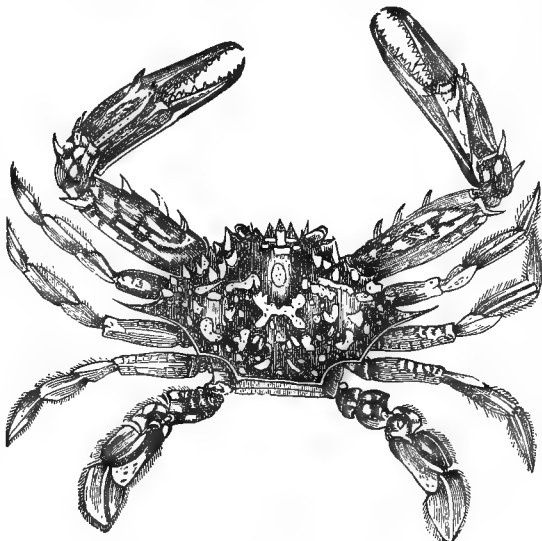
fiercely and retreats. It is said to climb the cocoanut tree for the fruit, but this is probably untrue.

2. *Sub-order Brachyura*.—This sub-order includes, among others, the following families: the *Maiadae*, or spider crabs, which live in deep water, and are seldom seen on the shore. One species, the *Libinia canaliculata*, found along the American coast north of the Chesapeake, is said to feed upon oysters. The family *Canceridae* includes those of which the common crab of Europe (*Cancer pagurus*) is the type. In these the shell is narrow behind and round in front, the claws of unequal size. These inhabit deep water, and are caught in nets or baskets. Many edible species are



*Parthenope horrida.*

known in various parts of the world. The *Portunidae* resemble the *Canceridae*, and are called paddling crabs. The common edible crab of the U. S. (*Lupea dicantha*) is found along the whole coast. These, like other crabs, moult once a year, and are several days casting the shell, but a new one is soon formed. While the new shell is forming, or before it is formed, they are called soft-shell crabs, and are much esteemed as food. The common small edible crab (*Carcinus menas*) is a small species found in England and



The Red Sea Crab: *Lupea pelagica*.

France, and one similar to it frequents our coast. These are found at low tide under stones and sand. Some crabs of the genus *Lupea* live in the ocean, floating on the seaweed or resting on the surface of the water. They are called swimming crabs. The *Eriphia spinifrons* is found in nearly all seas. The *Parthenope horrida* lives in the Indian and Atlantic oceans. The *Lupea pelagica* is from the Red Sea. The *Ocypodidae* include the little pea crab (*Pinnotheres pium*). The carapace is quadrilateral

or oval, the front transverse and knotted. They inhabit the muscle shell. The ancients were acquainted with one species of this crab, and believed that it found food for the mollusk and warned him of danger. There are several American species of this genus, one of which is a well-known parasite upon the oyster. The land crabs of the tropics are among the most curious members of this family. They live upon mountains at a distance from the sea, and have a kind of leaflet for retaining moisture in the branchial cavities. Once a year they visit the coast to deposit their eggs. It is said that in these journeys they have been observed to form a procession one hundred and fifty feet wide and three miles long. In Jamaica they are much valued as food. They live in moist regions, and make excavations which they inhabit during the day, seeking their food at night. Some species are said to live in dry woods. The violet crab (*Cardisoma carnifex*) inhabits the West Indian Islands, chiefly in the mangrove swamps. Its food is the fruit of a species of *Anona*, but it is said also to frequent cemeteries and devour the bodies. It is highly regarded as food, but only those are eaten which live at a distance from the cemeteries. Another kind of land crab (the *Gelasimus*) is named the calling crab, from the beckoning gesture of the claw which it makes when alarmed. This claw is larger than the other, and is used in digging its burrows. A common American species, the *Gelasimus vocans*, is called the fiddler, because one of its claws is thought to resemble a fiddle. It lives on the land, but is at home also in the water. It remains in its hole in the winter. The *Thelphusae* are land crabs, but some of them inhabit fresh water. Many of the so-called land crabs are properly crayfish. (For the king-crab (usually regarded as an entomostracan) see KING-CRAB.)

**Crab-Apple** (*Pyrus Coronaria*), a small tree growing wild in the U. S., bears rose-colored fragrant blossoms and fragrant greenish fruit, which is prized for preserves. Another wild crab-apple, the *Pyrus angustifolia*, also grows in the Southern States. The cultivated crab-apple is the *Pyrus baccata*, a native of Siberia. (See APPLE.)

**Crabb** (GEORGE W.) was born in Tennessee, but removed to Alabama. He distinguished himself in the Indian war in Florida, where he was made a major-general. He was elected a member of Congress in 1838, but defeated in 1841. Died in 1847.

**Crabbe** (GEORGE), an English poet, born at Aldborough, Suffolk, Dec. 24, 1754. He learned the profession of surgeon, which he soon renounced. He went to London in 1780, and soon produced "The Candidate," an unsuccessful poem, and was reduced to extreme poverty, from which he was relieved by the generosity of Edmund Burke, who received him as an inmate in his own house, and secured the publication of "The Library" by Dodsley (1781). Having taken holy orders in 1782, he became chaplain to the duke of Rutland at Belvoir Castle, and married Miss Sarah Elmy. His reputation was increased by the "The Village," a poem (1783). He became curate of Strathern in 1785, and obtained the living of Trowbridge, in Wiltshire, in 1813. Among his works are "The Parish Register" (1807), "The Borough" (1810), and "Tales in the Hall" (1819). He was distinguished for his vigor and the "Chinese accuracy" of his observation. "Mr. Crabbe," says Lord Jeffrey, "is the greatest mannerist, perhaps, of all our living poets. The homely, quaint, prosaic style, the eternal full-lengths of low and worthless characters, with their accustomed garnishing of sly jokes and familiar moralizing, are all on the surface of his writings." Died Feb. 8, 1832. (See "Life of George Crabbe," by his son, 1838.)

**Crabbe** (THOMAS), rear-admiral U. S. N., was born in Maryland in 1788, entered the navy when young, became a captain in 1841, a commodore in 1862, and rear-admiral in 1866. Died at Princeton, N. J., June 29, 1872.

**Cra'bro** [Lat. for *hornet*], a genus of hymenopterous insects belonging to the section *Aculeata*, or sting-bearers, and to the sub-section *Fossores* (burrowers). The hornet (*Cra'bro vulgaris*) is the type of this genus, which is now raised to the rank of a family named *Crabronidae*. Some insects of this family excavate their nests or retreats in wood. In the U. S. they build in fences, trees, etc.

**Cra'cow**, or **Kra'kow**, a city in Austrian Poland, on the left bank of the Vistula, 158 miles S. S. W. of Warsaw. It is connected by a railway with Vienna, Berlin, and Warsaw. It is the seat of a Catholic bishop, and has a castle founded about 700 A. D., a magnificent cathedral, and once had seventy-six churches, but only thirty-six are

preserved, besides seven Jewish synagogues, a university (begun in 1343, chartered in 1364, finished in 1401, and re-organized in 1817), a library of 201,831 volumes, a botanic garden, and many monasteries. Cracow was founded about 700 A. D., and was the capital of Poland from 1320 to 1609, when the court was removed to Warsaw. In the sixteenth century it contained thrice its present population. On the third partition of Poland, in 1795, it was annexed to the dominions of Austria. It formed a part of the duchy of Warsaw from 1809 to 1815. By the Congress of Vienna (1815) Cracow, with a small territory, was organized as a republic, under the protectorate of Russia, Austria, and Prussia. After an insurrection in 1846 it was again annexed to Austria. Pop. in 1880, 66,095, about one-fourth of whom are Jews.

**Crafts** (SAMUEL CHANDLER), born at Woodstock, Conn., Oct. 6, 1768, graduated at Harvard in 1790, settled in Craftsbury, Vt., in 1790; held many important offices in Vermont, and was long one of the judges of the State courts; was a member of Congress 1817-23, governor of the State 1829-32, and became U. S. Senator in 1842. In 1802 he explored the Lower Mississippi in company with F. A. Michaux. Died at Craftsbury, Vt., Nov. 19, 1853.

**Crag**, the name given to a part of the pliocene formation in the east of England, in France, Italy, etc. It consists of a shelly sand and gravel used to fertilize soils which are deficient in calcareous matter. The "coralline crag," etc. of the older pliocene is extensively found in Europe and Asia.

**Craig** (AARON H.), born in Weston, Vt., Feb. 3, 1821, was a member of Congress from New Hampshire (1857-61), U. S. Senator (1865-71), and was re-elected in 1870 for six years.

**Craig** (JOHN), a Scottish Reformer, born in 1512. He entered the Dominican order, and had charge of the novices at Bologna. Converted to the doctrines of Calvin, he was tried and condemned to be burned by the Inquisition, but was saved by a mob, who, on the death of the pope, broke open the prison. He returned to Scotland, and became a colleague of John Knox in the church of Edinburgh. He was appointed chaplain to James VI. in 1579, and wrote the National Covenant in 1580. Died in Dec., 1600.

**Craig** (LEWIS S.), an American officer, born in Virginia, entered the U. S. army as second lieutenant of dragoons in 1837; transferred to the infantry 1838; promoted to be first lieutenant in 1840, and captain in 1846. He served with distinction during the war with Mexico at Monterey (brevet major), Cerro Gordo (brevet lieutenant-colonel), Contreras, and Churubusco, severely wounded in the latter. He was killed by deserters, while in discharge of his duty, June 6, 1852, near New River, Cal.

**Craig** (SIR THOMAS), a Scottish lawyer, born about 1540. He was appointed a judge (justice-depute) in 1564. He wrote, besides Latin poems, a celebrated "Treatise on Feudal Law" ("Jus Feudale," 1655). Died Feb. 26, 1608.

**Craik** (DINAH MARIA), better known as **Miss Muloch**, an English novelist, born at Stoke-upon-Trent in 1826. Her first novel, "The Ogilvies," was published in 1849, and "John Halifax, Gentleman," in 1857. In 1865 she married G. L. Craik, a nephew of the literary historian. Besides novels and other works, she has published a volume of poems.

**Craik** (GEORGE LILLIE), one of the most useful writers of his time in the field of literary history and biography, was born in Fifeshire, Scotland, in 1799. In 1830 he published an interesting compilation of biographical anecdote, "The Pursuit of Knowledge under Difficulties," in one volume. This was originally issued by the Society for the Diffusion of Useful Knowledge, but has since been many times reprinted. He wrote several of the books published by the above-named society in their well-known series, and he also rendered much valuable help in the preparation of Knight's "Pictorial History of England," and wrote many of the historical and biographical articles in the "Penny Cyclopædia." In 1836 appeared in the Useful Knowledge series "Paris and its Historical Scenes," 2 vols.; in 1844-45, "Sketches of the History of Literature and Learning in England," six small volumes in three. This excellent work of permanent value was rewritten from chapters on the subject in the "Pictorial History of England." A new and enlarged edition, "Manual of English Literature and the English Language," was published in 1862. In 1845, Craik published "Spenser and his Poetry," 3 vols., and in 1846-47, "Bacon, his Philosophy and Writings," 3 vols. Each of these books was reprinted in 1859-60 in one small volume. The "Bacon" is a remarkable piece of condensation, completeness, and accuracy. In 1848 appeared another book of anecdote, which has had a wide popularity, "The Romance of the Peerage." In

1849, Craik was made professor of history and of English literature in Queen's College, Belfast, and in 1851 he published "Outlines of the History of the English Language," and in 1857 a well-known book, the parent of many others of its kind, "The English of Shakespeare illustrated by a Philological Commentary on his 'Julius Cæsar.'" Besides much valuable information and suggestion, this edition of Julius Cæsar contains two or three original emendations, one of which is of real importance. Prof. Craik died June 25, 1866. A nephew of the professor, of the same name, married Miss Muloch (Dinah Maria).

CLARENCE COOK.

**Craik** (JAMES), M. D., derives interest from his long and intimate association with Washington. Their commissions in the army were dated the same day, and their friendship was cemented by fifty years' intercourse. He was born in Scotland in 1731, was surgeon to the expedition against the Indians in 1754, was at Braddock's defeat (9th July, 1755), and subsequently served throughout the American Revolution. Washington said of him, "He was my compatriot in arms, my old and intimate friend." After the Revolution he practised at Mount Vernon, and was the family physician of Washington. Died Feb. 6, 1814.

PAUL F. EVE.

**Cramp** (JOHN MOCKETT), D. D., born July 25, 1796, at St. Peter's, Isle of Thanet, Kent, England, educated at Stepney College, was ordained May 7, 1818, and became pastor of the Baptist church in Dean street, Southwark, London. In 1827 he returned to his native place, and was associated in the ministry there with his father. In 1842 he became pastor of the Baptist church at Hastings, Sussex. In 1844 he became president of the Baptist college, Montreal, Canada, and president of Acadia College, Nova Scotia, in 1851; the principal of the theological department 1853-60; was reappointed president in 1860, and retired in 1869. In 1831 he published "A Text-Book of Popery," in 1833, "The Reformation in Europe" (issued by the Religious Tract Society); in 1844, "Lectures for these Times," in 1868, "Baptist History," and in 1871, "The Lamb of God." He has published about twenty sermons, lectures, or essays in pamphlet form. He has written also "Paul and Christ: a Portraiture and an Argument," and a memoir of the late Madame Feller of the Grande Ligne Mission, Canada.

**Cramp'ton's Gap**, a pass in the South Mountains, near Burkittsville, Frederick co., Md. The left wing of Gen. McClellan's army, under command of Gen. W. B. Franklin, approached this pass about noon of the 14th of Sept., 1862, to find it defended by a portion of the Confederate general McLaw's division of Lee's army, under command of Gen. Howell Cobb. After a stubborn fight of four or five hours, the Confederates were forced out of the gap, having suffered severe loss in killed and wounded, besides 400 prisoners and many small-arms.

**Cra'nach**, or **Kranach** (LUCAS), called **THE ELDER**, an eminent German painter and engraver, born at Cranach, a town near Bamberg, in 1472. His family name was **SUNDER**. He became court-painter to Frederick, the elector of Saxony, in 1504, and worked for many years at Wittenberg, where he was much respected and was made burgomaster. He continued to hold the office of court-painter under the two successors of Frederick, John the Constant and John Frederick the Magnanimous, and when, after the battle of Muhlberg in 1547, John Frederick was taken prisoner, Cranach shared his five years' captivity. They were both released in 1552. He was also an intimate friend of Luther and Melancthon, whose portraits he both painted and engraved. His works consist of oil paintings, engravings on copper, and woodcuts. His most important picture is at Weimar. It is an altar-piece. He was so rapid and prolific a worker that he was called *pictor celebratissimus*, and it is not surprising that his pictures are found in every considerable collection in Europe. There are two good specimens of his work in the Bryan Gallery, New York Historical Society, a "Venus and Cupid" and a "Portrait," and one in the New York Metropolitan Museum, a portrait of John Frederick the Magnanimous. He died Oct. 16, 1553. (See **HELLER**, "Das Leben und die Werke Lucas Cranach's," 2d ed., Bamberg, 1844. But the latest and best authority is **SCHUCHART**, "Lucas Cranach des Älteren Leben und Werke," Leipsic, 3 vols., 1851-71.)

CLARENCE COOK.

**Cranach, von** (LUCAS), a painter, a son of the preceding, was born in 1515. He painted portraits with success. He was burgomaster of Wittenberg. A good specimen of his work is in the Metropolitan Museum, New York—"Portrait of a German Lady." Died in 1586.

**Cran'berry** (i. e. "crane-berry," so called because its slender stalks were fancied to resemble the legs of a crane), the fruit of several species of a sub-genus, *Oxycoccus*, of

small, mostly prostrate evergreen shrubs of the natural order Ericaceae, belonging to the genus *Vaccinium*, but differing from the rest of the genus in having a wheel-shaped corolla, with its four petals decidedly revolute. The species are few, natives of the colder regions of the northern hemisphere. The fruit is acid, and is in great request for making sauces, jellies, etc. The only British species is the *Vaccinium Oxycoccus*, a native also of the northern parts of Europe, Asia, and America. It grows in marshy grounds in the Northern States, and is a wiry shrub with creeping branches, and small oval leaves strongly revolute at the margin. The blossoms are small, but beautiful, and of a deep rose-color. Large quantities of the fruit are collected in the north of England and in other countries, but it is seldom gathered in the U. S. They are often kept for a long time in water. They are an excellent antiscorbutic, and valuable in sea-stores. A sort of wine is made from them in Siberia and Russia. The American cranberry (*Vaccinium Macrocarpon*) is a larger and more erect plant, with larger leaves, less revolute at the edges. The berries are larger and of a brighter red. It is a native of Canada, but is found as far S. as Virginia, growing in sandy bogs and also elevated situations. The berries are largely cultivated near the sea-coast in the Northern States, and large quantities of them exported to Europe. Cranberries are imported into Great Britain from Russia. The berries of the cowberry (*Vaccinium Vitis Idæa*) are sold under the name of cranberries in Scotland, and used in the same way. They also grow in New England, but are there scarcely edible. A third species of cranberry (*Vaccinium Erythrocarpon*), a native of the Alleghanies in Virginia and Carolina, is a shrub four feet high, and with a habit more like that of the whortleberry than the other cranberries; it has an insipid fruit. The "high-bush cranberry" is the *Viburnum Opulus* of the U. S. and Europe. Its fruit has little value. The name mountain cranberry is often given to the *Arctostaphylos Uva Ursi* of the U. S. and Europe, a plant whose leaves are of value as a diuretic.

**Cranch** (CHRISTOPHER PEARSE), a son of the following, an American artist and poet, born at Alexandria, Va., Mar. 8, 1813, graduated at Columbian College, Washington, in 1831, studied divinity, but became a landscape-painter and author. He published a volume of poems (1854), and two stories for children, "The Last of the Huggermuggers" (1856) and "Koboltoso" (1857); also a translation of Virgil's "Æneid" (1872). Many of his finest poems appeared in the "Dial." REVISED BY CLARENCE COOK.

**Cranch** (WILLIAM, LL.D.), an eminent American jurist, born at Weymouth, Mass., July 17, 1769, graduated at Harvard in 1787. He was appointed chief-justice of the U. S. circuit court for the District of Columbia in 1805. He held this position for fifty years, during which, it is said, only two of his decisions were overruled by the Supreme Court of the U. S. As reporter of the decisions of the Supreme Court he prepared nine volumes of reports (1801-15). His legal learning was very profound. Judge Cranch was first cousin to President John Quincy Adams. Died Sept. 1, 1855.

**Crane** [from the Anglo-Sax. *cran*; Ger. *Kranich*; Gr. *κράνος*; Lat. *grus* (gen. *gruis*); Fr. *grue*], a popular name of various birds of the order Grallatores, and belonging to the family Gruidæ, of which the genus *Grus* alone occurs in the U. S. This family differs from herons, storks, etc. in having the short hind toe placed much higher on the leg than the front ones. They are nearly all large birds, with long necks, long legs, and powerful wings. Their wings are not elongated, but rounded. One of these is the common European crane (*Grus cinerea*), which breeds in the northern parts of Europe and Asia; it retires in winter to sub-tropical regions. Flocks of cranes periodically pass over the southern and central countries of Europe, uttering harsh cries, and often alighting for food. This crane, when standing, is about four feet high, its color ashen-gray, with face and neck nearly black. The visits of the crane to Great Britain are now rare; formerly they were more frequent. It feeds on seeds and roots, insects, reptiles, and small quadrupeds. It is highly valued for the table. The whooping crane (*Grus Americana*) is larger than the common crane, which it resembles, except that its plumage is pure white, the wings tipped with black. It frequents the southern parts of the U. S. in winter; in summer it migrates northward. The U. S. have also the sand-hill crane (*Grus Canadensis*) and the *Grus fraterculus*, the little crane. To this family belongs also the demoiselle (*Anthropoides virgo*) or Numidian crane, with which, rather than with the true crane, the Balearic cranes (*Balearia*) are ranked. Cranes use their bills as a weapon of defence, attacking the eyes of an assailant. The blue heron (*Ardea Herodias*) is sometimes called the blue crane.

**Crane**, a machine employed to raise heavy weights and to deposit them at some distance from their former position.

The most common crane consists of an upright revolving shaft, with a projecting arm or transverse jib, at the upper end of which is a fixed pulley. At the other end is a cylinder, which is put in motion by a wheel and pinion or cog-wheel. The weight is fastened to a rope which passes over the pulley and is wound round the cylinder, by means of which the weight is raised to the required height.

**Crane** (WILLIAM CAREY), D. D., born in Richmond, Va., Mar. 17, 1816, graduated at Columbian College and Hamilton Theological Seminary, pastor of a Baptist church in Montgomery, Ala., 1839-42. Since then he has occupied many positions of influence and responsibility in the South, and has been president of Baylor University (Independence, Tex.) since 1863. He has contributed largely to the periodical literature of both sections of our country.

**Crane** (WILLIAM MONTGOMERY), an American naval officer, born at Elizabethtown, N. J., Feb. 1, 1776. He served with distinction in the war against Great Britain (1812-15). He became chief of the bureau of ordnance in 1842. Died by suicide Mar. 18, 1846.

**Cra'ney Island**, at the mouth of Elizabeth River in Norfolk co., Va., has a lighthouse fifty feet high, standing in shallow water on iron screw-piles; lat. 36° 53' 28" N., lon. 76° 20' W. On this island the Confederates erected batteries during the civil war.

**Cranganore**, a maritime town of Southern India, is on the Malabar coast, about 18 miles N. of Cochin. A Christian church has existed here at least since the fifth century. This place was taken from the Portuguese by the Dutch in 1663, and now belongs to the British.

**Craniology**. See PHRENOLOGY, by F. G. FAIRFIELD.

**Cranium**. See SKULL.

**Cran'mer** (THOMAS), English reformer, born at Aslacton, in Nottinghamshire, July 2, 1489, of an ancient Norman family. He studied at Jesus College, Cambridge, of which he became a fellow in 1510, and was well versed in Greek, Hebrew, and theology. He lost his fellowship by marriage, but it was soon after restored on the death of his wife. In 1523 he was appointed lecturer on theology. He gained the favor of Henry VIII. in 1529 by advising that the question of the king's divorce should be tried by the word of God and referred to the universities. He was appointed a chaplain to the king, who sent him to Rome on a special mission. He married a niece of Osiander in 1532. He was appointed archbishop of Canterbury in 1533 by the king, of whom he soon became the favorite minister and adviser. He co-operated with Henry in the suppression of monasteries, but in 1538 he opposed the law of the "Six Articles" or "Bloody Statutes." He promoted the translation and circulation of the Bible. On the death of Henry VIII., Cranmer, in accordance with the royal will, was appointed one of the regents of the kingdom. He was the head of a commission which composed the Liturgy of the Anglican Church in 1548, and efficiently supported the Protestant cause during the reign of Edward VI. On the accession of Queen Mary, in 1553, he was placed in the Tower on a charge of treason. He was also accused of heresy, and was induced by the hope of saving his life to recant six times, and to subscribe to the doctrines of the papal supremacy and the real presence; but his enemies were determined not to spare his life. He was burned at the stake Mar. 21, 1556, and met his death with great fortitude, thrusting his right hand into the flames before his body began to burn. According to Hume, "He was a man of merit, possessed of learning and capacity, and adorned with candor and sincerity, and all those virtues which were fitted to render him useful and amiable in society." Macaulay and some other writers consider him an unscrupulous time-server. (See ARCHDEACON TODD, "Life of Cranmer," 1831.)

**Crannoge**, a term applied to a fortified island, such as are found in the lakes of Ireland and Scotland, and which were used as dwellings and places of refuge by the ancient Celtic inhabitants. The area of a small isle in some cases was enlarged by wooden piles or heaps of stones. Crannoges are mentioned in Irish annals as early as the ninth century. (See LAKE DWELLINGS.)

**Cranston** (HENRY Y.), born at Newport, R. I., in 1790, was a prominent official of his native State and city, and was in Congress 1843-47. Died Feb. 12, 1864.

**Cran'tor** [Κράτωρ], a Greek Academic philosopher, born at Soli, in Cilicia, lived about 300 B. C. He was a pupil of Xenocrates at Athens, and wrote, besides other works, a "Treatise on Affliction," which was highly esteemed. He is mentioned by Horace as an eminent moralist.

**Cran'worth** (ROBERT MONSEY ROFFE), BARON, an English judge, born at Cranworth, in Norfolk, Dec. 18, 1790. He was elected to Parliament as a liberal in 1832, became

solicitor-general in 1834, and a baron of the exchequer in 1839. In 1852 he was appointed lord chancellor by Lord Aberdeen. Having resigned in 1858, he was again lord chancellor from July, 1865, to June, 1866. Died July 26, 1868.

**Crape** [Fr. *crêpe*, from the Lat. *crispus*, "crisped" or "curled"], a light, transparent fabric, made of raw silk deprived of its gloss. Crape is crisped or smooth, according to the degree of twist in weaving. They are manufactured in Italy, England, and France, and are extensively used for mourning-dresses.

**Crapo** (HENRY H.). See APPENDIX.

**Cra'shaw** (RICHARD), an English poet, was the son of a clergyman. He was educated at the Charter-house and at Cambridge. In 1644 he was ejected from his fellowship for refusing to sign the Covenant. Going to France, he became a Catholic, and, through the influence of Queen Henrietta Maria, obtained a secretaryship to a cardinal, and afterwards became a canon at Loretto, where he died in 1640. His works, marked with fertility of imagination and devout fervor, are "Steps to the Temple," "Delights of the Muses," and "Carmen Deo Nostro" (1646).

**Crassula'ceæ** [from *Crassula*, one of the genera], also called **Sempervi'væ**, a natural order of exogenous plants (herbaceous or shrubby), all remarkable for the succulence of their stems and leaves. It comprises about 300 species, widely distributed over the world, and abounding in South Africa. They grow in dry situations, and derive nourishment from the air rather than from the soil. Many of them are cultivated in green-houses on account of their grotesque forms. The *Sedum* (stone-crop), houseleek, and other plants of the U. S. belong to this order.

**Cras'sus** (MARCUS LICINIUS), a Roman triumvir, born about 108 B. C., was in his youth a partisan of Sulla. He was elected prætor in 71 B. C., and defeated Spartacus, the leader of a servile revolt. In the year 70 he was chosen consul as the colleague of Pompey. He amassed an immense fortune by speculation, mining, dealing in slaves, and other methods. Avarice is said to have been his ruling passion, but for the sake of political success he gave large gifts to the people. About 60 B. C. he united with Cæsar and Pompey in a coalition called the first triumvirate. Crassus and Pompey having been chosen consuls in 56 B. C., the former obtained command of Syria for five years. He invaded Parthia in the year 54, in order to enrich himself by plunder. In 53 B. C. he was defeated with great loss by the Parthian general Surena, near Carrhæ (the Haran of the Bible). He was treacherously killed at a conference with Surena soon after that battle (53 B. C.). (See PLUTARCH, "Life of Crassus.")

**Cratægus** [Gr. *κραταγός*, a "thorn-bush"], a genus of thorny shrubs of the natural order Rosaceæ, sub-order Pomœæ, which contains the pear, apple, etc., but distinguished from the rest of the sub-order by its bony carpels. The species are numerous, natives of the temperate parts of the northern hemisphere, and often have flowers in beautiful corymbs. They are nearly all more or less spiny, hence the name thorn or thorn-bush is popularly applied to them. The only native of Great Britain is the hawthorn (*Cratægus Oxyacantha*), which is now naturalized in the Atlantic States of the Union. A number of other species are now found in plantations and hedges in Great Britain, of which the most common is the cockspur thorn (*Cratægus Crus Galli*), a native of North America from Canada to Carolina. Its leaves are not lobed; its fruit rather larger than that of the hawthorn. The azarole (*Cratægus Azarolus*), a native of the south of Europe, and the aronia (*Cratægus Aronia*), a native of the Levant, are occasionally cultivated for their fruit, which is about as large as the Siberian crab, and is used for dessert or pies, as are the fruits of some American species in Canada. *Cratægus orientalis* and *Cratægus tinacetifolia* have also fruit of considerable size. The latter is much used in Armenia. *Cratægus Pyracantha* differs in appearance from most of the genus. It is an evergreen shrub, with lanceolate, crenate leaves and clusters of rich red berries. It is a native of the south of Europe and the Caucasus. In Great Britain it is cultivated as an ornament, and known as the pyracantha. The American species are at least eleven in number. Apples, pears, and quinces are sometimes grafted upon thorn stocks. The thorn-bushes are used as hedge plants, but are apt to be infested by borers.

**Crat'erus** [Gr. *Κρατερής*], an eminent Macedonian general, and one of the successors of Alexander the Great. He served under that prince in Asia, and was one of his favorite generals. After the death of Alexander (323 B. C.) he was associated with Antipater in the government of Macedonia. He was defeated by Eumenes, and killed in battle in Cappadocia in 321 B. C.

**Cra'tes** [Κράτης] of Athens, a Greek comic poet who

flourished about 450 B. C. He was also an actor, and performed parts in the plays of Cratinus. His works were greatly admired, and were praised by Aristotle. Only small fragments of them are extant.

**Crates of Thebes**, a famous Cynic philosopher, lived about 320 B. C., and was a disciple of Diogenes at Athens. He had a high reputation for probity, wisdom, and self-control. He was rich in his youth, but set an example of voluntary poverty. He wrote poems and other works which are all lost.

**Crati'nus** [Κρατινός], an eminent Athenian comic poet of the old comedy, was born in 519 B. C. He was a contemporary and rival of Aristophanes. He was the first comic poet who introduced personal satire into the drama, and undertook to castigate the vices of his prominent contemporaries. Pericles was among the objects of his satire and invective. Cratinus gained a prize for his "Wine-Flask" in 423 B. C., when Aristophanes was his competitor. Died in 422 B. C.

**Crati'pus** [Gr. *Κράτιππος*], a Greek Peripatetic philosopher, a native of Mitylene. He was the most eminent philosopher of that age in the estimation of Cicero, who was his pupil and friend. Pompey, after his defeat at Pharsalia, had an interview with Cratippus, who conversed with him on the justice of Providence. Brutus attended his lectures at Athens in 44 B. C. Cratippus wrote "On Divination by Dreams," which is the only work attributed to him.

**Craven** (EARLS of, Viscounts Uffington, Barons Craven (England, 1665).—GEORGE GRIMSTON CRAVEN, third earl, born Mar. 16, 1841, succeeded his father in 1866.

**Craven** (ALFRED W.), born in New York, entered Columbia College, N. Y., graduated with honors, and studied engineering, rapidly rising to the first rank in his profession; was a successful railroad engineer and manager; in 1849 became prominently connected with the Croton aqueduct, New York; shortly after its completion was appointed engineer-in-chief to take charge of it; was afterward chosen commissioner in connection with the aqueduct, and subsequently filled both positions, engineer-in-chief and commissioner, and took complete charge of all the public works. He planned and carried into operation the system of sewerage which is now in use in New York City. He was one of the projectors and the first president of the American Society of Civil Engineers. Died Mar. 29, 1879.

**Craven** (CHARLES H.), U. S. N., born Nov. 30, 1843, in Maine, graduated at the Naval Academy as ensign in 1863, became a lieutenant in 1866, and a lieutenant-commander in 1868. He served in the steam-sloop Housatonic off Charleston from early in 1863 to Feb. 14, 1864, when that vessel was blown up by a torpedo-boat. He was in the combined army and navy expedition which resulted in the capture of the greater part of Morris Island July 10, 1863, and commanded a division of boats in the night assault upon Fort Sumter of Sept. 11, 1863.

FOXHALL A. PARKER.

**Craven** (THOMAS T.), U. S. N., born Dec. 30, 1808, in Portsmouth, N. H., entered the navy as a midshipman May 1, 1822, became a passed midshipman in 1828, a lieutenant in 1830, a commander in 1832, a captain in 1861, a commodore in 1862, and a rear-admiral in 1866. During the summer of 1861 he commanded the Potomac flotilla. During the year 1862, while in command of the steam-sloop Brooklyn, he took part in the engagement with Forts St. Philip and Jackson and capture of New Orleans, and "excited the admiration of his officers and crew by his coolness and the masterly handling of his vessel." He was engaged on the 28th of June, 1862, for two hours and forty minutes with the batteries at Vicksburg. In his report of the passage of the forts on his way to New Orleans, Admiral Farragut writes: "It was not long before we were enabled to bear away and give the forts a broadside of shells, shrapnell, and grape, the Pensacola, at the same time, passing up and giving a tremendous broadside of the same kind to the starboard fort; and by the time we could reload, the Brooklyn, Captain Craven, passed handsomely between us and the battery, and delivered her broadside, and shut us out." Retired Dec. 20, 1869.

FOXHALL A. PARKER.

**Craven** (TUNIS AUGUSTUS), U. S. N., born Jan. 11, 1813, in the State of New York, entered the navy as a midshipman Feb. 2, 1829, became a passed midshipman in 1835, a lieutenant in 1840, and a commander in 1861. He commanded the iron-clad Tecumseh in the engagement with Howlett's battery, James River, June 21, 1864, and on the morning of Aug. 5, 1864, was blown up by a torpedo while gallantly leading the iron-clads into the bay of Mobile.

FOXHALL A. PARKER.



**Crawfish**, or **Crayfish** [etymologically related to the word *crab*], a name given to several long-tailed decapodous crustaceans, those of Europe and the Pacific States of our country belonging to the genus *Astacus*, while those of the Eastern States and the Mississippi Valley belong to the genus *Cambarus*. They inhabit fresh water, and dig long burrows in the earth. They feed upon insects, mollusks, dead animals, etc. By some they are esteemed for the table. Crawfishes do immense damage by opening passages for water through the levees of the Mississippi, which in some cases have caused extensive crevasses. In New England they are quite rare, but are occasionally seen. Certain salt-water crustaceans are popularly called crawfishes, especially the spiny lobsters, of the genus *Palinurus*.

**Crawford**, EARLS OF (1398), earls of Balcarres (1650), Barons Lindsay (previous to 1443), Barons Lindsay of Balcarres (1633), Lords Lindsay and Barneil (Scotland, 1650), Barons Wigan (United Kingdom, 1826).—ALEXANDER WILLIAM CRAWFORD LINDSAY, twenty-fifth earl, M. A., author of "Letters on Christian Art," "Lives of the Lindsays," "Progression by Antagonism," etc., born Nov. 16, 1812, succeeded his father in 1869. D. Dec. 13, 1880.

**Crawford** (GEORGE W.), born in Columbia co., Ga., Dec. 22, 1798, graduated at Princeton in 1820, was admitted to practise law in Georgia in 1822, was a member of Congress in 1843, governor of Georgia (1843-47), and secretary of war under President Taylor (1849-50).

**Crawford** (MARTIN J.), an eminent citizen of Georgia, born Mar. 17, 1820, educated at Mercer University, rose to distinction at the bar, was elected to the State legislature in 1845, and elevated to the bench in 1853. In 1856 he was returned to Congress, and continued in the House of Representatives till Jan., 1861, when he withdrew on the secession of Georgia, and became a member of the Congress of the Southern States which met at Montgomery Feb. 4, 1861. He was one of the three commissioners appointed by that body to treat with the authorities at Washington for a peaceful separation of the States. After the war he resumed the practice of his profession, and at the time of his death, July 22, 1883, was associate justice of the supreme court of Georgia.

**Crawford** (NATHANIEL MACON), D. D., an American Baptist minister and eminent pulpit-orator, a son of William H. Crawford, was born near Lexington, Ga., Mar. 22, 1811. He became in 1854 president of Mercer University in Georgia. He was a prominent advocate of liberal education. Died Oct. 27, 1871.

**Crawford** (S. WYLIE), an American officer, born in Franklin co., Pa., Nov. 8, 1829, graduated at the University of Pennsylvania in 1847, appointed assistant surgeon U. S. A. in 1851. He served principally in Texas and New Mexico. In 1861 he was appointed major Thirtieth Infantry U. S. A., promoted to be lieutenant-colonel Feb. 17, 1864, and colonel Sixteenth Infantry Feb. 22, 1869; transferred to Second Infantry Mar. 15, 1869. On the outbreak of the civil war, April, 1861, Gen. Crawford was among the garrison of Fort Sumter. He was commissioned brigadier-general of volunteers April, 1862, and served in the Shenandoah campaign and with the Army of the Potomac up to the closing scenes at Appomattox Court-house, 1865. At Antietam, in 1862, he took command of Mansfield's division after the latter's death, and was severely wounded. Brevet-colonel, brigadier-general, and major-general U. S. A. Retired from active service, on account of wounds received, Feb. 19, 1873.

**Crawford** (THOMAS), an American sculptor, born in New York Mar. 22, 1814. He was a pupil of Thorwaldsen at Rome, where he worked for many years. He was employed in 1849 by the State of Virginia to execute a colossal equestrian statue of Washington, which is at Richmond. Among his works are a statue of "Orpheus," and a colossal statue of the Genius of America, which is on the dome of the Capitol at Washington. Died in London Oct. 10, 1857.

**Crawford** (WILLIAM HARRIS), an American statesman, born in Amherst co., Va., Feb. 24, 1772, removed to Georgia in his early youth. Having studied law, he was admitted to the bar in 1793, and settled at Lexington, Ga. He was elected a Senator of the U. S. in 1807 by the Democrats, and was sent as minister to France in 1813. He became secretary of war in 1815, and was secretary of the treasury from 1816 to Mar., 1825. In 1824 he was nominated for the presidency of the U. S. by a Congressional caucus. In the election of that year he had three competitors—Gen. Jackson, John Quincy Adams, and Henry Clay. Crawford received only forty-one electoral votes. Died Sept. 15, 1834.

**Crawford County System.** See CAUCUS, by Hon. HORACE GREELEY, LL.D.

**Crawfordsville**, city and R. R. centre, capital of Montgomery co., Ind. (see map of Indiana, ref. 6-C, for location of county). It is the seat of Wabash College, founded in 1835. Pop. in 1870, 3701; in 1880, 5254.

**Crawfordville**, capital of Wakulla co., Fla. (see map of Florida, ref. 2-C, for location of county), 20 miles from Tallahassee. Pop. in 1880, 84.

**Crawfordville**, on R. R., capital of Taliaferro co., Ga. (see map of Georgia, ref. 3-I, for location of county), 65 miles W. of Augusta. Pop. in 1880, 511.

**Crayfish.** See CRAWFISH.

**Cra'yon** [from the Fr. *crâie*, "chalk"], a word of French origin, signifying something to mark with, hence a pencil; a cylinder of charcoal, pipeclay, or chalk colored with various pigments and used for drawing on paper. Cohesiveness is given to the paste of which the cylinder is formed by gum, wax, or soap. Crayons containing plumbago are styled lead pencils.

**Cream** [Lat. *cremor*; Fr. *crème*; Ger. *Rham*], the oily or butyaceous part of milk, which being lighter rises to the surface. The term cream is applied in different ways to various preparations, indicative of superior quality or of cream-like consistence, as cold cream, shaving cream, etc. The French expression "La crème de la crème" ("The cream of the cream") signifies the most fashionable or aristocratic class of society.

**Cream of Tartar, Acid Tartrate of Potassa, Bitartrate of Potassa, Supertartrate of Potassa, or Potassæ Bitartras** [pharm.]; chemical constitution,  $\text{KHC}_4\text{H}_4\text{O}_6$ ; old system,  $\text{K}_2\text{O} \cdot \text{H}_2\text{O} \cdot (\text{C}_2\text{H}_3\text{O}_4)_2$ , a compound existing already formed in the juice of the grape and in other vegetable juices. In the juice of the grape it is held in solution by the saccharine matters present, but as it is less soluble in solutions containing alcohol and less sugar, as the sugar is transformed into alcohol in the process of fermentation, it is deposited in the casks, forming the crude tartar or argol of commerce. The amount varies with the variety of the grape, its ripeness, and with the process pursued in making the wine. The well-known "crust" of port wine is simply a deposit of this crude tartar or argol. Cream of tartar was known to the ancients, the Greek name for it being *ρως*, while the Latin term was *fixæ vini*. Up to 1764 it was considered to be an acid, and even in 1781 it was denominated in the Prussian Pharmacopoeia as *acidum tartari*. Marggraf, however, showed in 1764 that the alkali existed in it already, and was not formed by incinerating it, as had been previously supposed. Argol is an article of export from wine-producing countries, the best qualities coming from Italy and the south of France. It is used as the source of tartaric acid and the various tartrates employed in medicine and the arts.

Argol, as met with in commerce, is of two kinds—red and white, according as it has been deposited in the manufacture of red or white wines, some of the coloring-matter of the wine always existing in it. It contains from 5 to 45 per cent. of tartrate of lime, besides other impurities derived from the wine. It is refined by treatment with boiling water, in which the cream of tartar is quite soluble. The water being then cooled or evaporated, the salt crystallizes out; it is then redissolved in water, 4 or 5 per cent. of pipeclay added to the solution to precipitate the impurities, the liquid drawn off and evaporated. Thus prepared, it consists of colorless rhombic crystals, which usually contain 2 to 5 per cent. of tartrate of lime, besides, in some cases, traces of iron and copper. In damp situations the tartrate of lime is apt to change to the carbonate, and hence is objectionable, both in the crude and the refined article.

Cream of tartar has a pleasant acid taste, and is soluble in about 15 parts of boiling and 240 parts of cold water. It is much more soluble in water containing borax in solution. It is frequently adulterated with sawdust, clay, gypsum, flour, chalk, alum, and sulphate of potash. Samples purchased from several grocers in New York in 1872 were found to contain considerable proportions of gypsum or sulphate of lime, in one case 70 per cent. Cream of tartar is extensively used, in connection with bicarbonate of soda, as a substitute for yeast and leaven for raising bread. (See BREAD.) Cream of tartar is often used as a mordant in dyeing wool. In medicine it is used for its cathartic, diuretic, and refrigerant properties. It is frequently prescribed in combination with senna, sulphur, or jalap. It is also used for the preparation of soluble tartar (neutral tartrate of potash), Rochelle or Seignette salts (tartrate of potash and soda), tartar emetic (tartrate of potash and antimony), tartarized iron (tartrate of potash and iron), white and black flux, etc. Salt of tartar is the carbonate of potassa, prepared by the incineration of cream of tartar.

C. F. CHANDLER.

**Crea'sy** (Sir EDWARD SHEPHERD), an English historian and lawyer, born at Bixley, in Kent, in 1812. He became professor of history in University College, London, in 1850, and was appointed chief-justice of Ceylon in 1860. Among his works were "Fifteen Decisive Battles of the World" (1851) and a "History of England" (1869-70). D. Jan., 1878.

**Cre'atine** [from the Gr. *κρέας*, "flesh"], a neutral principle discovered in 1835 by Chevreul in raw muscular flesh, and afterwards carefully studied by Liebig and others. Anhydrous creatine has the formula  $C_4H_9N_3O_2$ . Creatine is found in the flesh of many if not all vertebrate animals, but is now generally considered to be one of the products of the normal destruction of the tissues. It occurs in the urine. Combined with two equivalents of water, it readily forms brilliant, colorless, transparent crystals, soluble in water.

**Creat'inine**, a powerful organic base or alkaloid ( $C_4H_7N_3O$ ) which exists in small quantities in the juice of animal flesh and in urine, as one of the products of the physiological destruction of tissues. When creatine is subjected to the action of strong acids, it is changed to creatinine, which is crystallized in colorless rhombic prisms.

**Cre'ationism**, as distinguished from TRADUCIANISM and the doctrine of PRE-EXISTENCE (which see), is the belief that the human soul is directly created by God, and that it joins the embryo soon after conception. Many passages of Scripture, of the Fathers, and of Aristotle were quoted to sustain this view.

**Crébillon, de** (PROSPER JOLYOT), a French dramatic poet, was born at Dijon Jan. 13, 1674. He produced in 1705 "Idoménée," in 1707 "Atrée," "Rhadamiste" in 1711, and "Pyrrhus" in 1726, after which he wrote nothing for twenty years. He was admitted into the French Academy in 1731. His genius was hampered by poverty. Among his later works is "Catilina" (1749). Died June 17, 1762. He is ranked among French dramatists of the first order. (See D'ALEMBERT, "Eloge de Crébillon.")—His son, CLAUDE PROSPER JOLYOT DE CRÉBILLON, fils, romancist, is known as one of the most libertine writers of a most dissolute age.

**Crécy**, a small town of France, department of Somme, about 12 miles N. of Abbeville. It was the scene of a signal victory gained by Edward III. with 40,000 English soldiers over a French army of 100,000 on the 26th of Aug., 1346. It is stated that nearly 30,000 of the French were killed in this action. Pop. in 1881, 1666.

**Creden'tials** [from the Lat. *credentia*, "evidence," "trust" (from *credo*, to "believe"); Fr. *lettres de créance*], papers or letters given to an ambassador or other diplomatic agent, in order to enable him to claim the confidence of the court to which he is sent. There are two sorts of credentials—the one sealed, drawn up and countersigned by the minister of foreign affairs; the other open, and signed only by the king.

**Cre'di, di** (LORENZO SCIARPELLONI), an Italian painter, born at Florence in 1452. He was a fellow-pupil of Leonardo da Vinci. Grace and depth of feeling mark his pictures. Died Jan. 12, 1537.

**Cred'it** [Lat. *credium*, a "trust," from *credo*, *credium*, to "trust," to "believe," to "lend"; Fr. *crédit*], belief, reliance, reputation for solvency and probity; honor or esteem; influence of a good character. In bookkeeping, *credit*, abbreviated as *Cr.*, is the reverse of *debit*, and denotes in personal accounts those items or values received from the party named at the head of the account. The term credit or creditor is also applied to the side of an account-book on which are entered all moneys, goods, etc. received by the party that keeps the book. In political economy, credit is used to express the lending of money or other property. The party who lends money or sells goods to be paid for at some future time is said to give credit, which is sometimes defined to be the acquisition by one party of the wealth of another in loan. In a majority of cases loans are made by persons who wish to retire from business, or who have more capital than they can advantageously employ, to parties entering into business or who wish to increase their business. "Public credit" is a phrase used to express the general confidence placed in the solvency of a state, and in its fidelity as well as its ability to pay its debts, or at least the interest on the same. (See POLITICAL ECONOMY.)

**Crédit Foncier** [i. e. "landed credit," from *fond*, "bottom" or "ground"], in France, a plan of borrowing money by mortgaging land (for a sum not exceeding half its value), and repaying the borrowed money and interest in small and regular instalments. The Crédit Foncier was established Feb. 28, 1852.

**Credit, Letters of.** See LETTERS OF CREDIT.

**Crédit Mobilier** (i. e. "credit on movable or personal VOL. II.—20

property"), a name given to a gigantic scheme or joint-stock company which originated in France in 1852, and was sanctioned by the government, with a capital of 60,000,000 francs. The objects of it are—1. To initiate trading enterprises of all kinds on the principle of limited liability; 2. To supersede or buy up trading companies—e. g. railway companies—and to substitute scrip and shares of its own for the shares and bonds of the company; and 3. To carry on the business of a bank or bankers on the principle of limited liability. (See AYCARD, "Histoire de Crédit Mobilier," 1867.)

"THE CREDIT MOBILIER OF AMERICA" is the title of an organization chartered in Pennsylvania in 1859 as a corporation for a general loan and contract business, and reorganized in 1864 with the intention, it would appear, of enabling the shareholders of the Union Pacific R. R. to construct their road without incurring any pecuniary liability in case of the failure of the enterprise. To this end the Credit Mobilier was to contract for the construction of the road at the risk of its own stockholders. The honesty of its management having been impeached, the affairs of the Credit Mobilier received (1872-73) an investigation from Congress, certain members of which were charged with having unlawfully profited by the enterprise. There has been no institution of this kind in England.

**Creed** [from the Lat. *credo*, to "believe"; Fr. *croiance*; Ger. *Glaube*], a term originally signifying "belief," but commonly applied to a statement or profession of fundamental points of belief [Lat. *symbolum*; Fr. *symbole* or *profession de foi*; Ger. *Glaubensbekenntnis*], especially applied to summaries of Christian doctrine. The Protestant churches agree in considering creeds mere standards of belief, the Bible alone affording authoritative rules of faith and practice, but they differ in their estimate of the importance of symbols. Among the more important creeds are the following:

The Apostles' Creed, a summary of the Christian faith which most Christian churches accept. Many ancient writers assert that this was composed by the apostles themselves, before they separated after our Lord's ascension; but this tradition is now almost universally rejected. The substance of it is no doubt very ancient, but in its present form it dates from the fourth century.

The Athanasian Creed, once supposed to be the work of Athanasius, was certainly composed by some other hand. It probably originated in Gaul, not far from the middle of the fifth century, but its author is not known. It is now omitted from the services of the Protestant Episcopal Church in America, but it is still read in the Church of England.

The Niceno-Constantinopolitan (or Nicene) Creed was first adopted at the Council of Nice, 325 A. D. This creed sets forth the faith of the Church in respect to the errors of Arianism. It is admitted by many Protestant churches, and is held as authority in the Roman and Greek churches. The form in which the Nicene Creed now appears in the Anglican prayer-books is essentially identical with the modified form of this creed adopted by the second œcumenical council of Constantinople, 381 A. D., with the addition of "and of the Son," made at Toledo in 589. The above formulas are known as the three catholic or general creeds, because they are received by the Greek and Roman churches, as well as by several Protestant bodies.

The Creed of Chalcedon was an exposition of faith declared by the fourth œcumenical council, held A. D. 451 at Chalcedon. It embraced the Niceno-Constantinopolitan Creed, followed by a statement of the doctrine of Christ's Person.

The so-called Creed of Pope Pius IV. is a statement of the doctrines of the Roman Catholic Church, as established by the Council of Trent. It was issued in 1564 by Pius IV. as a bull. It is slightly altered from the Nicene Creed in the first part, but is much more complicated, and especially enforces the doctrine of transubstantiation. It is sometimes called the "Tridentine Profession."

The Greek Church has no symbolical books, strictly speaking, but approves the "Answers of the Patriarch Jeremiah to the Lutherans" (1574-81), the "Orthodox Confession of Peter Mogila" (1643), and the "Eighteen Articles of the Synod of Bethlehem" (1672).

The Russian Church, in addition to its use of the above-mentioned documents, has of its own: (1) the "Primer for Children" (1720); (2, 3) the "Shorter" and "Longer Catechisms" (1839); (4) the "Treatise on the Duty of Parish Priests" (1776).

The Lutheran Church has had many creeds and confessions. Besides the Apostles', Nicene, and Athanasian Creeds, may be mentioned the Augsburg Confession (1530), the Articles of Schmalcald (1537), the Catechisms of Luther

\*The term "mobilier" is especially applied to stocks, government securities, and the like.

(1529), the Confession of Lower Saxony (1571), the Suanbian-Saxon Formula (1575), the Torgau Formula (1576), and the Formula Concordiæ (1580).

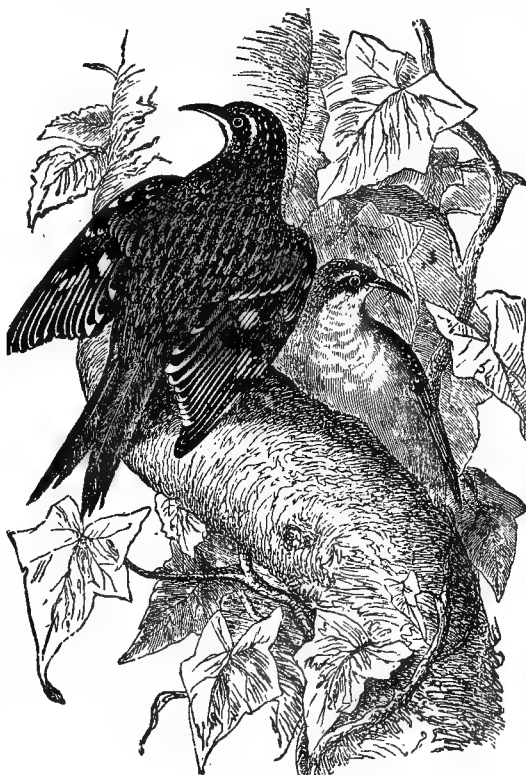
The Calvinistic Confessions of Bale (1530), the Tetrapolitan Confession (1531), that of the Helvetic churches (1536), the Palatine Catechism (1563), the "Expositio Simplex" (1566), the "Formula Consensus" (1675), the Gallican Confession (1559), the Belgic Confession (1559-61), the Scottish Confession of 1560, and the great Westminster Confession (1646), and Catechisms (Shorter, 1647; Larger, 1648), are among the most important Protestant symbols. The articles held by the Congregationalists and Baptists are based upon the Westminster Confession.

The Church of England receives the three catholic creeds and the "Thirty-nine Articles." The Anglican Creed at first (1552) consisted of forty-two Articles; in 1562 it was reduced to thirty-eight; and finally in 1571 it was put forth in its present form. A modification of these articles is received by the Protestant Episcopal Church in the U. S. The "Articles" of the Methodist Episcopal Church are also based upon the "Thirty-nine Articles."

**Creedmoor**, situated on Long Island and on R. R., 11 miles E. of New York City, in Queens co., N. Y. (see map of New York, ref. 8-K, for location of county), has the largest and most complete rifle-range in the U. S., and is much frequented for target practice. The range is under the control of an incorporated association, and was established in 1871, chiefly at the expense of the State and the cities of New York and Brooklyn.

**Creek Indians**, a tribe of American savages formerly living in Alabama and Georgia, were sometimes called Muscogees. They were numerous and warlike. In 1814 they waged war against the U. S., and were subdued by Gen. Jackson. In 1832 they ceded their lands to the U. S., and subsequently removed to the Indian Territory beyond the Mississippi. They are now in a condition of advancing civilization, and numbered in 1884, 14,000.

**Creep'er** [named from the movements of the bird], a



Creep'er.

popular name for several passerine birds of the genus *Certhia* and other allied genera. The best-known North American species are the brown creeper (*Certhia americana*) and the *Certhia albifrons* of the South-western States. They belong to the family Certhiidae.

**Creery** (WILLIAM R.), born in Baltimore, Md., in 1824, graduated at Dickinson College in 1842, taught in the Baltimore schools (1842-48 and 1862-68), was professor of belles-

lettres in Baltimore City College (1854-59), president of Lutherville Female Seminary (1859-62), and in 1868 became superintendent of public instruction in Baltimore. In conjunction with Prof. M. A. Newell, he prepared the Maryland series of school-books. Died May 1, 1875.

**Cre'feld**, a manufacturing town of Rhenish Prussia, is 13 miles N. W. of Düsseldorf, on the railway to Cologne. It is well built, and has more extensive manufactures of silk than any other town in Prussia. Here are also manufactures of cotton, linen, and woollen fabrics, lace, earthenware, etc. Pop. in 1880, 73,872.

**Creigh'ton** (J. BLAKELEY), U. S. N., born Nov. 12, 1822, in R. I., entered the navy as a midshipman Feb. 10, 1838, became a passed midshipman in 1844, a lieutenant in 1853, a commander in 1862, and a captain in 1868. In 1862 he commanded the steamer *Ottawa*, S. Atlantic blockading squadron. In 1863, while commanding the steamer *Ma-haska*, he participated in several engagements with the forts and batteries of Charleston harbor. On May 18, 1882, he became a rear-admiral; retired Nov. 21, 1882. Died Nov. 13, 1883.

FOXHALL A. PARKER.

**Cre'ma**, a town of Italy, province of Cremona, on the river Serio, 24 miles E. of Milan. It was founded by the Longobards in the sixth century. It has an old castle and a cathedral; also manufactures of silk and lace. Pop. 9,111.

**Cre'mation**. See FUNERAL RITES.

**Cre'mer** (JACOB JOHN), a Dutch novelist, born Sept. 1, 1827, studied painting, but devoted himself to literature. His "Betuwsche Novellen" (sketches of Dutch life) have been followed by "Anna Roose," "Dr. Helmond," and others.

**Crémieux** (ISAAC ADOLPHE), a French advocate and republican, born of Jewish parents at Nîmes April 30, 1796. He practised as an advocate in the court of cassation in Paris. In 1842 he was elected a member of the Chamber of Deputies, in which he acted with the radical party. He was minister of justice in the provisional government (1848), and retired from office in June. He was a member of the National Assembly in 1849-50. In Sept., 1870, he became minister of justice after the deposition of Napoleon III. As president of the Universal Israelite Alliance of Paris he displayed a remarkable activity in behalf of the Jews all over the world. D. Feb. 10, 1880.

**Cre'mnitz**, a Hungarian town, in Bars, in a gold and silver mining region. It has a mint and paper and vitriol works. Pop. 8,550.

**Cre'mo'na**, a province of Italy, bounded on the N. by the provinces of Bergamo and Brescia, W. by Milan, S. by Piacenza, Parma, and Reggio, and E. by Venetia. Area, 670 square miles. The soil is fruitful, producing grain, maize, rice, flax, wine, olives, etc. Capital, Cremona. Pop. in 1881, 302,064.

**Cremona**, a city of Italy, capital of the above province, in Lombardy, on the Po, here crossed by a bridge, 47 miles S. E. of Milan. It is surrounded by walls, is well built, with wide streets, and has handsome palaces and a cathedral. Connected with the cathedral is a belfry called Torazzo, 372 feet high, completed in 1284, and one of the most beautiful towers in Italy. Cremona is a bishop's see, and has a city hall, two theatres, a lyceum, a public library, and several hospitals. Here are manufactures of silk and cotton fabrics, porcelain, and chemical products. It was formerly celebrated for the violins of Amati (1590-1620), of Guarneri, and of Stradivari (1670-1728). Cremona was a populous town during the ancient Roman empire. P. in 1881, 31,930.


**Crenelle**, or **Crenel**, a term used sometimes to denote a battlement, but more frequently an embrasure in a battlement. The word *crenellated* is employed to signify that a building is supplied with crenelles. In its French form (*crenellé*, "crenellated," "embattled") the word is also used in heraldry with the special signification that any ordinary is drawn like the battlements of a wall. It is, however, not of any very frequent occurrence.

**Crenshaw** (ANDERSON) was born in South Carolina, but removed early to Alabama, where he held positions respectively as a judge of the circuit court, as a judge of the supreme court, and as chancellor of the southern division. He died in 1847.—WALTER H. CRENSHAW, son of Anderson Crenshaw, came to the House in 1838, and served from that time to 1867 in one or the other branch of the legislature of Alabama, and was never defeated.

**Cre'ole** [Sp. *criollo*, from *criar*, to "create," to "beget;" also to "nurture;" originally, a "child" or "nursling," a "descendant"], a native of the West Indies or South America who is descended from Europeans. The term is sometimes applied to those whose ancestors were partly white, and have in their veins some blood of the Indians or negroes.

**Cre'osote** [Lat. *creasotum*, from the Gr. *κρέας*, "flesh,"

and *σώζω*, to "save," referring to its antiseptic qualities), a colorless, syrupy liquid obtained for commercial purposes chiefly from the tar of beech-wood. It has a great refractive power, and a density of 1.037. It boils at 397° F. Its taste is peculiar, and almost insupportable when placed even in a minute quantity upon the tongue. It has an odor resembling that of smoked meats, which doubtless owe their preservation to its presence in the smoke they absorb. Cresosote is sparingly soluble in water, but readily so in ether and alcohol. It is generally adulterated in commerce with a large percentage of phenol (see CARBOLIC ACID), which can with difficulty be detected. The medical properties of true wood-cresosote are doubtless important, but have not been sufficiently studied. It is employed in toothache, in obstinate vomiting, and as an outward application in cancer. In an over-dose it is an irritant poison, for which no antidote is known. Distilled with dilute sulphuric acid it yields cresol,  $\text{C}_6\text{H}_5\text{O}_2$ .

**Crescen'do** [from the It. *cresco*, to "grow," to "increase"], in music, signifies a gradual increasing of sound, or changing from piano to forte and fortissimo. It is marked thus , or with the abbreviation *cresc.* The swell of a good organ produces a most perfect crescendo.

**Cres'cent** [from the Lat. *cresco*, to "grow" or "increase"], the figure of the new moon. The term is often used as an emblem of progress. It is generally supposed to be the "arms" of the Turkish empire, but it is more properly the "emblem" of that empire. It was used by the Greeks, and was the symbol of the Byzantine people before it was adopted by the Turks.

**Crescent City**, capital of Del Norte co., Cal. (see map of California, ref. 1-A, for location of county), is on the Pacific Ocean, about 260 miles N. N. W. of Sacramento. It has a small but safe harbor, and a lighthouse in lat. 41° 44' 34" N., lon. 124° 11' 22" W., with a flashing white light. Pop. in 1870, 453; in 1880, not in census.

**Crescent, Orders of the.** The oldest order of this name was that instituted at Angiers in 1464 by René, duke of Anjou, brother and heir-apparent of the Neapolitan king, Louis III. The badge was a crescent of gold, on which the words "Loz en Croissant" ("Praise to that which increases") were enamelled in red letters. Its aims were those common to all military and religious orders—defence of the Church and of the innocent suffering, deference to ladies and to all divinely-appointed authorities, etc. The order is not known, however, to have survived its founder. Probably the Turkish order of the Crescent is not destined to be very long-lived, either. It was instituted by Selim III. after the battle of Abukir, 1799, and was one of the flimsy devices by which that prince hoped to bring his people and his government in harmony with European civilization. The badge consists of a crescent of gold richly adorned with diamonds. As the Koran forbids the Mohammedans to wear any such token of distinction, the order was destined to be given only to Christians who in some way or other had aided the sultan. The first to receive it was the English admiral Nelson, who was highly elated at the gift, and paraded it at every occasion. The next was the Russian general Sebastiani.

**Crescen'zi, de' (PIETRO)**, an Italian senator, born at Bologna in 1230. He wrote in Latin a treatise on rural economy ("Opus Ruralium Commodorum"), the fruit of long travel and observation and the origin of agricultural science. Died in 1307.

**Cres'co**, on R. R., capital of Howard co., Ia. (see map of Iowa, ref. 2-I, for location of county), 19 miles N. W. of Calmar. It has a union school, foundries, and other manufactories, and ships great quantities of wheat. Pop. in 1870, 912; in 1880, 1875.

**Cres'ol** [a term which appears to be derived from the first syllable of "cresosote" and the first syllable of the Lat. *oleum*, "oil"], called also **Cresyl'ic Acid** and **Cres'yl Al'cohol**, a compound ( $\text{C}_7\text{H}_5\text{O}$ ) derived from coal-tar or from wood-tar by fractional distillation. Most of the CARBOLIC ACID (which see) of commerce contains a large percentage of cresol. It combines with alkalies, like its analogue phenol, and hence is by some called an acid: it is isomeric with benzyl alcohol, and is itself properly one of the alcohols. It refracts light strongly, and boils at 397° F. It is sold in large quantities as "carbolic acid," and used as a disinfectant.

**Cress**, a name popularly applied to many cruciferous plants having a pungent taste and used in salads. The garden cress (*Lepidium sativum*) is an annual, a native of Asia. It is easily raised by a little artificial heat in winter. It is antiscorbutic. The bitter cress or cuckoo flower (*Cardamine pratensis*) is common in moist meadows in Great Britain. The flowers are white or light purple, and have stimulant and diaphoretic properties. They had

once a reputation for the cure of epilepsy, particularly in children. This plant is also a native of America, like many of the other cresses. The young leaves of this species, as well as of *Cardamine amara* and *Cardamine hirsuta*, both British, and the latter American, are used as salads in Europe. The juice of *Cardamine pratensis* is much used as an antiscorbutic in the north of Europe. Water-cress (*Nasturtium officinale*) is a perennial, aquatic, cruciferous plant, used as a spring salad, and is a native of almost all parts of the world. The leaves have a pungent taste, to which is added a little bitterness and saltiness. They are very refreshing, however. It grows best in shallow running water with a bottom of sand. It is often cultivated and brought to market in America and Europe.

**Cres'son**, R. R. junction, Cambria co., Pa. (see map of Pennsylvania, ref. 5-D, for location of county), 252 miles W. by N. from Philadelphia, and 102 miles E. of Pittsburgh. It is beautifully situated on the top of the Allegheny Mountain, about 3000 feet above the level of the sea. It is a fashionable place of summer resort, and is commended for the purity of its air. Pop. not in census of 1880.

**Cressy**, in France. See CRECY.

**Crest**, in heraldry, the ornament affixed to the helmet, being a personal or hereditary device. Warriors bore insignia peculiar to themselves in this manner among the ancients. The earliest instance of the heraldic crest in England is said to have been that of Edmund Crouchback, earl of Lancaster, about 1280. The crest is in modern blazonry a figure placed upon a wreath, coronet, or cap of maintenance, which surmounts the coat-of-arms.

**Crest**, a town of France, department of Drôme, on the river Drôme, 14 miles S. S. E. of Valence. It has manufactures of silk fabrics, cotton prints, leather, soap, candles, paper, etc., and carries on a brisk trade in wine, wood, etc. Pop. in 1881, 5535.

**Crested Butte**, Col. See APPENDIX.

**Crest'line**, R. R. junction, Crawford co., O. (see map of Ohio, ref. 3-F, for location of county), 63 miles N. by E. from Columbus. Here are extensive shops of the railroads; also lock-works and other manufactories, a fine park, a splendid public-school building, and waterworks. Pop. in 1870, 2279; in 1880, 2848.

**Creston**, Ia. See APPENDIX.

**Creswell** (JOHN A. J.), an American lawyer, born at Port Deposit, Md., Nov. 18, 1828. He was chosen a Republican member of Congress in 1862, and a Senator of the U. S. for a short term in 1865. In Mar., 1869, he was appointed postmaster-general of the U. S. He resigned in Mar., 1873, and was then reappointed.

**Cres'wick** (THOMAS), an English landscape-painter, born at Sheffield in 1811. He became an associate of the Royal Academy in 1842. He painted British scenery with success. Among his works are "The Weald of Kent," a "Shady Glen," and "Wind on Shore." Died Dec. 28, 1869.

**Cresylic Alcohol**, or **Cresylic Acid**. See CRESOL.

**Cre'ta** [the Latin for "chalk," originally signifying "Cretan earth"], a pharmaceutical name for chalk (native carbonate of lime) and for the precipitated carbonate of lime. The former is more generally used. The chalk is powdered, washed, and dried, and is then known as *creta preparata* ("prepared chalk"), an excellent antacid remedy. *Cre'ta precipitata* (the chemically-prepared chalk) is more finely divided. (See CHALK.)

**Creta'ceous** [from the Lat. *creta*, "chalk"] **Sys'tem**, in geology, a name applied to the last-formed or uppermost rocks of the secondary or mesozoic period. It takes its name from the chalk, which in Europe is one of the characteristic rocks of the lower strata of this system. Next below the cretaceous lie the Jurassic rocks, and next above come those of the eocene period, which are the oldest of tertiary rocks. Cretaceous beds abound in the U. S.; and on the great plains and on both sides of the Rocky Mountains they are immensely developed, and contain great beds of valuable lignitic coal, which, however, is by some referred to the tertiary, or to a transition group between the cretaceous and the eocene.

**Crete**, or **Can'dia** [Gr. *Κρήνη*; Turk. *Kiriti*], a large and famous island of the Mediterranean, is between lat. 34° 57' and 35° 41' N., and lon. 23° 29' and 26° 20' E. It is 150 miles long, and from 6 to 35 miles wide. The surface is mountainous. Mount Ida rises near the middle of the island to the height of 7674 feet. Numerous caverns occur here, and an extensive one near Mount Ida is fabled to have been that which was anciently the retreat of the Minotaur. Among the minerals are limestone and slate. The chief productions of Crete are cotton, tobacco, olive oil, grapes, oranges, lemons, wine, silk, and wool. The population in ancient times is believed to have amounted

to 1,200,000, and at the time when it was acquired by the Venetians, to 500,000; it is now estimated at 210,000, of whom about 50,000 are Mohammedans, nearly all the others being Christians belonging to the Greek Church, which has eight bishops in the island. Most of the Mohammedans, however, are Greek with respect to descent, and Greek is the only language spoken in the island.

**History.**—Crete is by some historians considered the cradle of the civilization brought to Europe by the Phœnicians and Egyptians. According to tradition, Minos, a celebrated legislator, reigned over this island before the beginning of the historical period. In the time of Homer, Crete had a dense population of the Hellenic race, and contained a great number of flourishing cities. Crete was visited by the apostle Paul, who planted a church in it. The Venetians became masters of this island in 1204. The Turks conquered it from the Venetians in 1669. In 1866 the Christian inhabitants revolted against the Turks, and demanded annexation to the kingdom of Greece. This war excited much sympathy among Christian nations, but the Cretans were subdued in 1869. They obtained, however, a kind of constitution, and the island is now said to be well governed.

**Crete**, a city and R. R. junction, Saline co., Neb. (see map of Nebraska, ref. 7-J, for location of county), 20 miles from Lincoln. It has several manufactories, and is the seat of Doane College. Pop. in 1880, 1870; in 1885, 2258.

**Crétin** [Fr. *crétin*], a person affected with CRETINISM (which see).

**Crétineau-Joly** (JACQUES), a French author, born Sept. 23, 1803, at Fontenay, studied theology in Paris, and wrote a number of works in defence of the interests of royalty and the Catholic Church. He is best known by his "History of the Jesuits" (6 vols., 1844-46), an elaborate work in defence of that order. Among his other works are "Histoire de la Vendée Militaire" (4 vols., 5th ed. 1864), "Histoire de Louis Philippe" (2 vols., 1861-63), "Le Pape Clément XIV." (1853). D. at Paris Jan. 3, 1875.

**Cretinism** [Fr. *crétinisme*; etymology uncertain], a name applied to epidemic idiocy or defective mentality, usually associated with physical deformity and moral debasement. It is frequently hereditary, and is almost always found in connection with goitre. It prevails especially in deep alpine valleys, not only in Switzerland and Italy, but in the Pyrenees and Himalayas. It is also found in China, and in Bengal is frequent on calcareous plains. In Europe it is seldom found at a higher elevation than 3000 feet. Cretins are often very repulsive, dirty, and shameless, their appetite voracious, the mouth large and open, the eyes small and usually crossed, the nose flat and broad, the skull wide at the top, with a narrow base, and the forehead retreating. The complexion is cadaverous, the limbs rachitic, the whole body dwarfish except the hands and feet, which are large. Cretinism is a physical degeneration, caused by defective nutrition, bad ventilation, lack of sunlight, and especially by calcareous matter taken into the system in drinking-water. Like goitre, it is said to prevail especially where magnesian limestone abounds. Cretinism is often incomplete. The institution founded by Guggenbühl on the Abendberg in Switzerland has been the model for many others for the improvement of cretins and other idiots. (See IDIOCY, by HERVEY B. WILBUR, M. D.)

**Crétius** (KONSTANTIN), a German artist, born Jan. 6, 1814, studied with König. He has treated South European peasant-life and later history, especially the Cromwellian period. A seriousness of composition in his works and excellent coloring are to be remarked.

**Creuse**, a department near the centre of France, has an area of 2151 square miles. The surface is mostly mountainous; the soil in some parts is thin and poor. The principal mineral productions are coal and salt. The rearing of cattle is one of the chief branches of industry. This is one of the poorest departments of France. Capital, Guéret. Pop. in 1881, 273,782.

**Creuzer** (GEORGE FRIEDRICH), a learned German philologist and antiquary, born at Marburg Mar. 10, 1771. He became professor of philology and ancient history at Heidelberg in 1804, and retained that position for forty-four years. His principal work is his "Symbolism and Mythology of Ancient Peoples, especially the Greeks" (4 vols. 8vo, 1810-12). He ascribed to the pagan myths a mystical significance and a supernatural origin. The old poet Voss, in "Antisymbolik," contested the theory, and a lively controversy ensued. He edited the Oxford Plotinus (3 vols., 1835). Died Feb. 16, 1858. (See CREUZER'S autobiography, "Aus dem Leben eines alten Professors," 1847.)

**Creuzot, Le**, a town of France, department of Saône-

et-Loire, 12 miles S. S. E. of Autun. It is situated in the midst of rich mines of coal and iron, and has extensive blast-furnaces, iron-foundries, machine-shops, and glass-works. Cannon, anchors, steam-engines, etc. are made here. This town has increased rapidly in recent times. Pop. in 1881, 28,125.

**Crevasse** [a French word signifying a "crevice" or "crack," from *crever*, to "burst," to "break," to "split"], a breach in the dike or embankment of a river, as in the levees of the Mississippi. Crevassees are sometimes caused by the burrowing of crawfishes and other animals, and are frequently very destructive. The name is also given to the fissures in glaciers. (See LEVEES.)

**Crew**, in nautical language, is the company of persons employed in a ship, but the name is mostly limited to seamen and non-commissioned officers. There are upwards of eighty different grades or offices among the crew of the largest war-steamers. Besides the regular crew there are minor groups of workmen, such as the cooper's, carpenter's, sailmaker's crew, etc. In England the master of a merchant-ship, before starting on a voyage, is obliged to send a list of his crew to the customs comptroller at the port of departure, and a similar list within forty-eight hours after his return. This, however, is required of the masters of coasting vessels only twice a year. The number of hands in large sea-going steamers is relatively great, owing to the duties relating to the machinery, a steamer of a thousand tons sometimes requiring sixty or seventy hands. American ships carry smaller crews for their tonnage than those of other nations. This is regarded as a cause of many shipwrecks.

**Crewe**, a town of England, in Cheshire, 34 miles S. E. of Liverpool. It is a central station of five important railways, and has shops for the manufacture and repair of railway-carriages. Pop. in 1881, 24,372.

**Cribbage** [from *crib*, as used in the game], a popular game at cards, usually played by two persons. The game is sixty-one points, which are scored with pegs on a board called a cribbage-board having sixty-one holes on each side. In the U. S. the game, when two or four play, is decided by the winning of two out of three *legs*. Where three play, the first out in a double circuit of the board is the winner. When cribbage is played by three persons a three-cornered board is used. In this case each player receives five cards, and an extra card is dealt, which is added to the crib. When four persons play each has a partner, and each receives five cards, of which he discards one to form the crib. When only two persons play, six cards are dealt to each player, and each discards two, to form what is called the *crib*, which belongs to the dealer. The pack is then cut, and the dealer turns up a card, called the *turn-up*, which is reckoned in scoring as belonging to all the hands and the crib. The cards held in the hands are then played alternately, counting the pips (for every court card ten) up to thirty-one, for which two is scored to the person playing the card that makes it, and scoring in the same way for every combination made according to any of the following rules: Any combination of cards the united pips of which make up fifteen scores two points. A sequence in rank (without regard to suit) of three or more cards scores one for each card. Two similar cards of different suits (as two fives or two knaves) form a *pair*, and score two; three form a *pair-royal*, and four a *double pair-royal*, scoring respectively six and twelve. When the cards are all played each hand is counted by itself, according to the same rules. For example, a hand containing two sevens, an eight, and a nine, with an eight turned up, would score twenty-four: four fiftens (produced by the different combinations of eight and seven) = 8; four sequences of three each = 12; two pairs = 4. If the cards in either hand, or the cards in the crib and turn-up, are all of the same suit, it is called a *flush*, and one is scored for each card. If a knave of the same suit as the turn-up be in either hand or in the crib, the holder scores one; when the turn-up is a knave the dealer scores two. During the play, when it is found impossible to count to thirty-one without passing that limit, it is called a *go*, and the last player scores one.

**Crichton** (JAMES), called the ADMIRABLE CRICHTON, born in Perthshire in 1551 or 1560, was a son of Robert Crichton, lord advocate of Scotland. Educated at St. Andrew's, before he was twenty he had run through the entire circle of the sciences. He could speak in ten languages, and was adroit in all manly accomplishments. He journeyed through Europe about 1580, challenging all scholars to a learned disputation in any of twelve tongues. He vanquished all the doctors of all the universities; moreover, he disarmed the most famous swordsmen of the time in fencing, and by his grace and manly beauty his amorous triumphs were not less distinguished. He found his death in 1583, at the hands of his pupil Vincentio, son of Gonzago, the



duke of Mantua, a dissolute youth whom he had roughly jostled in a carnival encounter. Unmasking on discovering his young opponent, he presented his sword and bared his breast, and the brutal stripling stabbed him. "He was," says Scaliger, "a man of very wonderful genius, more worthy of admiration than esteem." The stories of his accomplishments are no doubt exaggerated. (See P. F. TYTLER, "Admirable Crichton," 1823.) (See APPENDIX.)

**Crick'et** [probably so called from the sound they produce], the popular name of certain orthopterous insects, nearly allied to locusts and grasshoppers, the type of the family Achetidae. The wings, being horizontally folded, form a slender point beyond the wing-covers. In virtue of



Field Cricket.

a peculiar formation of the wing-covers, and by their friction, the males produce that stridulous sound by which these insects are so well known. Of the typical genus *Acheta* the U. S. have several species, including the common black cricket (*Acheta abbreviata*). The common American mole-cricket (*Gryllotalpa brevipennis*) has wings shorter than the mole-cricket of Europe. The mole-cricket constructs chambers for their eggs beneath the surface of the earth, and the passages leading to these cells are long and tortuous, like those of the mole. The climbing crickets (*Ecanthus*) are represented in the U. S. by several species. They are often found upon weeds and shrubs.

**Cricket** [etymologically related to the word *crook*, it having been formerly played with a crooked stick for a bat], a sport well known as one of the national games of England, is of unknown though ancient date. It has become popular in England within the present century. It is played upon a tract of level, grassy ground, and requires players sufficient to form two sides of eleven, or twenty-two each. The variety of the game known as "double wicket" is that which is generally played, requiring two sets of wickets and balls, two bats and a ball. "Single wicket" may be played by a less number of persons. When a match is to be played, they first "pitch" the wickets, which are wooden frames of three upright sticks or "stumps" twenty-seven inches high. Two horizontal pieces of wood called "bails" are placed on the top of each wicket. The wickets are twenty-two yards apart. The players first toss for first innings, and the director of one side places a batter at each wicket; a wicket-keeper, a bowler, a "long-stop," and fielders are placed in position by the director of the other side. The object of the bowler is so to direct his ball towards the opposite wickets as to knock off the bails or strike down the stumps or upright rods, while the batter's object is to protect his wicket by stopping the ball or driving it out of the field. At a given signal the bowler delivers the first ball. If the batsman misses the ball and it passes the wicket, the wicket-keeper stops it and returns it to the bowler, who delivers another. When the batsman strikes the ball away, he runs to the opposite wicket, his companion crosses to his, and so on till the ball is returned by a fielder to the bowler or wicket-keeper. The batter may possibly have time to make two or three "runs" before the ball is returned. The scorers credit him with these runs. If the wicket-keeper or bowler touches the wicket with the ball before the batsman touches it with his bat or has reached his ground, the striker is out and another takes his place. If one of the opposite party catch a ball before it reaches the ground, or if the striker knocks down his own wicket, or if he prevent a ball from being caught, or strikes

it twice, or if a ball which would have hit his wicket is stopped by any part of his person, the striker is out. The duty of the wicket-keeper is to stop with his hands the balls which the batsman misses. The long-stop stands behind him, and stops balls that escape the wicket-keeper. The fielders are posted in different parts of the ground. They must possess quickness of eye and foot, and much depends upon their judgment of distance. Fielders throw the ball to the wicket-keeper, who returns it to the bowler. All change places at the end of every four bowls; every four balls are thus delivered from alternate wickets. Four balls are called an "over," and credited to the side which is in. The laws of the Marylebone Club of England are generally taken as the standard rules for this game. A company of English gentlemen arrived in the U. S. in 1885, met with great success in this game, and were first defeated here by the New York club in Sept. of that year.

**Crick'lade**, a town of England, in Wiltshire, on the river Isis, 7 miles S. E. of Cirencester. Pop. of civil parish, 1600.

**Crillon, de** (LOUIS DES BALBES DE BERTON), a famous French warrior, born in Provence in 1541. He served at the siege of Calais in 1558, and fought against the Huguenots in the civil wars. He distinguished himself at Jarnac and Moncontour, and at the naval battle of Lepanto (1571). During the reign of Henry III. he fought for that king against the Catholic League. In 1589 he entered the service of Henry IV., who styled him "the bravest of the brave." He contributed to the victory at Ivry (1590). Died 1615. (See SERVIEZ, "Histoire du brave Crillon," 1844; ABBÉ DE CRILLON, "Vie de L. des Balbes de Berton de Crillon," 3 vols., 1826.)—A descendant of "the brave" Crillon, Louis (1718-96), was a distinguished general of the Thirty Years' war, and in the service of Spain became duke of Mahon, and commanded at the futile investment of Gibraltar in 1782.—His grandson, Duc de Mahon (1775-1832), a Spanish general, was viceregent of Navarre under Joseph Bonaparte.

**Crime**, any act done in violation of those duties which an individual owes to the community, and for a breach of which the law has provided that the offender shall make satisfaction to the public. The ascertainment of these duties, which society imposes upon its members for the general welfare, is derived either from the common concurrence of the moral sentiments of any community or from the enactment of specific laws defining and enforcing particular obligations. Offences against the one variety of duties are said to be *mala in se* (wrongful in themselves), while those against the other are designated *mala prohibita* (wrongful because prohibited by statute). As a general practice, however, legislative prohibition is also extended to the case of crimes which are strictly *mala in se*, both to provide against uncertainty and fluctuation of opinion and to create additional sanctions; so that the precise original distinction between the two classes is no longer preserved. The laws of England recognize a larger variety of crimes not depending upon statute than is generally the case in the American States. But even here, as a rule, there are still some offences for which the common law alone makes provision.

By the common law crimes are divided into two great classes—felonies and misdemeanors. The distinction is based upon the relative enormity of various offences. Thus, the term "felony" includes those which are of greatest magnitude, while "misdemeanor" is reserved for the residue. But nevertheless an understanding of the exact extent of meaning of these two designations can only be attained by an indirect mode of definition—viz. by showing the diversity of punishment in the respective cases. A felony was originally any crime for which the penalty might be a forfeiture of lands or goods; a misdemeanor was one which entailed a milder punishment. In some of the American States the punishments distinguishing felonies have been changed, and are now either death or imprisonment in a State prison. In others, while the common-law distinction has been discarded, no different one has been adopted to supply its place, so that the two terms are used without precision or definiteness of meaning.

In order that a person may be guilty of a crime there must be a concurrence of capacity, intent, and wrongful act. The questions of capacity and intent are, in fact, closely related, since the law adjudges a person incapable of a criminal offence only because it presumes him incompetent to form a criminal purpose. The principal causes

of incapacity are infancy and the want of mental soundness. Infancy exempts from responsibility only when children are so young as to have no acquaintance with the nature of a criminal offence. At the common law a child under seven years of age is conclusively presumed to be unable to commit a crime; between seven and fourteen, his liability depends upon his actual discretion, which must be determined in each particular instance by special proof; after fourteen, he is considered presumptively capable. The want of proper mental capacity to form a criminal intention exists in the case of idiots, lunatics, and all persons who are either permanently of unsound mind, or so deranged at the time of the commission of any wrongful act as not to be aware of its guilty character. Exactly what degree of mental alienation should be sufficient to exempt from responsibility is a matter difficult to determine. The only criterion that can generally be adopted is the wrong-doer's power of appreciation of the wrongful nature of the particular act which he committed. (See *INSANITY*.) Voluntary drunkenness, however, though it may confuse and disorder the moral perceptions, and produce a kind of temporary insanity as pernicious in its effects as natural aberration, affords, in general, no defence for the criminal offender. Only where a specific intent is an essential element to constitute a crime can a person intoxicated be excused for that particular offence. As a rule, the intent to drink is sufficiently culpable to make the resulting act punishable. If, however, true insanity or delirium tremens should be produced as a consequence of intoxication, and the victim of it should commit an act which if he were sane would be a crime, he will be excused. The law in that case only regards the fact of insanity, without reference to the means by which it has been occasioned. Besides these natural incapacities, which exempt from penalty, there exist certain other causes for exoneration, such as duress and coverture. Whenever an offence is not perpetrated voluntarily, but under the compulsion of force or fear, there is wanting that willing pursuit of crime which is alone a just reason for condemnation. In like manner, the stress of overwhelming necessity relieves from guilt the involuntary wrong-doer. Coverture also, or the condition of a married woman, exempts from liability in some instances, because her action is considered to have been occasioned by constraint exerted by her husband. Thus, all crimes committed by a wife in the presence of her husband, except some of a graver class, as treason, murder, robbery, and the like, are presumed to be done by coercion. This presumption is not a conclusive one, but relieves a married woman from any consequence of her action until rebutted by direct evidence that the crime was exclusively of her own commission. This mode of justification by alleging constraint only applies to married women. Servants and children are not excused, though acting under the command of masters or parents.

The necessity for the existence of a criminal intent in order to make a person responsible for his wrongful acts forms an important distinction between criminal and civil liability, for in civil cases intent need not generally be proved. It has always been a well-recognized maxim in criminal jurisprudence that "the act does not make a man guilty unless his purpose also be guilty." But the intention need not necessarily contemplate the commission of the particular consequence which results. In most instances, of course, the act done will be the specific act intended. But yet, if there be a purpose to perpetrate one crime, and the means used for its accomplishment unexpectedly result in a different offence or affect a person against whom they were not directed, there is still a sufficient connection of intent and act to warrant a holding to accountability. Thus, if a man intends to shoot A and his act results in the death of B, whom he did not intend to injure, he is nevertheless responsible, as though he had actually intended to kill B. This principle, however, is not in all its rigor applicable when the crime committed is strictly in the class of *mala prohibita*, for the original purpose is not then deemed sufficiently reprehensible. A still different case arises where the preconceived intention had reference to the specific act performed, but did not include knowledge of its criminality, as where a person shoots game at a certain season when it is prohibited, without being aware that he is violating the law. In this class of instances it is likewise true that all the necessary elements of a crime are sufficiently present to justify punishment. The principle is, that ignorance of the law must afford no excuse. If such were not the rule, all laws would be ineffective, for would-be offenders would be likely to abstain from examining their provisions, and thereby secure impunity. The accompaniment of intent and act, therefore, which will constitute criminal transgression, may occur in three different forms: First, the intent may be wrongful, and contemplate the very offence committed; second, the intent may be wrongful, but contemplate an

other offence than the one committed; third, the intent may be really innocent, but contemplate an offence which happens to be prohibited by law, and so criminal.

There are some cases in which, though no actual criminal intent is conceived, yet the law presumes its existence. When acts are characterized by such a degree of negligence or carelessness as to evince a culpable indifference whether wrong is done or not, the wanton disregard of commonly recognized duties is essentially criminal of itself. But if an unlawful act is committed, through mere accident or misfortune, in the prosecution of some legitimate undertaking, the unwitting offender is excused. In like manner, though ignorance of law affords no justification, ignorance of fact, where no reasonable opportunity is granted for acquiring correct information, is a valid excuse. The law may always be known when the facts cannot be ascertained. "The guilt of the accused," it has been said as to these matters of fact, "must depend on the circumstances as they appear to him."

The necessity that an act must concur with the intent depends upon the principle that no mere mental conception or fancy, no matter how reprehensible morally, can ever be taken cognizance of at law without some overt expression of it in an objective result.

The parties engaged in the commission of crimes are distinguished either as principals or accessories. A principal in the first degree is one who is the actual, direct perpetrator of the offence. A principal in the second degree is one who is present, aiding and abetting the act to be done. An accessory is a participant in the wrong-doing in some more remote manner, either by procuration or assistance before the act, or after its occurrence by sharing in the profits acquired or shielding the immediate offenders from justice. In the one case he is called an accessory before the fact; in the other, an accessory after the fact. This distinction between principals and accessories is maintained only with reference to felonies, and even among these an exception is made of the crime of treason. There is no accessory before the fact in the common-law crime of manslaughter, for in it there is no preconceived intent to kill. In treason and in misdemeanors all the participants are deemed principals; in the one case, from the enormity, and in the other from the comparative triviality, of the offence. Where the distinction is preserved there is no reason for diversity of punishment as between principals and accessories before the fact. Accessories after the fact are not so severely punished, as their offence consists in an attack on the administration of justice. A wife is excused for thus shielding her husband. It was formerly the rule that the accessory could not be brought to trial before the principal, but this doctrine has been quite generally changed by statute.

The various crimes which may be committed are classified by legal writers in different ways. Blackstone in his Commentaries treats them as either offences against morals and religion or the law of nations, or as against the existence of the government or state, such as treason, or against public order under the respective titles of public justice, public peace, public trade, public health or economy, and finally, against individuals. These last are subdivided into those which are committed against the person, against habitations, and against property. This classification is incomplete, and no place can be found in it for certain well-established crimes, particularly those which have been created by statute. The most satisfactory treatment of the subject is that adopted by Mr. Bishop, who discusses the general principles of law governing crimes, and then considers specifically each crime known to the law under an alphabetical arrangement. It should be noticed that the criminal law of the Federal government is wholly created by statute, Congress having enacted so-called "Crime Acts." Under the State governments the common law of crimes exists unless changed by statute. It will be impossible in this brief notice to do more than to refer to some of the leading crimes, which are considered under their respective titles: ARSON, BRIBERY, BURGLARY, CHAMPERTY, CHEATING, EMBEZZLEMENT, FALSE PRETENCES, FORGERY, GAMING, LARCENY, LIBEL, MAYHEM, PERJURY, PIRACY, POLYGAMY, RAPE, RIOT, ROBBERY, TREASON, USURY. For punishment of crimes, see PUNISHMENT.

In this brief account only the common-law doctrine of crimes could be considered. Upon this may be further consulted BLACKSTONE'S "Commentaries," book iv.; BISHOP "On Criminal Law;" BISHOP "On Criminal Procedure;" WHARTON'S "American Criminal Law;" RUSSELL "On Crimes;" HALE, "Pleas of the Crown;" HAWKINS, "Pleas of the Crown;" EAST, "Pleas of the Crown;" and FOSTER'S "Crown Law." The statutes of the States severally should also be referred to. Upon the general subject of criminal offences may be consulted ORTOLAN'S "Droit Penal;" BECCARIA "On Crimes;" MITTERMAIER "On Capital Punishment," etc.

T. W. DWIGHT.

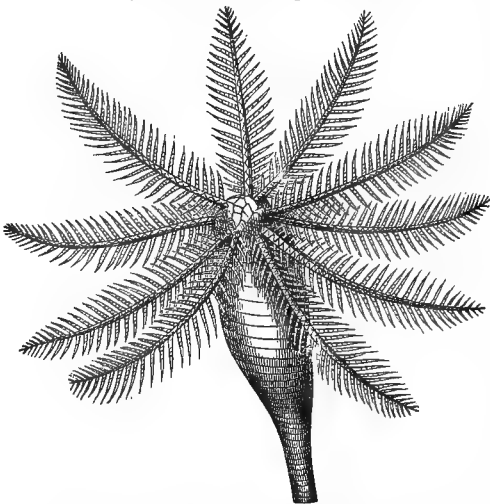
**Crime'a, The** [Russ. *Krim*; anc. *Taurica Chersonesus*], a peninsula of Southern Russia, forms part of the government of Taurida, and is nearly surrounded by the Black Sea and the Sea of Azof. It is connected with the main land by the isthmus of Perekop, 5 miles broad. Its length E. and W. is nearly 200 miles, and its area 7654 square miles. Pop. about 200,000. The north-western part of the Crimea is a treeless plain, the soil of which is impregnated with salt and fit only for pasturage. The south-eastern part is occupied by wooded mountains and fertile valleys, but they are ill cultivated. The highest peak of these mountains is 5180 feet above the level of the sea. Among the productions are grain, grapes, olives, silk, honey, and wine. Many horses and cattle are reared here, and salt is exported. The chief towns are Simferopol, Sevastopol, and Baktshi-Serai. The majority of the population are Tartars. It was conquered in the thirteenth century by the Tartars, who converted it into the khanat of Krim Tartary. It was annexed to Russia in 1783.

**Crimean War**, so called because it was chiefly waged in the Russian peninsula of the Crimea. It was carried on by France, Great Britain, Turkey, and Sardinia, against Russia. The motive of the allies was partly to check the growing power and encroachments of Russia, and to prop up the tottering throne of the Turkish sultan. One cause of the war was the claim of Russia to be the protector of the Greek Church in Turkey. After ineffectual negotiations between Russia and the Ottoman Porte, the Russian army entered the principalities in July, 1853, and war was declared by the sultan in October of that year. Early in Jan., 1854, the French and English fleets entered the Black Sea, and these allied powers announced to the czar Nicholas that their combined fleets must have command of that sea. A treaty of alliance between France, England, and the Porte having been signed Mar. 12, the former two powers declared war Mar. 27 and 28. The French and English fleets bombarded Odessa April 22. Lord Raglan took command of the British army, and Marshal Saint-Arnaud of the French. The allied armies landed at Varna May 29, and there suffered severely from cholera. The allies moved their armies to the Crimea early in September, and defeated the Russians at the river Alma on the 20th of that month. Prince Mentchikof commanded the Russian army. The allies commenced the bombardment of Sevastopol Oct. 17, fought a battle at Balaklava Oct. 25, and gained a victory at Inkerman Nov. 5. The British troops, being ill supplied with food and clothing, suffered great privations and hardships in the ensuing winter, and large numbers of them perished. The king of Sardinia joined the allies in Jan., 1855. In May, General Pelissier became commander-in-chief of the French army. On June 18 the allies attacked the important fortresses known as the Malakoff and the Redan, but were repulsed. The French took the Malakoff by storm Sept. 8, and the Russians evacuated Sevastopol about the 9th of that month. An armistice was concluded Feb. 26, 1856, and after the belligerents had met in conference at Paris, a treaty of peace was signed in that city Mar. 30, 1856.

**Criminal Law.** See LAW.

**Crim'mitschau**, a town of Saxony, on the Pleisse and on the railway from Altenburg to Zwickau, 10 miles N. W. of the latter. It has manufactures of woollens and a number of machine-works and breweries. Pop. 15,280.

**Crinoid'ea, or Crinoideæ** [from the Gr. *κρίνον*, a



*Apicrinites trigintidactylus* (a fossil enocrinite).

"lily," and *εἶδος*, "appearance"), an order or family of radiated animals of the class Echinodermata. As fossils they are sometimes called stone-lilies, having a radiated, lily-shaped disk supported on a jointed stem. When this stem is cylindrical, the species are termed encrinites; when it is pentagonal, they are called pentacrinites. The recent species of Crinoidea are few, but the extinct species are so numerous that their fossils constitute the greater part of extensive strata of limestone. The Burlington limestone contains a great variety of beautiful crinoids.

**Crin'oline** [from the Lat. *crinie*, "hair"], a name first given by the French to a fabric of horse-hair used in ladies' dress. It is now applied generally to structures of steel wire called "hoops," and used for the same purpose—that of distending the skirts. This was called *fardingale* in the time of Elizabeth. In 1744 hoops were so large that a woman occupied the space of six men. In 1796 they had been discarded in private life, but were worn at court until the time of George IV., who abolished them. Hoops have reappeared since 1850; they are made of steel wires covered with cotton thread, and form a skirt which varies in size and shape according to the changes of fashion.

**Cri'osphinx** [from the Gr. *κρίος*, a "ram"], a term applied to images, found in Egypt, of sphinxes having a ram's head instead of a human head. The latter are termed *andro-sphinxes*.

**Crisafulli** (HENRI), a noted French dramatist, was born in Naples 1827, but educated in Paris, and made his *début* in dramatic literature with "*Cesar Borgia*" (1855), "*Marie Stuart*" (1856), "*Giroflé-Girofla*" (1858), written together with Ed. Devicque.

**Cri'sis** [Gr. *κρίσις*, a "determination," from *κρίνω*, a "judge," to "decide"], a term which is used by physicians to denote the sudden determination of disease towards recovery or towards death. The doctrine of crises is connected with that of a *materies morbi*, or material of disease, in the blood. A doctrine associated with that of crises is the belief in certain days as showing characteristic symptoms, sometimes prognostic of recovery or death. This old belief seems to have had a certain foundation in the facts observable in clinical medicine. The doctrine of crises and of a *materies morbi* is still sometimes taught. A sudden discharge of any suppressed secretion is called a critical discharge when occurring about the turning-point of the disease.

**Cris'pi** (FRANCESCO), an Italian statesman, born Oct. 4, 1819, at Ribera, became a lawyer in Naples, was in 1848 one of the heads of the insurrection in Palermo, and for two years one of the leaders of the Sicilians in their resistance to Ferdinand I. In 1859 and 1860 he was again at the head of the new revolution of Sicily, and co-operated with Garibaldi in the expulsion of the Bourbons, which caused the annexation of Naples and Sicily to the kingdom of Italy. He led in 1861 the constitutional opposition, and entered the cabinet of Depretis in 1877, but retired in the same year, from private reasons.

**Cris'pin**, SAINT, a native of Rome, worked at the trade of a shoemaker in Gaul. In 287 A. D. he and his brother Crispinian suffered martyrdom. He is the patron saint of shoemakers. St. Crispin's Day is October 25.

**Crispin, Knights of Saint**, a secret society among shoemakers, founded in 1866 in Milwaukee, Wis., numbered in 1870 about 100,000 members in 300 lodges. They have an organization similar to that of the Free Masons and other secret orders. All the lodges of one State are under the jurisdiction of a State grand lodge, while the latter is subordinate to the U. S. grand lodge. The object of the order is to protect the interests of the workmen against employers, to regulate the wages, and to establish special funds in support of the members of the order and their families in case of sickness and death. There is also an order of the "Daughters of Saint Crispin," embracing women employed in the manufacture of shoes and boots.

**Crit'ias** [Κριτίας], an Athenian orator and one of the Thirty Tyrants, was a pupil of Socrates. He was banished from Athens about 406 B. C., but he returned with Lysander the Spartan in 404, and then became one of the ruling body called Thirty Tyrants. He caused the death of Theramenes. He was killed in a battle by the army of Thrasybulus in 404 B. C.

**Crit'ic** [Gr. *κριτικός* (from *κρίνω*, to "judge"); Lat. *criticus*; Fr. *critique*; Ger. *Kritiker*], literally and strictly, "[one] fit or competent to judge;" but the term is applied in common parlance to any one who takes upon himself to judge of works of literature, art, etc.—in short, of anything which requires the exercise of the judging, and particularly of the æsthetic, faculty. To *judge* and *condemn* appear to be considered by many as the principal part of the office of a critic. But he who is really "fit to judge"

will be no less able nor less willing to discover beauties, if they exist, than point out defects. It may indeed be the more frequent duty of a true critic to blame than to praise, because works of genuine merit are exceptions to the general rule; nevertheless, it is unquestionably a rarer, as it is a higher and nobler, office to appreciate and do justice to the various kinds and shades of excellence, than simply to condemn what merits condemnation.

Of all the critics of antiquity, the greatest beyond comparison was undoubtedly Aristotle. Aristarchus, who is often styled "the prince of critics," was more properly a grammarian and commentator than a critic, in the wider modern acceptance of this term. Among the Romans, Quintilian was especially distinguished as a critic, but the poet Horace was a critic of a higher and rarer order.

In modern times the greatest names in general criticism among the English are those of Dryden, Pope, Doctor Johnson, S. T. Coleridge, Hazlitt, Mackintosh, and Hallam; to which may be added those of Lords Jeffrey, Brougham, and Macaulay; and lastly that of Carlyle, who, if too often extravagant and wayward, is perhaps, when not biassed by pique or prejudice, not surpassed by any in breadth of comprehension or truth of insight. Among the French the most celebrated names are those of Boileau, Voltaire, Villemain, Sainte-Beuve, and Taine. The literature of Germany is rich in illustrious critics; among the greatest of these, in the department of general criticism, are Lessing, Goethe, and the two Schlegels. It is proper to observe that the Germans have studied the great principles which lie at the base of all sound criticism (i. e. the art or science of judging) more philosophically and more thoroughly than the critics of other nations. But it is perhaps in particular criticism that the Germans are most distinguished. Among the most remarkable examples of this kind we may cite Kant in the department of philosophy, Winckelmann in art, and Niebuhr in history, besides a host of other less distinguished names.

**Crit'icism** [for etymology, see **CRITIC**] signifies both the act and the art of criticising. In its latter signification it has been defined as "the art of judging with propriety concerning any object or combination of objects." In a more limited meaning its province is confined to literature, philology, and the fine arts, and to subjects of antiquarian, scientific, and historical investigation. The elements of criticism depend on the two principles of beauty and truth, one of which is the final end or object of study in every one of its pursuits—beauty in letters and the arts, truth in history and the sciences. Thus, historical criticism teaches us to distinguish the true from the false or the probable from the improbable in historical works; scientific criticism has the same object with respect to the different branches of science; while literary criticism, in a general sense, has for its principal employment the investigation of the merits and demerits of design, style, or diction, according to the general principles of composition and to the received standard of excellence in every language. In poetry and the arts, criticism develops the principles of that more refined and exquisite sense of beauty which forms the ideal model of perfection in each.

**Cri'to, or Cri'ton** [Κρίτων], a Greek philosopher, was a citizen of Athens, and a friend and disciple of Socrates, whom he attended in his last hours. He wrote seventeen dialogues on philosophy, which are not extant. Plato gave the name of "Crito" to one of his books.

**Critola'us** [Κριτόλαος], a Greek philosopher, born at Phaselis, in Lycia. He was the head of the Poripatetic school in Athens, and was eminent as an orator as well as a philosopher. He was sent to Rome on an important embassy with Carneades about 155 B. C.

**Crittenden** (ALONZO), born at Richmond, Berkshire co., Mass., April 7, 1801, died in Brooklyn, L. I., Jan. 23, 1883. He graduated in 1824 from Union College, and in 1845 took charge of the Brooklyn Female Academy, which, having burned down in 1851, was reorganized by the munificence of Mrs. Harriet L. Packer as the Packer Institute. Under the care of Mr. Crittenden as its president, the Packer Institute soon became one of the most important female educational institutions of the country, having about 700 pupils a year. He had a great talent for organization and administration, and at the same time he was an excellent teacher.

**Crittenden** (GEORGE B.), GENERAL, a son of the following, born at Russellville, Ky., Mar. 20, 1811; graduated at West Point 1832; began to practise law in Kentucky in 1835; served with distinction in the Mexican war; resigned his commission of lieutenant-colonel in the U. S. army in 1861, and joined the Southern Confederacy. He became a major-gen.; defeated at Mill Spring, Ky., Jan. 19, 1862; kept in arrest by the Confederates till Nov., 1863, and soon after resigned. D. Nov. 27, 1880.

**Crittenden** (JOHN JORDON), an American statesman, born in Woodford co., Ky., Sept. 10, 1786. He studied law, which he practised with distinction, and was elected to the Senate of the U. S. for a short term in 1817. Having passed about sixteen years in private life, he was re-elected to the national Senate by the Whigs in 1835 for a term of six years. He was a personal and political friend of Henry Clay. In Mar., 1841, he was appointed attorney-general of the U. S., but he resigned in September of that year. He was again elected a Senator of the U. S. in 1843, and was chosen governor of Kentucky in 1848. He was attorney-general in the cabinet of President Fillmore from July, 1850, to Mar., 1853, soon after which he joined the Native American party. In 1855 he again became a U. S. Senator. He opposed the secession movement in 1860-61, and, performing the part of a mediator, offered in the Senate a series of resolutions called the "Crittenden Compromise," which were not adopted. Died July 26, 1863.

**Crittenden** (THOMAS LEONIDAS), an American general, a son of the preceding, was born at Russellville, Ky., in 1819. He served with honor in the Mexican war. He commanded a division of the Union army at Shiloh, April, 1862, and obtained the rank of major-general of volunteers in the summer of that year. He commanded a corps at the battle of Stone River in 1863.

**Croa'tia**, a province of the Austro-Hungarian monarchy, is bounded on the N. W. by Carniola and Styria, on the W. by the Adriatic Sea, on the N. E. by Hungary, and on the S. by Bosnia, Servia, and Dalmatia. Various out-runners of the Alps, generally comprised under the common name of "the Julian Alps," traverse the country in its whole length, and divide it into two distinct sections, one belonging to the basin of the Danube, watered by the Save and the Drave, and the other forming part of the highlands of the Adriatic coast. About sixteen per cent. of the whole country is completely unproductive. In the eastern districts large tracts afford only pastures. But generally the mountains are covered with dense forests of oak, beech, pine, and chestnut trees, and the coast-region, 88 miles long, as well as the valleys of the Save and the Drave, is very fertile. The coast-regions are exposed to a violent wind, the so-called *bora*, and in the mountains the weather is subject to sudden changes. But in the valleys the climate is generally equable and mild. Large crops of wheat, oats, rye, potatoes, flax, and hemp are raised; tobacco is extensively cultivated, and an excellent wine is produced, though the national beverage, like that of Hungary, is made from the plum. Horses, swine (feeding in the forests), and bees are kept in great numbers. The manufacturing industry of the country is very small. A few silk-spinning factories, glass-works, and distilleries—that is about all. Grain, wine, chestnuts, honey, and horses are exported. Capital, Agram. Of the inhabitants, 94.55 per cent. are Croats and Servians, 2.76 per cent. Germans, 1.38 per cent. Magyars; the remainder are Israelites, Italians, and Albanians. Croats and Servians are two Slavic tribes which speak the same language, though the former use the Latin and the latter the Cyrillic alphabet. About 60 per cent. of the population are Roman Catholics, 33 per cent. belong to the Oriental Greek Church; the remainder are Protestants and Jews. This region was anciently inhabited by the Pannonians, who were conquered by the Romans in the reign of Augustus. In 640 A. D. the Croats or Horvats migrated from the Carpathian mountains to this country, and gave it the name of Croatia. For several centuries Croatia was an independent kingdom, until in 1097 it was conquered by the king of Hungary. This province, with Slavonia, now forms a division of the Hungarian kingdom (*Transleithania*). Their united area is 16,773 square miles. Pop. 1,732,261.

**Crocker** (ALVAN), born at Leominster, Mass., Oct. 14, 1801; received an academic education and became proprietor of a paper-mill; was president of the Fitchburg Railroad, and also one of the Hoosac Tunnel commissioners; member of Mass. legislature in 1836, 1842, and 1843, and of Mass. Senate for two terms; elected to Congress in 1872 and 1873. D. at Fitchburg, Mass., Dec. 26, 1874.

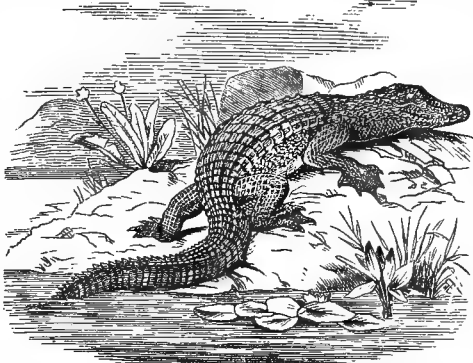
**Crock'ery** [from the Anglo-Saxon *croc*; Old English, *crock*, an "earthen vessel," a "pot or jar"], a collective term including all kinds of earthenware used for household purposes—cups, dishes, vases, bowls, platters, etc. The principal kinds are common or coarse earthenware, stoneware, quensware, and porcelain.

**Crock'et** [allied to the word *crook*], in Gothic architecture, an ornament resembling curved and bent foliage running up on the edge of a gable, pinnacle, or spire. The varieties of crockets are numerous, many kinds of leaf and flower being imitated for the purpose. Crockets only appear in pyramidal or curved lines, never in horizontal lines.

**Crockett**, a city, on R. R., capital of Houston co., Tex. (see map of Texas, ref. 3-J, for location of county). It has an active trade and is very thriving. Here are a male and female seminary. Pop. in 1870, 538; in 1880, 599.

**Crockett** (DAVID), a famous American hunter and humorist, born in Tennessee Aug. 17, 1786. He was elected a member of Congress in 1827, 1829, and 1831, and was a political friend of General Jackson. His habits were eccentric. He enlisted in the Texan army in revolt against Mexico, was taken prisoner at Fort Alamo, and massacred Mar. 6, 1836. His "Autobiography" was published in Philadelphia (1834); also "Tour to the North and Down East" (1835), "Sketches and Eccentricities" (1847), "Exploits in Texas," and "Life of Van Buren" (1835).

**Croc'odile** [Gr. *κροκόδειλος*, a "lizard" or "crocodile," Lat. *crocodilus*], a genus (*Crocodilus*) of saurian or rather



Nilotic Crocodile.

loricate reptiles, which gives its name to the family Crocodilidae, other genera of which are also called crocodiles. Like most reptiles, the crocodiles are carnivorous, and owing to their great size, strength, and voracious habits, they are the dread of the countries which they inhabit. They have bony plates embedded in the skin, which form a strong armor. They are called Emydosauri, or tortoise-lizards. Some authors term them Loricata, or mailed reptiles (from the Latin *lorica*, a "coat of mail"). They are capable of walking on land, but are much better fitted for the water. They are furnished with elevated nostrils at the extremity of the skull, so that they can almost wholly conceal themselves in water while breathing the air. The water does not enter the throat, which closes like the valves of the heart. The ears are also guarded by tightly-closing valves. The young crocodiles are hatched from eggs strangely small in proportion to the size of the adult animal, being less in size than the eggs of the goose.

These great reptiles are divided into two families—the true crocodiles and the alligators. They are easily distinguished by the shape of the head, the muzzle of the crocodiles being narrow behind the nostrils, while that of the alligator forms a straight line; and there are other anatomical distinctions. The gaviol, or Gangetic crocodile (*Gavialis Gangeticus*), is one of the largest of its order, sometimes being thirty feet long. It has an extraordinary length of muzzle, which gives it a grotesque aspect. It has one hundred and twenty teeth, of similar appearance and equal length. Its color is a dark olive-brown, with black spots. The crocodile of the Nile (*Crocodilus vulgaris*), now seldom seen below the first cataract, is a most formidable animal. Living exclusively on animal food, and preferring tainted meat, it is useful in purifying the waters. It also feeds on fish, and is a dangerous foe to cattle and other animals. It is nearly as large as the former species. The Indian crocodile (*Crocodilus porosus*) is an Asiatic species; it is sometimes called the double-crested crocodile, because the head has two long ridges extending from the front of the eye over the upper jaw. This is never found except in low lands with still water. It is very common in Ceylon. The marsh crocodile (*Crocodilus palustris*), frequently called mugger or gon, has a large range of locality, and sometimes grows to a great length; in the British Museum is a skull twenty-six inches long, denoting a total length of thirty-three feet. It is found in Asia, and is said to occur in Australia. Another species is the American crocodile (*Crocodilus acutus*), often confounded with the alligator. This is found in the hotter portions of America, and occurs in the U. S. It makes a hideous noise at night, so that one unaccustomed to it has no chance of sleep. The margined crocodile (*Crocodilus marginatus*) inhabits the rivers of Southern Africa. It is distinguished from the Egyptian crocodile by the great

concavity of the forehead and stronger dorsal plates. Several other living species are known. Many fossil species have been found, especially in the U. S. (See ALLIGATOR, CAYMAN, GAVIAL.)

**Croc'us** [Gr. *κρόκος*, "saffron"], a large genus of iridaceous plants (herbs) native of Asia and Europe. The *Crocus vernus* and other species are well known as affording many varieties of very early spring flowers which are common in cultivation. *Crocus sativus* and other species blossom in autumn. The autumn crocuses are rarely cultivated in the U. S. Their orange-red stigmas, when dried, constitute the drug known as "true" SAFFRON (which see).

**Crocus of Mars**, a name given to the finely-divided red oxide of iron, used in medicine and in the arts. The "crocus of antimony" of the old chemists was a mixture of the tersulphide and teroxide of antimony. The "crocuses" received their name from their saffron color.

**Croes** (JOHN), S. T. D. See APPENDIX.

**Crœ'sus** [Gr. *Κροῖσος*], a king of Lydia proverbial for his riches, was born about 590 B. C. He succeeded his father Alyattes in 560, and soon extended his dominions by the conquest of the Æolians, Ionians, and other peoples of Asia Minor. Sardis was the capital of his kingdom. He is said to have enriched himself by the golden sand of Pactolus. In 546 B. C. he was defeated in battle and taken prisoner by Cyrus of Persia, who devoted him, together with fourteen Lydian youths, to the flames as a thanksgiving sacrifice to the god whom the Persians worshipped under the aspect of the fire. Crœsus was saved, however, in a curious way, and afterward lived in honor at the court of Cyrus as his trusted friend. (See HERODOTUS's beautiful narrative.)

**Croft** (WILLIAM), an English composer of cathedral music, was born in Warwickshire in 1677. He was appointed composer to the chapel-royal and organist of Westminster Abbey in 1708. He composed "Divine Harmony" (1712) and "Musica Sacra" (1724). Died Aug. 14, 1727.

**Croghan** (GEORGE), an inspector-general of the U. S. army, born in Kentucky Nov. 15, 1791. He served as volunteer aide in the battle of Tippecanoe 1811; was appointed captain in the Nineteenth Infantry 1812, major 1813, lieutenant-colonel 1814, and inspector-general, with the rank of colonel, 1825. He distinguished himself at the defence of Fort Meigs and sortie May 15, 1813, and for his gallant conduct in the defence of Fort Stephenson, against a greatly superior force of British and Indians, he was presented by Congress with a gold medal with suitable emblems and devices. Died Jan. 8, 1849, at New Orleans.

**Cro'ker** (JOHN WILSON), a writer and politician, born at Galway, in Ireland, Dec. 20, 1780. He was elected a Tory member of Parliament in 1807. He co-operated with Scott and others in founding the "Quarterly Review," to which he contributed many roughly satirical reviews. In Parliament he obstinately opposed the Reform Bill. Among his works are "Songs of Trafalgar" and an edition of Boswell's "Life of Johnson" (1831). Died Aug. 10, 1857.

**Croker** (THOMAS CROFTON), a popular Irish writer, born at Cork Jan. 15, 1798. He obtained a clerkship in the admiralty at the age of twenty-one, and retained that position until 1850. He published "Researches in the South of Ireland," "Fairy Legends and Traditions," "Legends of the Lakes," etc. Died Aug. 8, 1854.

**Croly** (DAVID G.). See APPENDIX.

**Cro'ly** (GEORGE), LL.D., a poet, prose-writer, and pulpit-orator, born in Dublin, Ireland, in Aug., 1780. He took orders in the Anglican Church, and became in 1835 rector of St. Stephen's, Wallbrook, London. Among his works are "Salathiel, a Story of the Past, Present, and Future" (1827); "History of George IV." (1830); "Poetical Works" (2 vols., 1830); "Catiline, a Tragedy," which was praised in "Blackwood's Magazine;" a "Life of Edmund Burke" (1840); and "Marston," a novel. Died Nov. 24, 1860.

**Croly** (JENNIE CUNNINGHAM). See APPENDIX.

**Crom'arty**, a county of Scotland politically connected with Ross (which see), and comprising nine detached districts inside that county. Area, 344 square miles.

**Crom'arty**, a town and seaport of Scotland, in the united counties of Ross and Cromarty, is finely situated at the entrance of Cromarty Frith, 18 miles N. N. E. of Inverness. It has a good harbor, which will admit vessels of 400 tons; also manufactures of ropes, sailcloth, and sacking. Hugh Miller was born here. Pop. in 1881, 1352.

**Cromarty Frith**, a landlocked inlet of the North Sea, in the N. E. part of Scotland. It communicates with Moray Frith, and is adjacent to the counties of Ross and Cromarty. It is 18 miles long, varies in width from 3 to 5 miles, and forms a noble harbor, in which the largest fleet could ride safely. The entrance to this frith is a strait 1½ miles wide.



**Cro'mer**, a small seaport and watering-place of England, in Norfolk, and on the North Sea, 21 miles N. of Norwich. It stands on the top of a high cliff. It has a fine church in the Tudor style and a public library. All attempts to form a harbor here have been baffled by the heavy sea, which is continually encroaching on the land. Cromer Bay is dangerous to navigators, and is called by sailors "The Devil's Throat." It is, nevertheless, visited by a number of smaller crafts.

**Crom'lech** [a Welsh term signifying a "bent or concave stone"], or **Dolmen**, a rude structure of two or more unhewn stones fixed vertically in the ground, and supporting a large flat stone placed in a horizontal position. Cromlechs are found in England, Wales, Ireland, France, Germany, Denmark, Hindostan, and other countries. The theory of the older antiquaries was that the cromlech was a Druidical altar, but the skeletons and other remains which have been found in many of them tend to confirm the opinion that cromlechs were originally the sepulchral monuments of some now forgotten race. In many instances cromlechs have been discovered in the interior of earthen mounds or barrows. Among the remarkable cromlechs in England are Kit's Coty House in Kent and Chun Quoit in Cornwall. The weight of the flat stone in the latter is estimated at twenty tons.

**Crompton** (SAMUEL), inventor of the spinning-mule, was born near Bolton, in Lancashire, England, Dec. 3, 1753. Farming and weaving were the employments of his boyhood. For his invention, which was perfected in 1779, he received, in subscriptions from the manufacturers, only £67 6s. 6d. His means were so limited that he could not go to the expense of taking out a patent, and he was consequently glad to make private arrangements with the manufacturers for the use of his invention, many of whom, however, did not scruple to evade their obligation. Meanwhile, the mule spread so rapidly, and its influence was so palpable, that in 1812 he drew up a petition to Parliament for a public reward. Parliament voted him £5000. He was a shy, sensitive, studious man, fond of mathematics and of music. But his business talent was very limited; he once more failed, and a new petition to Parliament was refused. Died at Bolton June 26, 1827. (See FRENCH, "Life of Crompton," 1859.)

**Cromwell** (HENRY), a younger son of Oliver, was born at Huntingdon Jan., 1628. He served as colonel under his father in Ireland in 1649, became a member of Parliament in 1653, and lord deputy of Ireland in 1657. His administration was moderate and popular. After 1659 he lived as a private citizen. Died in 1674.

**Cromwell** (OLIVER), lord protector of England, was born at Huntingdon April 25, 1599. He was a son of Robert Cromwell and a grandson of Sir Henry Cromwell. In 1616 he entered Sidney Sussex College, Cambridge, which he quitted on the death of his father, in June, 1617. He married Elizabeth Bourchier in 1620, and settled on his estate at Huntingdon. In the short Parliament of 1628 he made but one speech, and during the eleven years prorogation he devoted his time to the cultivation of his farms. He represented Cambridge in the Short Parliament, which met in April, 1640, and in the Long Parliament, which met the same year. He was then a zealous member of the Country party, and took an active part in the business of the House, but was not a fluent speaker. Once, when he rose to address the house, Lord Digby inquired of Hampden (who was Cromwell's first cousin), "Who is that sloven?" Hampden replied that it was Oliver Cromwell, and added, "That sloven whom you see before you has no ornament in his speech; but if we should ever come to a breach with the king, that sloven, I say, will be the greatest man in England." Having raised two companies of volunteers, he entered the army of the Parliament in 1642 as a captain of cavalry, and distinguished himself by his strict discipline. He soon became a colonel, and formed a body of fanatical soldiers, the redoubted "Ironsides." On the 2d of July, 1644, he commanded the victorious left wing at Marston Moor. The Parliamentarians were divided into two parties, Presbyterian and Independent, of which latter Cromwell was the master-spirit. He was excepted from the "Self-Denying Ordinance," which excluded from military command members of Parliament. When the army was reorganized, and Fairfax appointed general-in-chief, Cromwell was promoted to the rank of lieutenant-general. In command of the right wing at Naseby, June, 1645, he greatly contributed to that decisive victory. In May, 1646, the king surrendered himself to the Scottish army, which transferred him to the custody of the English Parliament, in which the Presbyterians had a majority. In June, 1647, the king was seized by one of Cromwell's officers, and removed from the custody of Parliament into that of the army, which the Independents controlled.

Charles hoped to profit by the dissensions between the Presbyterians and the Independents, and intrigued with both. Cromwell defeated the duke of Hamilton, who commanded an army of Scottish royalists, at the battle of Preston Aug., 1648. In December of that year forty-one Presbyterian royalists were ejected from Parliament by Colonel Pride, acting under the orders of Cromwell. This was called "Pride's Purge." Cromwell was a member of the court which tried the king and condemned him to death in Jan., 1649. Cromwell was now the most powerful man in the country, and became a member of the new council of state. In 1649 he went to Ireland as lord lieutenant with an army, and subdued the rebellious Irish royalists with extreme severity. The Scotch proclaimed Charles II. as their king, and raised an army for the invasion of England and the promotion of the royal cause. Cromwell, who had returned to England in May, 1650, was then appointed commander-in-chief. He signally defeated the Scottish army at Dunbar on the 3d of Sept., 1650, and took about 10,000 prisoners. Charles II., having been reinforced, marched into England, and was pursued by Cromwell, who gained a decisive victory at Worcester Sept. 3, 1651. In this great crisis he displayed eminent vigor and sagacity. Clarendon observes that "his parts seemed to be raised, as if he had concealed his faculties until he had occasion to use them." In April, 1653, he dissolved the remnant of the Long Parliament, which was called the Rump, and he soon summoned a new Parliament. He assumed the title of Lord Protector of the Commonwealth in 1653. His domestic policy was favorable to religious liberty and conducive to the prosperity of the country. His foreign policy was dignified and enlightened, and secured for England a more commanding position than she had previously occupied. The title of king was offered to him by Parliament, but he declined it. He was stigmatized as an usurper by the royalists, and also by the republicans. He died on the 3d of Sept., 1658, and was succeeded by his son Richard.

It was long the fashion for historians to represent Cromwell as a fanatic, a hypocrite, and a man of cruel temper and mediocre talents. His character has been vindicated from these calumnies by Carlyle and other recent writers, and it is now generally admitted that as a statesman and commander he displayed abilities of the highest order. "Never," says Macaulay, "was any ruler so conspicuously born for sovereignty. The cup which has intoxicated almost all others sobered him. His spirit, restless from its buoyancy in a lower sphere, reposed in majestic placidity as soon as it had reached the level congenial to it. Rapidly as his fortunes grew, his mind expanded more rapidly still. Insignificant as a private citizen, he was a great general; he was a still greater prince." (See CARLYLE, "Letters and Speeches of Cromwell;" JOHN FORSTER, "Life of Cromwell" in his "Statesmen of the Commonwealth of England," 7 vols., 1840; R. SOUTHEY, "Life of O. Cromwell," 1844; VILLEMANN, "Histoire de Cromwell," 1819.)

**Cromwell** (RICHARD), a son of the preceding, was born at Huntingdon Oct. 4, 1626. He entered Lincoln's Inn as a student of law in 1647, and married Dorothy Major in 1649. He was a man of moderate capacity, virtuous and unambitious. After Oliver became Protector, Richard was elected to Parliament, and was a member of the privy council. He succeeded his father as Protector in Sept., 1658, but the army was disaffected, and he was not earnestly supported by the people. He resigned his power in April, 1659, and passed the rest of his life in obscurity and peace. Died July 12, 1712.

**Cromwell** (THOMAS), earl of Essex, an English courtier and minister of state, was born at Putney about 1490. He became an agent of Cardinal Wolsey, who employed him in important business. Soon after the fall of Wolsey he entered the civil service of Henry VIII., whose favor he gained. He promoted the Reformation by his strenuous efforts to destroy the supremacy of the pope, and co-operated with his friend Cranmer in establishing a new ecclesiastical polity. In 1534 he was appointed principal secretary of state, and about a year later vicar-general with power to suppress monasteries. He was for several years the most powerful subject in England, and was created earl of Essex in 1539. He was a man of superior talents, but is said to have been unscrupulous and rapacious. Froude, however, defends him against these imputations, and gives him a high character. He promoted the marriage of Henry VIII. with Anne of Cleves, because she favored the Lutheran doctrines. His agency in this affair was conducive to his own ruin, for the capricious king regarded her with disgust. Cromwell was tried for treason, and was beheaded July 28, 1540. (See MICHAEL DRAYTON, "Historie of the Life and Death of Lord Cromwell," 1609; FROUDE, "History of England," chaps. vi.-xvii.)

**Cro'nos** [Κρόνος], a god of the Greek mythology, was

said to be a son of Uranus, and the father of Jupiter, Neptune, Juno, and Ceres. He is commonly identified with the Roman Saturn.

**Cronstadt** [Ger. "crown city"], a fortified seaport-town of Russia, is on the flat and arid island of Kotlin, in the Gulf of Finland, about 20 miles W. of St. Petersburg, and opposite the mouth of the river Neva. It is an important commercial town, and the greatest naval station of Russia. It is stated that two-thirds of the foreign commerce of Russia passes through Cronstadt, which has three harbors. The outer harbor, which is intended for ships of war, is capable of containing thirty-five ships of the line. The inner harbor is used for merchant-vessels, and has a capacity for 1000 vessels. The place is very strongly fortified. Pop. in 1882, 48,276. Ice renders this port inaccessible for nearly five months in the year. (See *Cronstadt and St. Petersburg Canal*, in *SHIP-CANALS*.)

**Cronstadt**, in Transylvania. See *KRONSTADT*.

**Crook** (GEORGE), an American officer, born Sept. 8, 1828, near Dayton, O., graduated at West Point in 1852, and July 28, 1866, lieutenant-colonel Twenty-third Infantry. He served on frontier duty 1852-61, in Rogue River expedition 1856, and in command of Pitt River expedition 1857; engaged in several actions, in one of which was wounded with an arrow. In the civil war he became colonel Thirty-sixth Ohio Volunteers, and was promoted Oct. 21, 1864, to be major-general U. S. volunteers, serving in West Virginia operations 1861-62, engaged at Lewisburg (wounded and brevet major); in Northern Virginia campaign 1862; in Maryland campaign 1862, engaged at South Mountain and Antietam (brevet lieutenant-colonel); in operations in West Virginia 1862-63; in Tennessee campaign 1863, engaged at Tullahoma, Hoover's Gap, Chickamauga, and pursuit of Wheeler, with constant skirmishes (brevet colonel); in Northern Virginia 1864, making constant raids and in numerous actions (brevet brigadier-general U. S. A. and brevet major-general U. S. volunteers); in Sheridan's Shenandoah campaign 1864, engaged at Berryville, Fisher's Hill (brevet major-general U. S. A.), Strasburg, Opequan, and Cedar Creek; in command of cavalry of Army of the Potomac 1865, engaged at Dinwiddie Court-house, Jetersville, Sailor's Creek, Farmville, and Appomattox Court-house; and in command of the district of Wilmington, N. C., 1865-66. In command of districts in Idaho 1866-68; of Department of Columbia 1868-70; of Department of Arizona 1871-75, and again in 1882; of Department of the Platte 1875-82. He has greatly distinguished himself in subduing hostile Indians and quelling disturbances arising among them in the territories under his command, and in 1873 was promoted to be a brigadier-general U. S. army.

GEORGE W. CULLUM.

**Crooked Island**, one of the Bahama Islands, has an area of 160 square miles. Salt is exported from it.

**Crooked Lake**, in the western part of New York, extends from Penn Yan south-westward into Steuben co., and is about 18 miles long. The greatest width is one and a half miles. The surface is 718 feet above the level of the ocean. It is now generally called Keuka Lake, and is celebrated for the fine vineyards in the vicinity. It lies in a deep valley.

**Crooks** (GEORGE R.), D. D., LL.D., a Methodist divine and journalist, was born in Phila. Feb. 3, 1822, graduated in 1840 at Dickinson College, joined the Methodist ministry in 1841, travelled and preached extensively in Illinois, was appointed classical and mathematical tutor in Dickinson College in 1842, principal of the Collegiate Grammar School in 1843, and adjunct professor of ancient languages in 1846. In 1848 he resumed the ministry, occupying important pulpits in Philadelphia, Wilmington, New York, and Brooklyn. In conjunction with Professor McIntock, he prepared "A First Book in Latin," and "A First Book in Greek," which have been successful textbooks. He has also published Butler's "Analogy," with an elaborate analysis of the work, notes, index, and life of Butler. His most important production is a "Latin-English Lexicon" for schools and colleges, the preparation of which was shared by Professor Schem. His eminent journalistic career began in 1860, when he was elected first editor of the "Methodist," a weekly newspaper established in New York City by a company of Methodist laymen who were favorable to independent or unofficial journalism in their Church. Under his control the "Methodist" has been an effective power in the denomination, visibly elevating the character of its journalism, successfully advocating lay representation in its councils, and freely discussing all questions relating to its welfare.

**Crookston**, R. R. junction, capital of Polk co., Minn. (see map of Minnesota, ref. 3-A, for location of county). Pop. in 1880, 1227.

**Crop**, the first stomach of a fowl; also applied to grain and other plants or fruits cultivated on a farm. In geology, crop or outcrop signifies the edge of a stratum where it comes to the surface of the earth. Strata which are not horizontal, and which expose one edge at the surface, are said to *crop out*.

**Cropsey** (JASPER FRANK), an American landscape-painter, born at Westfield, Richmond co., N. Y., Feb. 18, 1823. He became a resident of England in 1856.

**Croquet**, kro'kà' [etymology uncertain], the French name of a game recently revived from obscurity, and introduced into this country. It is played with wooden balls and mallets, the object of the game being to propel a ball through a number of hoops or arches fastened into the ground to a fixed goal (turning-post), and thence back to the starting-point (winning-post). The laws of the game have been explained in various treatises. The game is a modification of the ancient sport called "pell-mell." It can be played by from two to eight persons.

**Crosby** (ALPHEUS), an American educator, born at Sandwich, N. H., Oct. 13, 1810, graduated at Dartmouth in 1827, was tutor and professor of ancient languages in his *alma mater* (1829-57), and principal of the normal school at Salem, Mass. (1857-65). He edited Xenophon's "Anabasis," and published a Greek grammar and other works, which have been extensively used. Died Apr. 17, 1874.

**Crosby** (REV. HOWARD), D. D., LL.D., was born in New York City Feb. 27, 1826, graduated at the New York University in 1844, became professor of Greek in the same in 1851, professor of Greek in Rutgers College, N. J., in 1859, pastor of First Presbyterian church in New Brunswick in 1861, resigned his pastorate in 1862, and his professorship in 1863, when he became pastor of the Fourth Avenue Presbyterian church in New York City. He was chancellor of the University of New York 1870-81, and one of the revisers of the New Testament. Of bold, ardent, and energetic temper, his scholarship has always been put to popular use. Besides other works, he has published "Lands of the Moslem" (1850), "Ædipus Tyrannus" (1851), "Notes on the New Testament" (1861), "Bible Manual" (1870), "Life of Jesus" (1871).

**Crosby** (JOHN SCHUYLER), born at Albany, N. Y., Sept. 19, 1839, entered the regular army as second lieutenant of artillery in 1861, served with his battery under McClellan in the Army of the Potomac, was breveted major and lieutenant-colonel after the battles of Pleasant Hill and Sabine Cross-Roads, and was in 1864 promoted to the staff of Maj.-Gen. Canby as assistant adjutant-general, and shortly afterward transferred to the staff of Maj.-Gen. Sheridan in the same capacity. He resigned his position in the army in 1872, and was in 1876 appointed U. S. consul at Florence, Italy; became gov. of Mon. Aug. 4, 1882, and first assistant postmaster-gen. Nov., 1884.

**Crosby** (PIERCE), U. S. N., born Jan. 16, 1824, in Pennsylvania, entered the navy as a midshipman in 1838, became a passed midshipman in 1844, a lieutenant in 1853, a commander in 1862, and a captain in 1868. He served on the E. coast of Mexico during the Mexican war, and in 1861 was employed with the army, and rendered most important service in Chesapeake Bay and in the sounds of North Carolina, particularly at the capture of Forts Hatteras and Clarke, where he was highly complimented for "his efficient services" by Major-General Butler, who commanded the land forces in the attack. He commanded the Pinola at the passage of Forts St. Philip and Jackson and capture of New Orleans, April 24, 1862, and at the passages up and down the Mississippi past the Vicksburg batteries, June 30 and July 15, 1862. He did good service during the years 1863-64 in command of the Florida and Keystone State, North Atlantic blockading squadron, and in 1865 commanded the steamer Metacomet during the operations which led to the fall of Mobile. His services are thus highly spoken of by Rear-Admiral Thatcher in his official despatch to the navy department of April 12, 1865: "I am also much indebted to Commander Crosby, who has been untiring in freeing the Blakely River of torpedoes, having succeeded in removing over 150—a service demanding coolness, judgment, and perseverance." Became rear-admiral 1882. FOXHALL A. PARKER.

**Cro'sier**, or **Crozier** [Late Lat. *cruciarium*, from *crux* (gen. *crucis*), a "cross;" Fr. *croisse*], a staff surmounted by a cross, which is carried before an archbishop on solemn occasions. It is about five feet long and is hollow. The term is also somewhat incorrectly applied to the pastoral staff of Roman Catholic bishops, which is curved at the top in imitation of a shepherd's crook.

**Cros'man** (ALEXANDER F.), U. S. N., born June 11, 1838, at St. Louis, Mo., graduated at the Naval Academy in 1855, became a master in 1858, a lieutenant in 1861, a lieutenant-

commander in 1862, and a commander in 1870. He was attached to the steam-frigate *Wabash* during 1863 and 1864, during which period he was constantly in action on shore in co-operation with the army. He was with the naval brigade at the severe engagements of Boyd's Neck and Tulifinny Cross-Roads Nov. 30 and Dec. 6, 1864, and honorably mentioned in the official report of Commander George H. Preble of Jan. 10, 1865. Drowned at Greytown, Nicaragua, April 12, 1872.

FOXHALL A. PARKER.

**Cross** [Gr. *σταυρός*; Lat. *crux* (gen. *crucis*); Fr. *croix*; Sp. *cruz*; Ger. *Kreuz*; It. *croce*], an instrument anciently used for inflicting the punishment of death, and after the crucifixion of Christ the principal Christian symbol. As an instrument of death the cross occurred in the ancient world under a double form—either as a plain vertical stake, to which the convict was nailed with the hands above the head, or as a vertical stake provided with a cross-bar at the top, to which the convict was fastened in the same way, only with the arms outstretched. With respect to the cross on which Christ suffered death, the New Testament gives no indication of its form; only it is evident from John xix. 29 that it had a considerable height. But it seems almost impossible that the tradition which formed on this point, and which unanimously refers to the Roman cross—the vertical stake with the cross-bar—should not be correct. As a symbol the cross occurs under many different forms: the *crux immissa* or *crux ordinaria* (†), the Latin cross or cross of the Romans, on which Christ suffered, the *crux decussata* (X), the Burgundian cross, also called the cross of St. Andrew, because the apostle Andrew is said to have suffered martyrdom on it, the *crux commissa* (T), the Greek cross, on which the apostle Philip is said to have suffered death, also called St. Anthony's cross or the Egyptian cross, because by that St. Anthony is said to have destroyed the idols of Egypt; finally, the double cross (‡) and the triple cross, of which the first is used by the pope, the second by the Raskolniks.

**Cross**, in heraldry, an ordinary formed by lines drawn palewise and fesswise, enclosing (if bounded by the escutcheon) one-fifth of the shield, or one-third if charged. It is one of the honorable ordinaries, and occurs with many varieties of forms.

**Cross** (CHARLES E.), an American officer, born in Massachusetts in 1837, graduated at West Point in the engineer corps in 1861, and at the time of his death was a captain of engineers, U. S. A. He served in constructing the defences of Washington, and on engineer duty in Manassas campaign of 1861; in Peninsula campaign of 1862 (brevet major July 1, 1862); and at the battle of Antietam, Sept. 17, 1862 (brevet lieutenant-colonel); at the battle of Fredericksburg Dec., 1862, at the battle of Chancellorsville May, 1863; and while in charge of bridge details at the third crossing of the Rappahannock this gallant and accomplished officer was shot through the brain, and instantly killed, June 5, 1863. Brevet-colonel June 5, 1863.

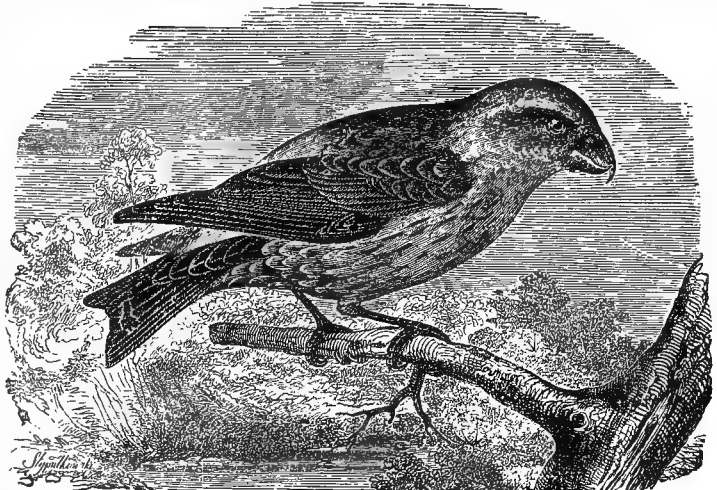
G. C. SIMMONS.

**Cross** (GEORGE D.), born at Westerly, R. I., Jan. 24, 1799, was for many years a prominent and public-spirited citizen of his native town and State, and was for a long time chief-justice of the common pleas court of Washington co. Died Oct. 1, 1872.

**Cross** (JOSEPH), D. D., a clergyman, first of the Methodist Episcopal Church, afterwards of the Protestant Episcopal Church, born in Somersetshire, England, in 1813. He removed to the U. S. about 1825, and published various works, among which are "Life and Sermons of Christmas Evans," "Headlands of Faith," and contributions to periodical literature.

**Cross** (TRUEMAN), an American officer, born in Maryland, appointed an ensign in the Forty-second Infantry, U. S. A., April 27, 1814, second lieutenant Oct., 1814, first lieutenant Jan. 18, captain and assistant deputy quartermaster-general June 18, assistant inspector-general (rank of major) Oct., 1820. He served in the infantry 1821–26, when he was transferred to quartermaster department; colonel and assistant quartermaster-general July, 1838. Killed April 21, 1846, by Mexican banditti near the camp opposite Matamoras, Tex., while serving as chief quartermaster Army of Occupation.

**Cross-Bill**, the name of several birds of the genus *Loxia*. The *Loxia curvirostra* inhabits the north of Europe, and feeds on pine-cones, seeds, and nuts, its strong bill enabling it to break the shells with ease. The mandibles of the bill cross each other, and are crescent-shaped.



Parrot Cross-Bill.

The bird is about seven inches long, and subject to great changes of color. The older birds are of a greenish-yellow, spotted with white, and have a gray tinge. The males of a year old are red. The cross-bills migrate southward in winter, and are sometimes seen in England. The American cross-bill (*Loxia Americana*) is distinct from the European, but much resembles it. It is a northern bird, but is sometimes found in Pennsylvania. It feeds on seeds and buds of trees. The male is red, but of a whitish color beneath. The parrot cross-bill (*Loxia pityopsittacus*) is seven inches and a half long, of a tile-red color, with dark streaks below. It is similar to the common cross-bill in its habits. It is sometimes seen in England and France. The European white-winged cross-bill (*Loxia bifasciata*) is six and a quarter inches long. It is of a brick-red orange or grayish-brown above, reddish-orange beneath; it is a rare species. The American white-winged cross-bill (*Loxia leucoptera*) is of a crimson color, with black wings and tail; the wings have two white bands. It is about six inches in length. This bird is rarely seen farther S. than New York.

**Cross-Bow**. See ARBALEST.

**Crosse** (ANDREW), an English gentleman who gained distinction by his experiments in electricity, was born in Somersetshire June 17, 1784, and was educated at Oxford. He commenced in 1807 experiments with a view to form artificial crystals by a voltaic battery, in which he was successful. In the course of many years spent in this pursuit he obtained not less than twenty-four mineral crystals similar in form to those produced by nature. These discoveries were not published until he explained them before the British Association for the Advancement of Science in 1836. Some excitement was produced in the same year by the apparent generation of insects of the genus *Acarus* during his experiments with a voltaic battery. (See SPONTANEOUS GENERATION.) Died July 6, 1855.

**Cros'sen**, a town of Prussia, in the province of Brandenburg, at the confluence of the Bober with the Oder, 32 miles S. E. of Frankfort. It has manufactures of woollen cloth and hosiery. Pop. 6977.

**Cross-Examination**, in the law of evidence, is the examination of a witness by a party against whom he is called to testify, and is thus distinguished from a direct examination, which is had by the party calling the witness. The range of a cross-examination is much wider than that of a direct examination, the party examining being allowed to impeach the credit of the witness, and to show the inconsistency of his statements, his bias, his want of memory, and other matters tending to reduce the value of his testimony. The course of the examination, depending on the circumstances of the case, must be largely left to the discretion of the presiding judge. For these reasons leading questions are regularly allowed, though they are in general excluded on the direct examination, as tending to make the answers of the witness mere echoes of the questions asked. It is, however, a rule that if a merely collateral question be asked and answered, the cross-examining counsel will not be allowed to call witnesses to disprove the

truth of the answer. This rule would not extend to a question as to the point whether the witness had not previously given a different version of the facts from that to which he testifies. If such a question is properly put to him as to time, place, and circumstances, and he answers in the negative, he can be contradicted by other witnesses. The same remark may be made as to a question put to him as to expressions used by him showing hostility towards the party against whom he is called. A witness on cross-examination cannot be required to answer whether he has committed a crime the commission of which would subject him to punishment, or has done any act which would subject him to a forfeiture of his estate; though this rule does not extend to an answer which would merely expose him to a civil liability. So he may, to a certain extent, be compelled to answer questions tending to discredit and degrade him. Thus, according to the better opinion, he may be asked whether he has not been confined in the State prison, as the object of the question is not to exclude him from testifying, but to affect the credit due to his statements. He could be shown to be *incompetent* to testify only by the production of the record of his conviction. The true theory of a cross-examination is to qualify the direct testimony, and accordingly the witness should not at this stage of the case be called on by the cross-examining counsel to give independent testimony sustaining his part of the issue, though this rule is not always adhered to in practice. (See EVIDENCE.) T. W. DWIGHT.

**Cross Keys**, a post-office of Rockingham co., Va. An indecisive action took place here on June 8, 1862, between the armies under command of Gens. Fremont and Jackson. Gen. Fremont's forces attacked "Stonewall's" army at 9 A. M. The battle continued with great violence till 4 P. M., and skirmishing and artillery fire till dark. During the night Jackson's army retreated.

**Cross**, **The Order of the**, originally a spiritual order of knighthood, which was founded in Palestine in the time of the Crusades, and was then called the "Bethlehemite Order." In 1211 the knights of this order adopted the monastic life, and settled in Austria, Bohemia, and other parts of Europe. They still have two establishments in Austria, and one in the Netherlands. They are called "Canons Regular of the Holy Cross." The "Regular Clerks of the Holy Cross" were founded in 1834, in France, by Abbé Moreau. They had in the U. S. in 1868 about 170 members. A congregation of "Daughters of the Holy Cross" was founded in the seventeenth century in France, and numbered in 1870 about 500 members. A second congregation of the same name was founded in 1835 in Belgium.

**Cross**, **The Southern**, the most conspicuous constellation of the southern hemisphere, is not visible in the northern hemisphere, except in regions near the equator. It consists of four bright stars arranged in the form of a cross. The two stars which mark the summit and foot of the cross have nearly the same right ascension, and serve as pointers to the South Pole.

**Crossville**, capital of Cumberland co., Tenn. (see map of Tennessee, ref. 6-H, for location of county). Pop. in 1880, 99.

**Crosswell** (EDWIN), an American politician and journalist, born at Catskill, N. Y., in May, 1797, was a member of the Albany Regency. He became about 1824 editor of the "Albany Argus," a Democratic journal of great influence, which he continued to direct until 1854. Died June 13, 1871.

**Crotalaria** [from the Gr. *κρόταλον*, a "rattle"], a genus of plants of the natural order Leguminosæ, sub-order Papilionacæ, deriving its name from the inflated pods in which the ripe seeds rattle. It comprises numerous species, partly annual herbaceous plants and partly shrubs. The most important of them is the *Crotalaria juncea*, the sunn hemp of India, an annual plant extensively cultivated for its fibre, which is considered equal to Russian hemp. The *Crotalaria sagittalis*, or "rattle-box," is a small annual growing in most of the U. S. Several other species grow in the Southern States and the West.

**Crotalus**. See RATTLESNAKE.

**Crotch** (WILLIAM), born at Norwich, Eng., July 5, 1775, d. at Taunton Dec. 29, 1847. He showed so precocious a talent for music that the reputed historian of music, Dr. Charles Burney, gave an account of the infant genius in the "Philosophical Transactions of the Royal Society" (1779). In 1777 he was appointed professor of music at the University of Oxford, and in 1822 principal of the Royal Academy of Music in London. As a composer he did not fulfil the great expectations he had awakened, though he published many vocal and instrumental compositions, but as a critic and historian his works are still of interest:

"Elements of Musical Composition and Thorough-Bass" (1812), "Styles of Music of All Ages" (1813).

**Crotch'et** [Fr. *crochet*, diminutive of *croche*, a "hook"], in music, one of the notes or characters of time, equal to half a minim.

**Cro'ton** [Gr. *κρότων*], a genus of trees, shrubs, and herbs of the order Euphorbiaceæ; the species are numerous and mostly tropical. Some of them possess the acrid properties of their order in excess. One of the most important is the *Croton Tiglium*, which yields croton oil. It is a native of the tropical parts of Asia. The seeds were formerly used as a purgative, but their use is disapproved on account of their uncertain and violent action; they are now chiefly valuable for the oil which they yield. Some species of croton are fragrant and aromatic, and are employed in medicine. One of these is the CASCARILLA (which see). Eight species are native to the Southern States.

**Croto'na**, or **Cro'ton**, an ancient Greek city of Italy, was in the peninsula of the Bruttii, and on the Mediterranean Sea. It was founded 710 B. C., and became a populous and important city. The Crotonians worshipped Hercules as their tutelary divinity, and, led by the famous athlete Milo, they in 510 B. C. conquered Sybaris and levelled it with the ground. The decline of Crotona began with the arrival of Pythagoras. The city was originally governed by a council of 1000—men who descended from its Achæan founders—but 300 adherents or disciples of Pythagoras once succeeded in overawing the council and seizing the supreme authority. They were soon expelled by the people and a democratic form of government established, but from that time the stability of the government was lost, and the effects of the loss soon became visible. During the war between Pyrrhus and the Romans the city suffered still more; one-third of the space within the walls was unoccupied. During the latter years of the Second Punic war Hannibal took up his headquarters at Crotona during three successive winters, which seems to have completed the ruin of the city. It is mentioned again in the wars of Narses and Belisarius. Its site is now occupied by Cortona. In the days of its prosperity its territory was rather extensive, stretching from sea to sea, and it was noted for its salubrity. To this circumstance—the healthiness of the situation—was ascribed the great personal beauty of the youths and maidens of the city, though the Crotoniat method of training and education was also celebrated.

**Croton Aqueduct**. See AQUEDUCT, by GEN. M. C. MEIGS, U. S. Army.

**Croton Oil** (*Oleum Tiglit*) is the expressed oil of the seeds of *Croton Tiglium*, a small tree which grows in Hindostan, Ceylon, and other parts of India. In taste it is hot and acrid, varies from a pale yellow to a reddish-brown color, has a faint, peculiar smell, and is miscible with alcohol, ether, and oil of turpentine. It is a powerful purgative, valuable because it can be employed with good effect in very minute portions. Great care must be used in its administration. It is applied externally as a counter-irritant in neuralgia, epilepsy, and pulmonary diseases. The pale oil comes directly from India; that of a darker color is expressed after importation.

**Croton River** rises in Dutchess co., N. Y., flows south and south-westward through Putnam and Westchester counties. It enters the Hudson River about 35 miles above New York City, which derives from this river its supply of water. Its length is estimated at 50 miles.

**Croup**. All the forms of croup have one thing in common—viz. an obstruction (catarrhal or inflammatory) in the interior of the larynx, particularly on the vocal chords. The milder form is called "false croup" or "pseudo-croup." The larynx is reddened, its mucous membrane swelled, and its secretion of mucus usually increased. Thereby the passage of air through the larynx is impeded, and spasmodic action of its muscular apparatus effected. It is frequently found in children who have before suffered from "colds," especially from catarrh of the throat and enlarged tonsils, and who have been too carefully kept from the contact with cold air and cold water. The attack of "pseudo-croup" is sudden or preceded by nasal or bronchial catarrh. It takes place after the child has been asleep for some hours. It wakes up about midnight with a barking cough, loud and laborious respiration, small and frequent pulse, and more or less fever. In bad cases the veins of the neck and face swell, the face is bloated and bluish, and suffocation appears imminent. This attack may last from half an hour to six hours. It terminates in perspiration, the cough becoming moister, the voice being hoarse, but may return in the next night. Some children are apt to have many attacks in the course of many years. There are no membranes in the throat, no glands swollen round the neck. A very severe

attack requires an emetic (powdered ipecac, sulphate of zinc, sulphate of copper, turpeth mineral); milder attacks require very little or no treatment. Let the child drink a little hot milk at short intervals. It must not sleep longer than an hour at a time, and should take a drink on waking up. Put a mustard-plaster round the neck, or apply cold water at short intervals. Where the throat is sore, ice-pills every five or ten minutes; where inhalation is very spasmodic, half a teaspoonful of paregoric (one dose) or one grain of Dover's powder. Treat the consecutive general catarrh for four or five days with uniform warm (not hot) temperature of the room, warm water inhalations (kettle on the stove), small doses (hourly) of ipecac, or an antimonial preparation or muriate of ammonia. Where there is a chronic catarrh of the throat (dryness, redness, swelled tonsils, hacking cough, snoring), a teaspoonful of glycerine as a preventive at bed-time.

While this "pseudo-croup," commonly called "croup," is a very mild disease—we have never seen a case terminating fatally—the other form, or "true croup," "membranous croup," is very dangerous. Under ordinary circumstances, and with a treatment exclusively medicinal, ninety out of a hundred die. It consists sometimes in simple inflammatory swelling ("laryngitis"), but usually in the obstruction of the larynx by a deposit of a whitish, grayish, or (through admixture with a little blood) darker "croupous" or "diphtheritic" membrane. The deposit may take place upon or into the normal tissue of the organ. It seldom originates in the larynx; sometimes ascends from the trachea; mostly descends from the throat, where it is discovered in one or more small spots or over a larger surface. In exceptional cases it extends over the interior surface of the nose and the mouth. Such deposits may be known to exist for days; they will then descend, result in hoarseness, increasing to complete absence of voice (aphonia), and in great difficulty of respiration, with final suffocation. When the deposits cover the whole interior of the larynx, both inspiration and expiration are impeded, and aphonia is complete. When they result in serous (watery) swelling of the larynx (especially the posterior insertion of the vocal chords) only, expiration is easier and the voice not entirely suppressed. The first stage is either that of throat diphtheria or of a simple catarrh only, which is attended with but little fever, and therefore little thought of. It may last a few days. In the second stage (twelve hours to fourteen days) the symptoms of obstruction show themselves; the voice is hoarse, and at last absent; respiration is slow, labored, and loud; the muscles of the neck and chest exerted to their utmost; the insertion of the diaphragm drawn in with every inspiration, deep grooves forming with every inspiration above and below the clavicle, the child tossing about, supporting itself on its knees, and throwing the head backward. The lips begin to exhibit a bluish hue. This symptom (cyanosis) increases in the third stage, where the influence of the insufficient oxygenization of the blood is more visible in general paleness, bluishness, in sleepiness, in the frequent and irregular pulse, in the cool surface, convulsive twitchings, and loss of consciousness. Unfortunately, the latter symptom is not constant, many children dying with undisturbed intellect. Death is the result of direct suffocation, or the result of a complication of the disease with bronchitis or pneumonia. Medicinal treatment is very unsatisfactory. We seldom succeed in dissolving and removing the membranes. Nitrate-of-silver applications to the larynx have justly been discarded. Inhalation of diluted lime-water through an atomizer or of lactic acid in glycerine and water (1:8-10) has proved successful in a few instances. Emotics are of use in such cases *only* where the membranes are known to be partially loosened (peculiar flapping sound in respiration), or when the presence of mucus, in addition to a membrane, proves dangerous. Ice-pills frequently, ice applications to the throat, moist air, 1-2 grains of chlorate of potassa in a teaspoonful of water every 1-1 hour; inhalations of carbolic acid, either through an atomizer or sprinkled through the room; muriate of ammonia evaporated on a stove or hot coal,—all such means may be tried, but not to such an extent as to interfere with a copious supply of pure air, the effect of which may still be improved by inhalation of oxygen gas. Where the disease runs its course with fever, quinia, seldom aconite or veratrum. Most cases will resist treatment. Twenty or twenty-five per cent. will be saved by tracheotomy, an operation consisting in the artificial opening of the windpipe below the obstructed larynx. This opening in the trachea is kept patent by means of a silver or hard-rubber tube inserted in it until the disease has disappeared from the larynx. The relief given by this operation is surprising, and although the mortality after its performance is still very great, death is almost always easier, resulting more from exhaustion than from suffocation.

ABRAHAM JACOBI.

**Crow** [Ang.-Sax. *craue*, so called from the sound produced by the bird], a name popularly applied to several birds of the genus *Corvus*, which includes also the ravens, the rooks, the daws, and some other birds. The carrion crow of Europe is called in England by various names—flesh crow, black crow, etc. Its feathers are very black and glossy, with reflections of green and purple. It is a cautious and intelligent bird, and feeds on flesh.

The common American crow (*Corvus Americanus*) is not so large as the preceding. Its voice is less harsh, and it is somewhat gregarious in its habits. Its color is a glossy blue-black. It inhabits the civilized parts of North America. It is hated and persecuted by farmers for its destruction of Indian corn and the eggs and young of other birds, but has great cunning and tenacity of life. These crows are found more especially in the Northern than the Southern States, as they are unable to contend with the vultures which abound in the latter. Many devices have been employed to exterminate them, without much success. They accomplish some good by devouring the grubs of injurious insects.

The fish crow of the U. S. (*Corvus ossifragus*) is sixteen inches long, black, and resembles the common crow, but is somewhat smaller, and may be distinguished by the naked chin. Other American species are the white-necked crow of Arizona (*Corvus cryptoleucus*) and the fish crow of Puget Sound (*Corvus caurinus*).

The hooded crow of Europe (*Corvus cornix*) resembles the



Hooded Crow of Europe.

others in habits, but is more mischievous. It is of a shiny black, but its neck, back, and under parts are of a smoky gray. It is extremely sagacious; it is found in all parts of Europe. Though not a gregarious bird, and generally living two and two together at considerable distance, it is very easily tamed and very true to its friends.

**Crown** [Lat. *corona*; Fr. *couronne*; Ger. *Krone*], originally a fillet of leaves, and used by the ancients in the observance of religious rites and festive occasions. The Greeks used the crown as a symbol of office and a token of victory. It was not only bestowed on victors in the games, but also on citizens who had rendered great services to the country. The Romans used it as the reward of courage. The *corona obdionalis* was most highly prized; this was bestowed by a besieged army or town on the general who came to their rescue. The civic crown, made of oak leaves and acorns, was given to any soldier who had saved the life of a citizen. This gave him a place next the senators on public occasions, and he, his father, and grandfather were released from all public burdens. The person whose life he had saved owed to him filial duty ever after. The *corona muralis* was bestowed on the first who entered a beleaguered city. It was a circlet of gold surmounted by turrets. The *corona triumphalis* was of three kinds, and the reward of a victorious general.



The modern crown, as an emblem of sovereignty, was derived from the Oriental diadem rather than from the ancient crown. Alexander the Great adopted it from the kings of Persia, and in the Roman world it was introduced by Constantine I. ("the Great"), whose reign began in 306. Crowns were first used by Spanish kings about 580, by the kings of Lombardy about 590, and in France in 768. The papal triple crown was at first a plain pointed cap. Pope Hormisdas added the first crown (523), Boniface VIII. the second (1294-1303), and John XXII. the third (1316-34). The crowns of kings and emperors are closed; those of princes and noblemen, open circlets surrounding the head.

**Crown and Half Crown** were originally English gold coins issued by Henry VIII. in 1527. The first commission for coining them of silver was signed by Edward VI. Oct. 1, 1551. The crown at present is a silver coin worth five shillings sterling—about \$1.25 U. S. in silver.

**Crown Glass**, the glass usually employed for windows. It is made of a mixture of 100 parts of sand, 35 of soda-ash or potash, and 35 of chalk. It is essentially a silicate of soda (or potash) and lime.

**Crown Imperial.** See FRITILLARY.

**Crown's shield** (A. S.), U. S. N., born Mar. 14, 1843, in the State of New York, graduated as ensign at the Naval Academy in 1863, became a lieutenant in 1866, a lieutenant-commander in 1868, and afterward commander. He served in the steam-sloop *Ticonderoga* in both the Fort Fisher fights, and was commended for efficiency by his commanding officer, Capt. Charles Steedman.

FOXHALL A. PARKER.

**Crown Point**, on R. R., capital of Lake co., Ind. (see map of Indiana, ref. 2-B, for location of county), 41 miles S. E. of Chicago. It has graded schools and a public library. Pop. in 1880, 1708.

**Crown Point**, a post-village, R. R. junction, and township of Essex co., N. Y. (see map of New York, ref. 2-J, for location of county). The township was first settled by the French, who in 1731 built Fort St. Frederick (the "Crown Point" of history) on a long cape projecting into Lake Champlain, which became the seat of thriving settlements, which were destroyed in 1759, and again in 1777, by the British troops. In 1775 it was surprised and taken by the provincial forces. The British fort at Crown Point, which cost with its outworks nearly \$10,000,000, is now in a ruinous condition; but it was never of any great importance as a military post. Crown Point has extensive beds of rich iron ore and mineral phosphate of lime. Iron, lumber, and wooden wares are manufactured on an extensive scale. It has a lighthouse. Pop. of township in 1870, 2449; in 1880, 4287.

**Crown Prince** [Ger. *Kron Prinz*], in Prussia, Sweden, and some other European countries, is the title of the heir-apparent to the throne.

**Crown, Treaty of the**, a treaty made at Vienna Nov. 16, 1700, in which the emperor Leopold recognized the elector Frederick III. as king of Prussia. Frederick engaged to furnish 10,000 men to support Austria in the Diet, and to vote as elector for the descendants of the emperor's son, Joseph, king of the Romans.

**Crows**, or **Absorokas**, a tribe of American Indians inhabiting the northern part of Wyoming Territory and the southern part of Montana. They are divided into "Mountain" and "River Crows," and belong to the great Dakota family.

**Croydon**, a market-town of England, in the county of Surrey, on the London and Brighton Railway, 10½ miles S. of London Bridge. It has a fine Gothic church. The archbishops of Canterbury had a palace here until 1750. About a mile from Croydon is Addiscombe House, which became a military academy, and is now called the Royal India Military College. Pop. in 1881, 78,953.

**Crozer Theological Seminary** (Baptist) is located at Upland, Pa., 14 miles from Philadelphia, on the Philadelphia Wilmington and Baltimore R. R. It was founded and endowed through the liberality of the members of the Crozer family, residents of Upland and Philadelphia, in 1868. It has an endowment of \$230,000, and a seminary building, library building, gymnasium, and three professors' houses, delightfully situated on grounds twenty acres in extent.

**Crozet** (CLAUDE), an eminent educator, born in France, educated at the Polytechnic School of Paris, became an officer of artillery under Napoleon I. He emigrated to this country in 1816, and was appointed professor of engineering at the U. S. Military Academy at West Point; resigned in 1823, and became a civil engineer. Died in 1863.

**Crucible** [Late Lat. *crucibulum*; see below], a vessel employed by chemists in heating and fusing metallic ores, glass, and other substances. Crucibles are generally made of materials capable of resisting high temperatures, such as fireclay, plumbago, porcelain, platinum, and silver. Crucibles are said to have been so called because they were formerly marked with a cross (Lat. *crux*, gen. *crucis*), which was thought by the alchemists to protect them from evil spirits.

**Crucifera** [Lat. from *crux* (gen. *crucis*), a "cross," and *fero*, to "bear," alluding to the cross-shaped flowers], a large and well-marked order of exogenous herbs, characterized by flowers with four petals arranged in the form of a cross, and by four long and two short stamens. The seed-vessels are *siliques*, *silicles*, *loments*, or nut-like fruits. The juice is usually acrid, but none of the order are poisonous. Among the cultivated *Crucifera* are the cabbage, turnip, rape, and mustard. The wallflower, stock-gill-flower, etc. are valued in ornamental horticulture. The number of genera is about 175, and the known species are over 1600.

**Crucifix**, a cross with an image of Christ upon it, either carved or painted. At first only the naked cross was used; then the cross with a lamb at its foot to represent Christ. The idea of an artistic representation of the crucifixion of Christ was, of course, utterly foreign to the primitive Church, and could not arise until a considerable period had passed by. When, at last, the imagination ventured to touch those holy subjects, the artistic instinct found full satisfaction in a merely symbolical use of them. The cross and the lamb were combined, the cross leaning against the shoulder of the lamb or, a little later, the lamb being fastened to the cross. No representation of Christ himself nailed to the cross occurs until the middle of the fifth century. The bronze relief in the church of St. Sabian in Rome, and the ivory relief in the British Museum, are probably the oldest examples of the kind. From about 692 to the twelfth century Christ was represented as alive and clothed, with his hands extended in prayer. In the twelfth century four nails were used, the feet side by side. From the thirteenth century only three nails were used, and Christ was represented as dead or dying, with only a girdle about his loins. The movement is one often met with in the history of art, from symbolical indications to naturalistic imitation.

**Crucifixion** [Lat. *crucifixio*, from *crucifigo*, *crucifigum*, to "crucify," from *crux*, *crucis*, a "cross," and *figo*, *fixum*, to "fix" or "fasten"], literally, "fastening on the cross," a form of capital punishment common among almost all ancient nations, except the Jews, who in their later history probably borrowed it from the Romans. The hanging on a tree spoken of in Deuteronomy xxi. 22 apparently has reference to crucifixion *after death*. Tradition ascribes its invention to Semiramis. It consisted in nailing or binding the criminal to a Cross (which see), where he was left until dead from hunger or exhaustion. The legs were frequently broken to hasten death; sometimes, however, a fire was lighted under the cross for the same purpose, or wild beasts were let loose upon those crucified. The body was usually left on the cross till destroyed by the action of the elements. Crucifixion was abolished by Constantine the Great, probably in the year 315.

This inhuman form of punishment was visited upon Christ by the Jews, in accordance with the unwilling sentence of Pontius Pilate. In addition to the scourging, which seems to have been a legal part of the punishment, he was forced to wear the crown of thorns, and subjected to other indignities by the brutality of the soldiers and populace. (See the accounts given in the four Gospels.)

**Cru'den** (ALEXANDER), author of the "Concordance," was born at Aberdeen, in Scotland, May 31, 1700. He was educated for the ministry of the Kirk, but never preached, having had his reason unsettled by disappointment in love. In 1722 he removed to London, and taught the classics, and shortly after to the Isle of Man. In 1732 he returned to London and opened a bookstore. In 1735 he became librarian to Queen Caroline, wife of George II. In 1737 he published his "Complete Concordance of the Old and New Testaments," which is still the best in our language. He was several times an inmate of lunatic asylums, and during all the latter part of his life was fitful and extravagant. He set up as a reformer, calling himself "Alexander the Corrector." He died suddenly at Islington, Nov. 1, 1770.

**Cruikshank** (GEORGE), an English caricaturist, son of an engraver originally from Scotland, was born in London Sept. 28, 1792. He illustrated William Hone's satirical works. His comic humor and fertile imagination were displayed in illustrations for "The Comic Almanac," "Peter Schlemihl," "Oliver Twist," and "My Sketch-

Book." With his brother ROBERT (1790-1856) he produced "Life in London." In 1848 appeared "The Bottle," eight plates depicting the drunkard's career. He subsequently devoted himself to oil painting. D. Feb. 1, 1878.

**Cruikshank** (WILLIAM), F. R. S. L., a Scottish anatomist, born in Edinburgh in 1746. He became a resident of London, and a partner of Dr. William Hunter. He published, besides other works, "Anatomy of the Absorbent Vessels" (1786). Died June 27, 1800.

**Crusade** [from the Sp. *crusada* (from *cruz*, a "cross"); Catalan, *crusada*; Fr. *croisade*; It. *crociata*; Ger. *Kreuzzug*], i. e. a war waged for the defence or advancement of the cross, but applied especially to the religious wars carried on by the Christians of the Middle Ages for the recovery of Palestine from the Mohammedans. From a very early period the Christians were in the habit of making pilgrimages to Jerusalem and other parts of Palestine rendered sacred by events connected with the Saviour's life and death. These pilgrimages continued with but little opposition till the year 1065, when Palestine, then governed by the Egyptian caliphs, was overrun and conquered by hordes of Seljuok Turks. The accounts (doubtless often exaggerated) of the indignities inflicted on the Christian residents and pilgrims by these barbarians produced a deep and powerful impression in all parts of Christendom. At length, Peter the Hermit, a monk and native of Amiens in France, having visited Palestine and witnessed the cruelty of the Turks, reported what he had seen to Urban II., by whom encouraged, he travelled through Italy and France, and by his zeal and eloquence excited an extraordinary religious enthusiasm among all classes. In 1095, at a council held at Clermont, a crusade was resolved on. On this occasion the pope himself addressed the multitude. Previous to the setting out of the true crusade, four armies, consisting of disorderly multitudes of the very dregs of Christendom, had departed for Palestine. The first consisted of 20,000 foot, commanded by Walter the Penniless. It marched through Hungary, but was almost entirely destroyed by the natives of Bulgaria, a few only escaping to Constantinople. It was followed by a second, consisting of 40,000 men, women, and children, under Peter the Hermit. The two united at Constantinople, crossed the Bosphorus, and encountered the Turks at Nice. They were utterly routed. Another unorganized band of 15,000 Germans was cut to pieces in Hungary, and its fate was shortly shared by an immense mob of 200,000 persons from England, France, Flanders, and Lorraine. It was only now that the true crusaders entered upon the scene. Six armies, embracing all the chivalry of Europe, and led respectively by Godfrey of Bouillon, Hugh the Great (count of Vermandois), Robert Curthose, Count Robert of Flanders, Prince Bohemond of Tarentum (under whom was Tancred), and Count Raymond of Toulouse, set forth for Constantinople. Having united their forces and spent some time at this place, they crossed into Asia Minor. Here their first step was the capture of Nice in June, 1097. They also defeated the sultan Soliman at Dorylaeum, and took the principality of Edessa. They then marched into Syria, and laid siege to Antioch. After a seven months' siege, during which the crusaders suffered terribly from famine and disease, the city surrendered. The inhabitants were massacred by their captors, who were besieged in their turn by an army of 200,000 Mussulmans. On the 28th of June, 1098, the Mohammedans were put to rout, and the way opened to Jerusalem. In the summer of 1099, 40,000 crusaders, the remnant of a vast host which had comprised not less than 600,000 warriors, laid siege to Jerusalem. The city was taken on the 15th of July, after a siege of somewhat more than five weeks. Eight days later Godfrey of Bouillon was elected king of Jerusalem.

The three Latin principalities of the East (Edessa, Antioch, and Jerusalem) maintained themselves against the attacks of the Mohammedans till the year 1144, when the emir of Mosul conquered Edessa and massacred its Christian inhabitants. His son, Noor-ed-Deen, marched upon Syria and Palestine. A second crusade was preached by Saint Bernard, abbot of Clairvaux, and in 1147 two armies, numbering together 1,200,000 men, set out for Jerusalem. They were commanded by Louis VII., king of France, and Conrad III., emperor of Germany. This expedition utterly failed through the treachery of the Greek emperor, Manuel Comnenus, and neither army ever saw the Holy Land.

In 1187, Salah-ed-Deen (or Saladin), sultan of Egypt, invaded Palestine, and in October of that year took Jerusalem. This event gave rise to a third crusade, under the leadership of Frederick Barbarossa, emperor of Germany, Philippe Auguste, king of France, and Richard Cœur-de-Lion, king of England. Barbarossa was drowned on the way. The crusaders gained some important victories, but they were not united among themselves, and the crusade was closed by a treaty in which Saladin agreed to impose

no taxes on Christian pilgrims to Jerusalem. In 1195, Henry VI. of Germany undertook a crusade (sometimes called the fourth), but the death of the emperor caused the project to be abandoned. A fourth crusade, instituted by Pope Innocent III. in 1203, turned from its course to take possession of the Byzantine empire, and never reached Palestine at all.

The Children's Crusade in 1212 (of which an excellent account has been written by the Rev. George Zabriskie Gray, New York, 1870) is one of the strangest episodes in history. An army of unarmed French children, 30,000 strong, headed by a boy named Stephen, set out for the Holy Land by way of Marseilles. A similar army of German children, 20,000 strong, led by a boy named Nicholas, crossed the Alps at Mont Cenis. A second army of German children, numbering nearly 20,000, the name of whose leader is not known, crossed the Alps by a more easterly route, touching the sea at Brindisi. Their idea was, that the Mediterranean would open a path for them to Palestine, and that the Holy Land would be recovered and the Moslems converted by miracles. Some of the children got discouraged and returned to their homes; many stopped by the way; but most of them either perished on the march, were lost at sea, or were sold into slavery.

In 1228, Frederick II. of Germany commanded a fifth crusade, by which he became master of Palestine and was crowned king of Jerusalem.

In 1239, the Turks having again seized upon Jerusalem, a sixth crusade was undertaken, under Thibaud, count of Champagne. A nominal surrender of the Holy Land was the result.

In 1244, Jerusalem was burned and pillaged by a new race of Turks. A seventh crusade, headed by Louis IX. (Saint Louis) of France, set out in 1249. It was badly defeated by the sultan of Egypt, who also made a prisoner of the king. Louis obtained his freedom by the payment of a large ransom.

The eighth and last crusade was also undertaken by Saint Louis in 1270. The king died at Carthage of the plague, and Prince Edward, afterwards Edward I. of England, assumed the command of the army. The expedition accomplished nothing of importance, and in July, 1272, Edward returned to England with the last of the crusaders. The chief result of the Crusades was a better acquaintance of the people of Western Europe with two civilizations more advanced than their own—the Greek and the Saracenic. Thus a powerful impulse was given both to the literature and the commerce of Europe. (See MICHAUD's "Histoire des Croisades;" HALLAM's "Middle Ages;" MILMAN's "Latin Christianity," and WILKEN's "Geschichte der Kreuzzüge.")

REVISED BY R. D. HITCHCOCK.

**Cruse** (CHRISTIAN FREDERIC). See APPENDIX.

**Cru'senstolpe** (MAGNUS JAKOB), a Swedish author, born Mar. 11, 1795, wrote historical novels and satirical political tracts. His "Positions and Relations" caused his imprisonment for 3 years. Died Jan. 18, 1865.

**Crushing Machinery**. See GRINDING and CRUSHING MACHINERY, by PROF. R. H. THURSTON, C. E.

**Crusta'cea** [neut. plu. of *crustaceus*, a Latin adjective signifying "shelly," or "having shells" like those of a lobster, from *crusta*, the "shell of a lobster"], a class of articulate animals considered by Linnaeus as insects, but now universally regarded as distinct, though having interesting resemblances to that class. They are usually divided into DECAPODS, TETRADECAPODS, ENTOMOSTRACANS (including CIRRIPEDS), and ROTIFERS (which see).

The decapods (crabs, lobsters, etc.) are at the head of this class, but many of the others are of very different forms and habits. In the most important members of this class the body is somewhat spindle-shaped, and composed of a number of articulated rings, allowing of considerable movement. These divisions are sometimes of almost equal size, having similar appendages. In some cases a few of the segments attain a higher development than the others, and the organs of motion are confined to them, while the appendages of the other segments approach a rudimentary condition; and in the higher forms the anterior segments coalesce into a single mass, called the *cephalothorax*, which bears the mouth and organs of motion. By means of a calcareous secretion the skin is hardened into a skeleton; this protects the soft parts of the body; a thin membrane joins the segments. The animal casts off its shell at certain periods, and a new calcareous secretion is made. The form of the articulated appendages (legs and feet) is various. The nervous system of the Crustacea is formed by a series of ganglia running along the surface of the body, united to each other and to a cephalic ganglion or brain by a pair of nervous filaments, from which nerves proceed to the different organs of the senses, and is situated above the œsophagus. The digestive organs show a high degree

of development. The respiration takes place through branchiæ of different forms. The species are mostly unisexual, and reproduction takes place by ova.

**Cruveilhier** (JEAN), a French anatomist, born at Limoges Feb. 9, 1791. He obtained in 1835 the chair of pathological anatomy created in Paris by Dupuytren. He published an important work on "The Pathological Anatomy of the Human Body" (2 vols., gr. fol., with 233 plates, 1829-40), and other works. Died Mar. 11, 1874.

**Cryolite** [from the Gr. κρύος, "ice," and λίθος, a "stone"], is so named because it melts in the flame of a candle. It is a double fluoride of aluminium and sodium, and is important as a source of the metal aluminium. It is a rather rare mineral, found in Greenland, from which large quantities are imported into Europe and the U. S. for the manufacture of soda. When fused it may be made into table-ware much resembling porcelain, and known as "hot-cast porcelain."

**Cryophorus** [from the Gr. κρύος, "ice," and φέρω, to "bear"], an instrument invented by Wollaston to freeze water by its own evaporation. It consists of a glass tube with a bulb at each end. One bulb contains water. A complete vacuum is produced in the tube and opposite bulb, and the empty bulb being placed in a freezing mixture, the vapor arising from the water is condensed, so that the water soon congeals in the other bulb, though the intervening tube be two or three feet long.

**Crypt** [from the Gr. κρυπτός, "hidden"], the under or hidden part of a building; a vault under a church, either entirely or partly under ground. Crypts generally do not extend beyond the limits of the choir or chancel, and some are of smaller dimensions. They were sometimes used as places of sepulture, and seem indeed to have been designed at first for the reception of the bodies of saints, martyrs, and the higher dignitaries of the Church. The later Romanesque and the more recent styles of church architecture generally have no crypt. One of the largest crypts in England is that under Canterbury Cathedral.

**Crypto-Calvinists**, a name applied in the last half of the sixteenth century to the followers of Melancthon (called also Philippists), who earnestly desired the union of the Lutherans and Calvinists, and were charged with leaning too strongly towards the Calvinistic doctrine of the Lord's Supper.

**Cryptogamous Plants**, or **Cryptogams** [from the Gr. κρυπτός, "hidden," and γάμος, "marriage"], a term applied to flowerless plants, the lower series of plants in the natural system, which have no true flowers, but have, instead of seeds, spores that consist of a single cell and contain no embryo. They have no obvious stamens or pistils. The name "cryptogamous" was first used by Linnaeus, and implied that in his opinion they had organs analogous in functions to stamens and pistils, but concealed from view; and the correctness of his surmise is now confirmed. He gave the name Cryptogamia to a distinct class in his artificial system. Many cryptogamous plants have no leaves, some have no root, and those which are lowest in organization consist only of a single cell. Many of them are parasitic. Cryptogamous plants are divided into two principal groups—namely, thalloids, in which the stem and leaf are not distinguishable; and acrogens, in which the stem and leaf are distinguishable. The former group comprises the Fungi, Lichens, Algæ (sea-weeds), and Characeæ, etc.; the latter, Filices (ferns), Musci (mosses), Equisetaceæ, Hepaticæ, club-mosses, etc. The Proto-phytes, etc. are all cryptogamous, though hardly belonging to either of the above divisions.

**Cryptography** [from the Gr. κρυπτός, "hidden," and γράφω, to "write"], the art of writing or telegraphing in cipher, or in such a way that the matter written cannot be read by any one not in possession of the necessary key. Many plans have been devised for this purpose, but almost any person who has taste for the solution of puzzles or enigmas can readily understand most writing of this kind; and it is probable that no kind of cipher could be invented which would be proof against systematic and ingenious decipherers. Military and naval signals resemble cryptographic writing in this respect. Among the learned authors who have discussed this comparatively unimportant subject may be mentioned Lord Bacon, who demands of good ciphers that "they be not laborious to read and write, that they be impossible to decipher, and, in some cases, that they be without suspicion," Dr. William Blair, Bishop Wilkins, the marquis of Worcester, and many others. Practically, ciphers have been in use from very old times. The Lacedæmonians employed a kind of cryptography in transferring the orders of the ephors to the military chiefs. Cæsar employed a very simple, but at that time very effective, method, selecting certain letters instead

of others in regular advance in the series. An example of an entirely new alphabet invented for the purpose is found in the celebrated letter of Charles I. to the earl of Glamorgan and the Irish Catholics.

**Crystal**. See CRYSTALLOGRAPHY, by PROF. THOMAS EGGLESTON, A. M., E. M.

**Crystal Falls**, a series of cascades of the Cascade Creek, in Montana. The creek flows into the Yellowstone River from the W. side, between its upper and its lower falls. One mile from its mouth occur the principal falls, consisting of three leaps, which together measure 129 feet, perpendicularly. They are remarkably beautiful.

**Crystalline Lens**. See EYE.

**Crystalline Rocks**, a term applied in geology to such rocks as granite, quartz, and marble, which show by their crystalline structure that they have been brought into their present state by the action of chemical forces. In the early history of geology such rocks were called *primitive*, but they are not limited to any geological age, and it is not improbable that crystalline rocks may be in course of formation at the present time. The greater number of intruded igneous rocks (such as basalt) possess the crystalline structure.

**Crystallography** is the science of crystals. It is derived from the Gr. κρύσταλλος, a "crystal," and γράφω, to "describe." A crystal is a natural inorganic solid, bounded by plane surfaces, which are symmetrically arranged around certain imaginary lines called *axes*. Κρύσταλλος, originally meant "ice"; it was afterwards applied to the transparent variety of quartz, because it was thought that rock-crystal was water turned into stone; it was subsequently applied indifferently to any solid which assumed a geometrical shape by natural laws.

All crystals may be referred to seven systems, six of which are referred to three axes, and one of them to four. These systems are divided into two classes, according as the axes are or not at right angles. Those which are at right angles are called the *orthometric*, and those which are not are called *clinometric* systems. In each one of them there are three varieties. When all the axes are equal and at right angles, the system is called *isometric*. When only two are equal, but all at right angles, it is called the *tetragonal*. When none of the axes are equal, but all are at right angles, it is called the *orthorhombic*. The *clinometric* systems are called, respectively, the *monoclinic*, the *dilclinic*, and the *triclinic*, according as the axes have different inclinations. The single system of four axes is called the *hexagonal*.

In all of these systems one axis is placed upright, and is called the vertical axis. In the isometric, tetragonal, and hexagonal systems the other axes are simply called the basal axes, while in each of the other systems each axis has its own name. The axes always terminate in homologous parts, whether these parts are edges or angles.

The axes form a system of co-ordinates by which the position of any face may be determined. Taking the most general case of three unequal axes, the vertical axis is usually designated by *a*; the one from left to right, *b*; and the one from front to behind, *c*. Starting from the origin, the half-axes are determined as + or - (Figs. 43, 44). The distances on these half-axes, cut off by any crystal face, are called parameters. One of them can always be made equal to unity, so that  $ma : nb : c$ , with their signs, will always give the position of any crystal face with reference to a given variety of axes. When a face is parallel to an axis, it is said to cut it at a distance equal to infinity, and its coefficient for that axis will be so written, as  $oa : ob : c$ . Every face of a crystal which does not cut all the axes must either cut two or be parallel to two of them. According to Weiss, the symbol of any face will be  $ma : nb : c$ . Naumann simplifies it by using two letters, or their numerical values, and writing between them the capital letter which represents the type of the system—O for octahedron, P for pyramid, and R for rhombohedron. The two letters are always written in the same order: *m* is always equal to, greater or less than unity, and always greater than  $n, m \leq 1, m > n$ . The coefficient 1 is never written.

Dana's symbols are simply a contraction of Naumann's, in which the letters for the primitive form of the system are left out, and  $\infty$  is written *i*. Thus,  $mOn$  becomes  $ni$ , and  $\infty O \infty$  becomes *ii*.

In every crystalline system a single form is taken as the base of the system. Any form belonging to the system may be taken for this base, but it is generally conceded to adopt pyramids. From this form all the others are derived by three very simple laws: (1) All the similar parts of a crystal may be similarly and simultaneously modified. This gives rise to *holohedral* forms. (2) Half the similar parts may be similarly and simultaneously modified. This gives rise to *hemihedral* forms, which in some of the systems are known as *inclined*, *parallel*, or *gyroidal* forms.

(3) One quarter of the similar parts may be similarly and simultaneously modified, giving rise to *tetartohedral* forms.

In the isometric system the modifications may be composed of one, two, three or six planes; in the tetragonal and hexagonal, of one and two; in the orthorhombic, monoclinic, diclinic, and triclinic, of only one plane at a time.

#### ORTHOMETRIC SYSTEMS.

##### ISOMETRIC SYSTEM.—1. *Holohehedral Forms.*

Three axes,  $a, a, a$  (Fig. 1), all equal and at right angles. The base of the system is the octahedron.

*Octahedron, 0.*—When the axes  $a$  cut in the relation  $a:a:a$ , the solid is made up of eight faces, which are equilateral triangles (Fig. 2). There can be but one octahedron.

*Hexahedron,  $\infty 0 \infty$ .*—When the solid angles of the octahedron are modified by planes which are parallel to two of the axes, and cut one at a distance equal to unity, the resulting solid will be a cube, and will have the formula  $a:\infty a:\infty a$  (Fig. 3).

*Rhombic Dodecahedron,  $\infty 0$ .*—When the edges of the octahedron are modified in such a way that two of the axes

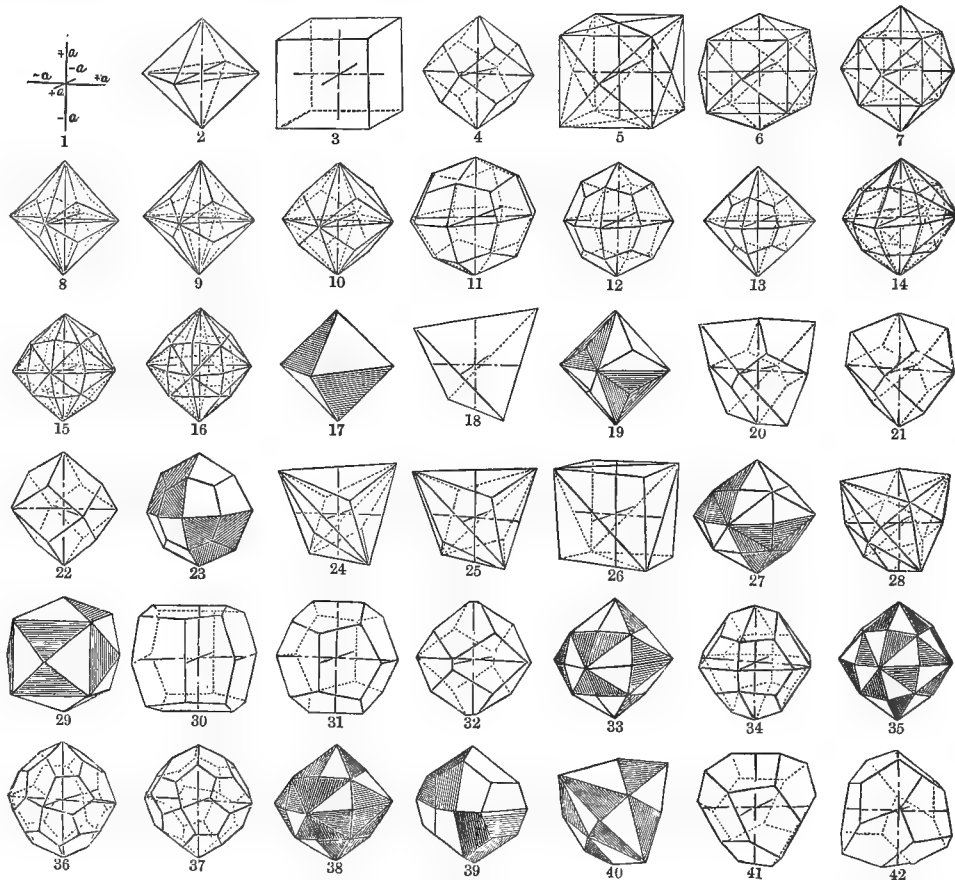
are cut at a distance equal to unity, while the plane is parallel to the third, the formula will be  $a:a:\infty a$  (Fig. 4). There can be but one rhombic dodecahedron.

*Tetrahexahedron,  $\infty 0 n$ .*—When the edges of the octahedron are modified, so that one of the axes is cut at unity, one at infinity, and one at  $n$ , the formula will be  $\infty a:a:na$  (Fig. 5). As there is nothing to limit the inclination of the planes, there may be an infinite variety of tetrahexahedra (Figs. 5, 6, 7), the limit being  $\infty 0$  on the one hand when  $n=1$ , and  $\infty \infty$  on the other when  $n=\infty$ .

*Trigonal Trisoctahedron,  $m 0$ .*—When the edges of the octahedron are replaced, so that two of the axes are cut at unity and the third at  $m$ , the formula is  $ma:a:a$ . Each plane of the octahedron becomes replaced by three triangular planes; hence the name trisoctahedron. As there is nothing to limit the inclination of the planes, there may be an infinite variety of trigonal trisoctahedra (Figs. 8, 9, 10). Their limit will be 0 on the one hand when  $m=1$ , and  $\infty 0$  on the other when  $m=\infty$ .

*Tetragonal Trisoctahedron,  $m 0 m$ .*—When the solid angles of the octahedron are modified so that two of the axes are cut at a distance  $m$  and the third at unity, the formula will

#### ISOMETRIC SYSTEM.



be  $ma:a:ma$ . The faces of the octahedron will be replaced by three tetragonal planes. As there is nothing to limit the inclination, there may be an infinite number of tetragonal trisoctahedra (Figs. 11, 12, 13). Their limit will be 0 on the one hand when  $m=1$ , and  $\infty 0 \infty$  on the other when  $m=\infty$ .

*Hexoctahedron,  $m 0 n$ .*—When the angles of the octahedron are modified so that each axis is cut at a different distance, the formula will be  $ma:na:a$ . Each plane of the octahedron will be replaced by six triangular planes. As there is nothing to limit the inclination of the planes, there may be an infinite number of hexoctahedra (Figs. 14, 15, 16). This solid is the most interesting of all the solids of the system, for by successively changing the values of  $m$  and  $n$  all the other forms of the system may be derived from it. They can all be seen upon it in outline.

##### 2. *Hemihedral Forms.*

In the isometric system there are three kinds of hemihedry: (1) *inclined*, (2) *parallel*, and (3) *gyroidal*. (1) The forms are said to be *tetrahedral* or *inclined* when the faces

are not parallel. This is produced when all of the modifications are carried out on alternate homologous parts. (2) They are *dodecahedral* or *parallel* when alternate modifications are carried out in the same order on all the homologous parts. (3) *Gyroidal* forms are produced when alternate modifications are carried out alternately on all the homologous parts. The hexoctahedron is the only solid which allows of hemihedral forms according to the three laws.

##### (1) *Inclined or Tetrahedral Forms.*

*Tetrahedron,  $\pm \frac{0}{2}$ .*—When alternate faces of the octahedron are produced to the exclusion of the others (Fig. 17), a tetrahedron (Fig. 18) is formed. There can be but two tetrahedra, which are distinguished as + and -.

*Hemi-Trigonal Trisoctahedron,  $\pm \frac{m 0}{2}$ .*—When  $m 0$  is modified by this law, a tetrahedron is produced, each of whose faces is replaced by three tetragonal planes (Figs. 19, 20, 21, 22).

*Hemi-Tetragonal Trisoctahedron*,  $\pm \frac{mOm}{2}$ .—When  $mOm$  is modified by the same law, a tetrahedron is produced, each one of whose planes is replaced by three triangular planes (Figs. 23, 24, 25, 26).

*Hemi-Hexoctahedron Inclined*,  $\pm \frac{mOn}{2}$ .—When  $mOn$  is modified by the same law, a tetrahedron is produced, each one of whose faces is replaced by six triangular planes (Figs. 27, 28). The other forms,  $\infty O\infty$ ,  $\infty O$ , and  $\infty On$ , do not admit of inclined hemihedry.

### (2) Parallel or Dodecahedral Forms.

*Hemi-Tetrahexahedron*,  $\infty On$ .—When  $\infty On$  (Fig. 29) is modified, so that every alternate face is produced, a solid is formed (Figs. 30, 31, 32), which is often called the *pentagonal dodecahedron*.

*Hemi-Hexoctahedron Parallel*,  $\pm \left[ \frac{mOn}{2} \right]$ .—When  $mOn$  is modified so that every other plane is taken in the same order on each face (Fig. 33), a solid (Fig. 34) is produced, which is often called the *diploid*.

### 3. Gyroidal Form.

*Gyroid*,  $\pm \left( \frac{mOn}{2} \right)$ .—When  $mOn$  is modified in such a way that the faces are taken alternately above and below (Fig. 35), a solid having twenty-four pentagonal faces is produced (Figs. 36, 37). This solid has not been found in nature.

### (3) Tetartohedral Form.

*Tetartoid*,  $\pm r\frac{mOn}{4}$ .— $mOn$  is the only form which allows of the carrying out of this law. When the hexoctahedron, the diploid, or the hemi-hexoctahedron inclined, is modified as shown in (Figs. 38, 39, and 40, Figs. 41 and 42) are produced, and as there are two pairs of these, which are right and left forms, they are distinguished as + and -  $r$  and  $l$ .

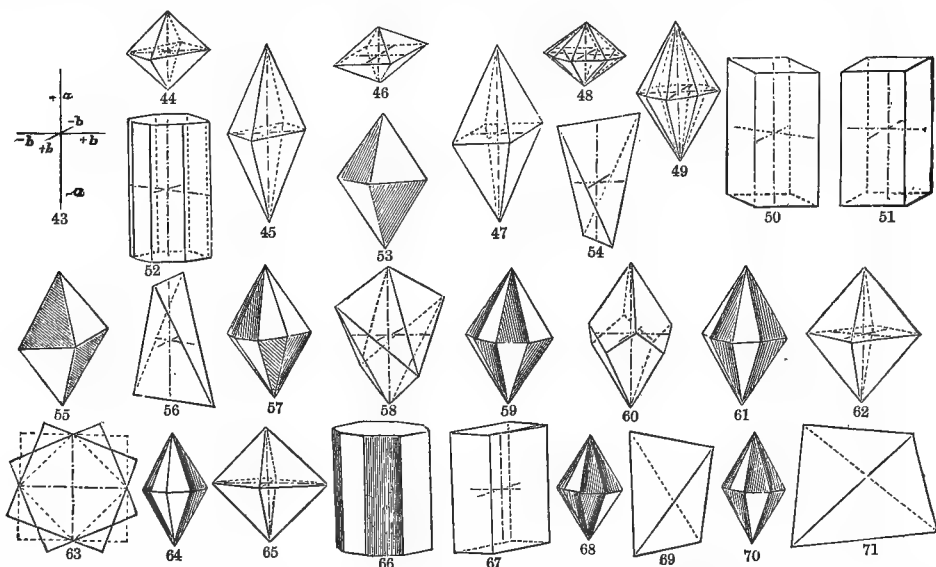
### TETRAGONAL SYSTEM.

The axes of this system (Fig. 43) are of two kinds:  $a$ , the vertical, being longer or shorter than  $b$ ,  $b$ , which are both equal.

#### Holohedral Forms.—Closed Forms.

*Tetragonal Pyramid of the First Order*,  $P$ .—When the axes are cut in the relation  $a : b : b$ , the pyramid of the first order or *protopyramid* (Figs. 44, 45) is produced. The plane which includes the axes  $b$  is a square, and is called the basal plane, and its angles and edges are called basal angles and edges. The planes which include the axes  $a$ ,  $b$  are rhombs, and are called the terminal planes, and their angles and edges terminal angles and planes. The general formula for these pyramids is  $ma : b : b$ , for which the symbol is  $mP$ , in which  $m \geq 1$ ; but in that protopyramid  $P$  which is selected for the base of the system the value of  $m$  is taken for unity. As  $m$  may have any value, there may

### TETRAGONAL SYSTEM.



be any number of pyramids. They are called acute or obtuse according as the terminal angle is acute or obtuse.

*Pyramid of the Second Order*,  $mP\infty$ .—When the terminal edges of the protopyramid are modified by one plane in the relation  $ma : \infty b : b$ , a solid exactly similar in all respects to the protopyramid is produced, but turned  $90^\circ$ , so that the basal axes terminate in the centre of the basal edges (Figs. 46, 47). As  $m$  may be  $\leq 1$ , there may be an infinite number of deuteropyramids. The two forms,  $P\infty$  and  $2P\infty$ , occur where  $m = 1$  in the first case, and  $m = 2$  in the second.

*Ditetragonal Pyramid*,  $mPn$ .—When the terminal edges of the protopyramid are modified in the relation  $ma : nb : b$ , a solid is produced in which each plane of the protopyramid is replaced by two planes (Figs. 48, 49). This solid  $m \geq 1$ ,  $n > 1 < \infty$ ; hence there may be any number of ditetragonal pyramids. This solid bears the same relation to this system that the hexoctahedron does to the isometric system.

#### Open Forms.

*Tetragonal Prism of the First Order*,  $\infty P$ .—When the basal edges of  $P$  are modified by one plane, the axes will be cut in the relation  $\infty a : b : b$ , which produces simply four vertical planes (Fig. 50), which, as they are not closed, produce an open form and is the protoprism.

*Tetragonal Prism of the Second Order*,  $\infty P\infty$ .—When the basal angles of the protopyramid are modified by one plane in the relation  $\infty a : \infty b : b$ , a prism (Fig. 51) is produced similar to the protoprism, but turned  $90^\circ$ .

*Ditetragonal Prism*,  $\infty Pn$ .—When the basal angles of the

protopyramid are modified by two planes in the relation  $\infty a : nb : b$ , a prism (Fig. 52), made up of eight faces, which are parallelograms, is produced.

*Basal Pinacoid*,  $\infty P$ .—When the axes are cut by planes in the relation  $a : \infty b : \infty b$ , we have simply a pair of planes parallel to the basal axes.

#### Pyramidal Hemihedral Forms.

The pyramidal hemihedral forms of the tetragonal system are called (1) *scalenohehedral* or *sphenoidal*, (2) *trapezoidal*, (3) *pyramidal*.

#### (1) Scalenohehedral.

*Sphenoid of the First Order*,  $\pm \frac{P}{2}$ .—When alternate planes of  $P$  are produced, a solid resembling a tetrahedron is formed, in which the faces are isosceles triangles (Figs. 53, 54). There will be two of these sphenoids. This solid is named after the mineral *sphene*, in which it frequently occurs.

*Sphenoid of the Second Order*,  $\pm \frac{mP\infty}{2}$ .—When  $mP\infty$  is treated by this law, another sphenoid is produced, similar in every respect to the sphenoid of the first order, but turned  $90^\circ$  (Figs. 55 and 56).

*Tetragonal Scalenohehedral*,  $\pm \frac{mPn}{2}$ .—When two faces together, taken alternately above and below, of  $mPn$  are taken (Fig. 57), the solid resulting is a sphenoid, each of whose faces is replaced by two planes (Fig. 58).



## (2) Trapezoidal.

*Tetragonal Trapezohedron*,  $r$  or  $l \frac{mPn}{2}$ .—When  $mPn$  is modified by taking one plane alternately above and below (Fig. 59), a solid (Fig. 60) is produced; to distinguish them from the other hemihedral forms of  $mPn$ , they are called right,  $r$ , and left,  $l$ .

## (3) Pyramidal.

*Tetragonal Pyramid of the Third Order*,  $\frac{r}{l}$  and  $\frac{l}{r} \frac{mPn}{2}$ .—

When  $mPn$  is modified, by taking one alternate plane, but the same plane above and below (Fig. 61), a pyramid is formed which resembles the other pyramids of this system (Fig. 62). It is, however, turned to one side more or less, depending on the angle of  $mPn$ . The relations of the pyramids and prisms of the three orders is illustrated by (Fig. 63). Another pyramid which is purely theoretical is formed as shown in (Figs. 64 and 65).

*Prismatic Hemihedral Forms.*

*Tetragonal Prism of the Third Order*,  $\frac{r}{l}$  or  $\frac{l}{r} \frac{mPn}{2}$ .—

When  $\infty Pn$  is modified so that only every other plane is

taken (Fig. 66), a prism is produced resembling the prism of the second order, except that the basal axes terminate to one side of the centre of the faces of the prism (Fig. 67).

*Tetartohedral Forms.—Sphenoidal.*

*Tetarto-Sphenoid*,  $\pm \frac{r}{l} \frac{mPn}{4}$ .—When  $mPn$  is modified as

shown in Fig. 68, it produces a sphenoid (Fig. 69), called the sphenoid of the third order.

*Plagio-Sphenoid*.—When  $mPn$  is modified as in (Fig. 70), it produces a sphenoid (Fig. 71), called the sphenoid of the fourth order. It has not been found in nature.

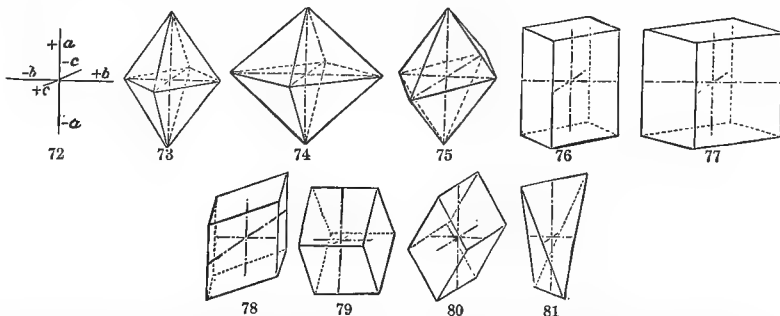
## ORTHORHOMBIC SYSTEM.

The axes of this system (Fig. 72),  $a$ ,  $b$ ,  $c$ , all unequal, but all at right angles.

*Holoheral Forms.—Closed Forms.*

*Rhombic or Protopyramid*,  $P$ .—When the axes are cut in the relation  $a : b : c$ , the solid produced is a pyramid, whose faces are scalene triangles (Fig. 73). The planes  $ab$ ,  $ac$ , and  $bc$  are rhombs of different values. As the basal axes form the diagonals of the rhombs  $bc$ , they are called,  $b$  the *macro* or *longer*, and  $c$  the *brachy* or *shorter* axis or *diago-*

## ORTHORHOMBIC SYSTEM.



nal. In each species a value of  $a$  is selected for unity, and this value is represented in  $P$ , the base of the system. The general formula will, however, be  $ma : b : c$ , or  $mP$ , in which  $m \geq 1$ .

*Macropyramid*,  $mPn$ .—This solid (Fig. 74) resembles the protopyramid, but the symbol is  $ma : nb : c$ , in which  $m \geq 1$ . The macro axis has for its coefficient  $n > 1$ . The planes, therefore, cut the macro axis extended. The long mark — through the  $P$  symbolizes this fact.

*Brachypyramid*,  $mPn$ .—In this form (Fig. 75) the symbol is  $ma : b : nc$ , in which  $m \geq 1$  and  $n > 1$ . The planes, therefore, cut the brachy axis extended, which is expressed by the curve  $\cup$  drawn through the  $P$ .

*Open Forms.*

*Rhombic or Protoprism*,  $\infty P$ .—When the basal edges of  $P$  are modified by one plane, which is parallel to the vertical axis  $a$ , according to the law  $ma : b : c$ , the resulting form is composed of vertical parallelograms (Fig. 76).

*Macoprism*,  $\infty Pn$ .—When the basal edges of  $mPn$  are modified by planes passed according to the law  $ma : nb : c$ , in which  $n > 1$ , the macro axis extended will be cut. The form consists of four vertical parallelograms (Fig. 77).

*Brachypism*,  $\infty Pn$ .—When the basal of  $mPn$  edges are modified according to the law  $ma : b : nc$ , in which  $n > 1$  (Fig. 78), the resulting form is a prism, in which the brachy axis extended is cut.

*Basal Pinacoid*,  $\infty P$ .—When the axes are cut in the relation  $a : \infty b : \infty c$ , we have simply two pairs of planes.

*Macrodome*,  $mP\infty$ .—When the terminal edges of  $P$  are

modified according to the law  $ma : \infty b : c$ , in which  $m \geq 1$ , the form is roof-shaped, and is called a *dome*, from *domus*, a "house." The dome is always over the axis from which it takes its name.

*Brachydome*,  $mP\infty$ .—When the terminal edges are modified according to the law  $ma : b : \infty c$ , in which  $m \geq 1$ , a dome over the brachy axis is formed.

*Basal Pinacoid*,  $\infty P$ .—When the axes are cut in the relation  $a : \infty b : \infty c$ , planes parallel to the basal axes are produced.

*Macro Pinacoid*,  $\infty P\infty$ .—When the axes are cut according to the law  $\infty a : \infty b : c$ , planes parallel to the axis  $b$  are produced.

*Brachy Pinacoid*,  $\infty P\infty$ .—When the axes are cut according to the law  $\infty a : b : \infty c$ , planes parallel to the axis  $c$  are produced.

*Hemihedral Forms.*

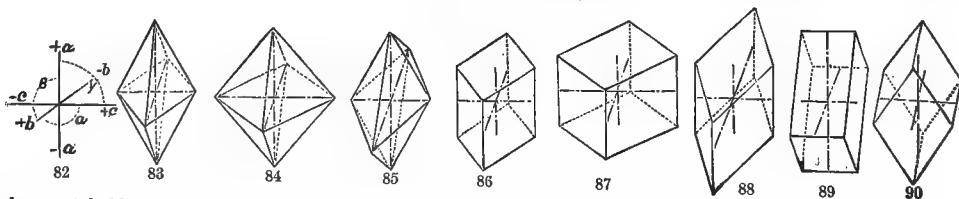
The hemihedral forms of this system consist of one solid, the rhombic sphenoid, and pairs of planes or single planes.

*Rhombic-Sphenoid*,  $\pm \frac{mP}{2}$ .—When alternate planes of the protopyramid are taken, a sphenoid is formed whose faces are scalene triangles (Fig. 81).

*Hemimorphic Forms.*

According to the law of symmetry, when a crystal is terminated by modifications at one extremity of an axis, the same planes should be repeated at the other. In this and the hexagonal system there occur crystals where this

## MONOCLINIC SYSTEM.



law does not hold good, and these exceptions are called *hemimorphic* forms.

*Limit Forms.*

When the protoprism is accompanied by the macro and brachy pinacoids, the prism has a hexagonal section.

When the angle of the prism is near  $120^\circ$ , forms are produced which are so similar to hexagonal combinations that it is frequently difficult, without careful measurement or a determination of the optical properties of the mineral, to make the distinction.

## CLINOMETRIC SYSTEMS.

## MONOCLINIC SYSTEM.

The axes of this system (Fig. 82) are of three kinds, and have only a single inclination. The angle  $\gamma$  of the plane  $ac = 90^\circ$ , the angle  $\alpha$  of the plane  $bc = 90^\circ$ , the angle  $\beta$  of the plane  $ab \approx 90^\circ$ .  $a$  is called the *vertical*,  $b$  the *clino*, and  $c$  the *ortho* axis or diagonal. The plane of the basal axes is thus inclined to the vertical axis, while the ortho and clino axes are at right angles to each other.

## Holohedral Forms.—Open Forms.

**Monoclinic Pyramid,  $\pm P$ .**—As the axes  $b$  and  $c$  are of unequal length, and the plane which contains them makes two angles with the vertical axis, the one in front being an obtuse and the one behind making an acute angle, the relation  $a : b : c$  will produce only a hemipyramid or a pair of planes, above in front or behind below. The pyramid will be formed by these and the other pair of planes behind above and in front below. The pyramid itself will be  $\pm P$  (Fig. 83). The two planes, above in front and below behind, are by convention called  $-P$ , and the others  $+P$ . When  $m$  is not equal to 1, the symbol becomes  $\pm mP$ .

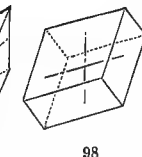
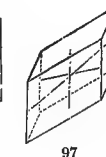
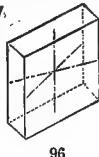
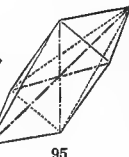
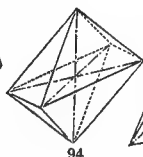
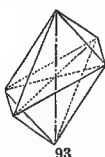
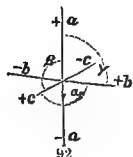
**Orthopyramid,  $\pm mPn$ .**—When the axes are cut in the relation  $ma : b : nc$ , the two forms produce the orthopyramid (Fig. 84).

**Clinopyramid,  $\pm mPn$ .**—When the axes are cut in the relation  $ma : nb : c$ , the two forms produce the clinopyramid (Fig. 85).

**Protoprism,  $\infty P$ .**—When the basal edges of the protopyramid are modified, the axes are cut in the relation  $\infty a : b : c$ . A monoclinic prism (Fig. 86) results.

**Orthoprism,  $\infty Pn$ .**—When the basal edges of the protopyramid are modified by one plane in such a way that the ortho axis extended is cut at a distance  $n$ , the relation is  $\infty a : b : nc$  (Fig. 87).

**Clinoprism,  $\infty Pn$ .**—When the orthopyramid is modified so that the clino axis extended is cut at a distance  $n$ , the relation is  $\infty a : nb : c$  (Fig. 88).



**Triclinic Pyramid,  $P$ .**—When the axes (Fig. 92) are cut in the relation  $a : b : c$ , a pair of planes are produced. The pyramid is made up of four tetarto-pyramids, which are distinguished by accents.  $P$  signifies the planes right above,  $P$  the planes left above,  $P$  the planes right below, and  $P$  the planes left below, with their diagonally opposite planes. The pyramid is  $P$ . The protopyramid (Fig. 93) will always be  $mP$ , except when  $m$  equals one, the macro-pyramid (Fig. 94) is  $mPn$ , and the brachy pyramid (Fig. 95)  $mPn$ .

**Triclinic Prism,  $\infty P$ .**—When the relation  $\infty a : b : c$  is carried out, it produces a single pair of planes, whose symbol is  $\infty P$  or  $\infty P$ , according as the planes are to the right or the left. Each prism is made up of two hemiprisms. The whole form (Fig. 96) is  $\infty P$ . The brachy prism (Fig. 97) is  $\infty P$ , and the macro prism  $\infty Pn$ .

**Triclinic Domes.**—The domes are single pairs of planes, and each dome is made up of two hemidomes. The macrodomes are made up of  $mP\infty$  and  $mP\infty$  (Fig. 98), and the brachydomes of  $mP\infty$  and  $mP\infty$  (Fig. 99).

The only other planes are the basal pinacoid,  $\infty P$ , the macro pinacoid,  $\infty P\infty$ , and the brachy pinacoid,  $\infty P\infty$ .

## SYSTEM WITH FOUR AXES.

## HEXAGONAL SYSTEM.

The hexagonal system is referred to four axes. One of these  $a$  (Fig. 100) is vertical. It is at right angles to the plane of the basal axes  $b$ , which are inclined to each other at an angle of  $60^\circ$ . The vertical is the optical axis, and is consequently the line of greatest physical as well as mathematical importance.

## Holohedral Forms.—Closed Forms.

**Hexagonal Pyramid,  $P$ .**—When the axes (Fig. 100) are cut in the relation  $a : \infty b : b : c$ , the pyramid of the first order (Fig. 101), or protopyramid, is produced. In the form chosen for the base of the system the vertical axis is cut at a distance equal to unity, but it may be cut at other distances,  $m \approx 1$ , so that the general symbol is  $mP$ . The pyramids are said to be acute or obtuse according as the terminal angle is acute or obtuse.

**Hexagonal Pyramid of the Second Order,  $mP2$ .**—When

**Orthodome,  $\pm mP\infty$ .**—As the edges which join the axes  $a$ ,  $b$  are of two kinds, only parallel planes will be produced by a single modification,  $ma : b : \infty c$ . The orthodome (Fig. 89) will therefore be made up of two hemi-orthodomes. The same convention for the signs  $+$  and  $-$  is made as for the pyramid.

**Clinodome,  $mP\infty$ .**—As the edges which join the axes  $a$ ,  $c$  are alike, a dome results from the relation  $ma : \infty b : c$  (Fig. 90).

## DICLINIC SYSTEM.

The axes (Fig. 91) of this system are of three kinds, and have two inclinations. The angle  $\gamma$  of the planes  $ab \approx 90^\circ$ , the angle  $\alpha$  of the planes  $bc = 90^\circ$ , the angle  $\beta$  of the planes  $ac \approx 90^\circ$ . The basal axes are thus at right angles to each other, but the plane which contains them has two inclinations to the vertical axis.

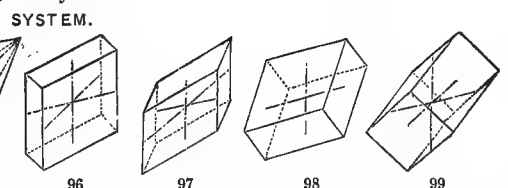
**Diclinic Pyramid,  $P$ .**—As the faces of the pyramid are equal only in pairs, the pyramid is made up of four tetarto pyramids. This system admits of only hemi forms and tetarto forms.  $a$  is called the vertical,  $b$  the macro, and  $c$  the brachy axis. It admits of tetarto, macro, and brachy pyramids and prisms, and tetarto, macro, and brachy domes and the pinacoids. Mitscherlich announced that he had discovered this system in a crystal of hyposulphite of lime, but subsequent crystallographic and optical researches proved that this salt was triclinic; in consequence of which the system was abandoned by most crystallographers. It has, however, the same theoretical basis as any of the other systems, and there does not seem to be any good reason why it should not be preserved.

**Triclinic System.**

The axes of this system (Fig. 92) are of three kinds and have three inclinations, the angles  $\alpha$ ,  $\gamma$ ,  $\beta$ , are  $\approx 90^\circ$ . The axis  $a$  is called the vertical,  $b$  the macro, and  $c$  the brachy axis.

## TRICLINIC SYSTEM.

The axes of this system (Fig. 92) are of three kinds and have three inclinations, the angles  $\alpha$ ,  $\gamma$ ,  $\beta$ , are  $\approx 90^\circ$ . The axis  $a$  is called the vertical,  $b$  the macro, and  $c$  the brachy axis.



the terminal edges of the protoprism are replaced by one plane, so that the axes are cut in the relation  $ma : 2b : b : 2b$ , another pyramid called the deutero pyramid (Fig. 102), which is similar in all respects to the protopyramid, except that it is turned  $30^\circ$  from it, is produced.

**Dihexagonal Pyramid,  $mPn$ .**—When the terminal edges of the protopyramid are replaced by two planes, all three of the axes  $b$  will be cut at unequal distances. If the shortest parameter is called unity or  $b$ , and the longest  $\mu b$ , the third parameter will have a value of  $\frac{\mu}{\mu-1}b$ , and its length will be between 1 and 2. The axes will be in the relation  $ma : \mu b : b : \frac{\mu}{\mu-1}b$ , or  $ma : \mu b : b : nb$ , in which  $m \approx 1$ ,  $\mu \approx 2$ , and  $n = \frac{\mu}{\mu-1}$  (Fig. 103).

## Open Forms.

**Hexagonal Prism,  $\infty P$ .**—When the basal edges of the protopyramid are modified by one plane which is parallel to the vertical axes, they are cut in the relation  $\infty a : \infty b : b : b$ , and the protoprism (Fig. 104) is produced.

**Hexagonal Prism of the Second Order,  $\infty P2$ .**—When the basal edges of the deutero pyramid are modified by one plane parallel to the vertical axis, a deutero prism is produced (Fig. 105). The axes are cut in the relation  $\infty a : 2b : b : 2b$ . This prism is in every respect similar to the protoprism, but it is turned  $30^\circ$ .

**Dihexagonal Prism,  $\infty Pn$ .**—When the basal edges of the dihexagonal pyramid are modified by one plane, so that the axes are cut in the relation  $\infty a : \mu b : b : \frac{\mu}{\mu-1}b$ , a dihexagonal prism (Fig. 106) is produced.

**Basal Pinacoid,  $\infty P$ .**—When the axes are cut in the relation  $a : \infty b : \infty b : \infty b$ , the basal pinacoid is produced.

## Pyramidal Hemihedral Forms.

This system admits of four different kinds of hemihedral forms, derived from its pyramids, which are called (1) *scalenohedral*, (2) *trapezoidal*, (3) *pyramidal*, and (4) *trigonal hemihedry*.

(1) *Scalenohedral.*

*Rhombohedron of the First Order*,  $\pm \frac{mP}{2}$ .—When  $mP$  is modified by producing every alternate plane (Fig. 107), the rhombohedron (Fig. 108) is produced. As there are two of them, they are designated by the signs + and -.

*Rhombohedron of the Second Order*,  $\pm \frac{\infty P_2}{2}$ .—When  $\infty P_2$  is modified by the same law (Fig. 109), other rhombohedra (Fig. 110) are produced, similar to those of the first order, but turned  $30^\circ$ . As there is no limit to the angles of the pyramids from which they are produced, there are an infinite variety of rhombohedra. They are called acute or obtuse according as the terminal angle is acute or obtuse.

*Hexagonal Scalenohedron*,  $\pm \frac{mPn}{2}$ .—When the dihexagonal pyramid is modified, so that every two alternate faces above and below are taken (Fig. 111), the scalenohedron (Fig. 112) is produced. There are four of these scalenohedra. In order to get a clear idea of them, we have only to suppose that the terminal or basal edges of the rhombohedra were modified by two or the terminal angles by six planes.

(2) *Trapezoidal Hemihedry.*

*Hexagonal Trapezohedron*,  $r$  or  $l \frac{mPn}{2}$ .—When the dihexagonal pyramid is modified by the extension of every alternate plane above and below (Fig. 113), the hexagonal trapezohedron (Fig. 114) is produced. They are distinguished as right and left.

(3) *Pyramidal Hemihedry.*

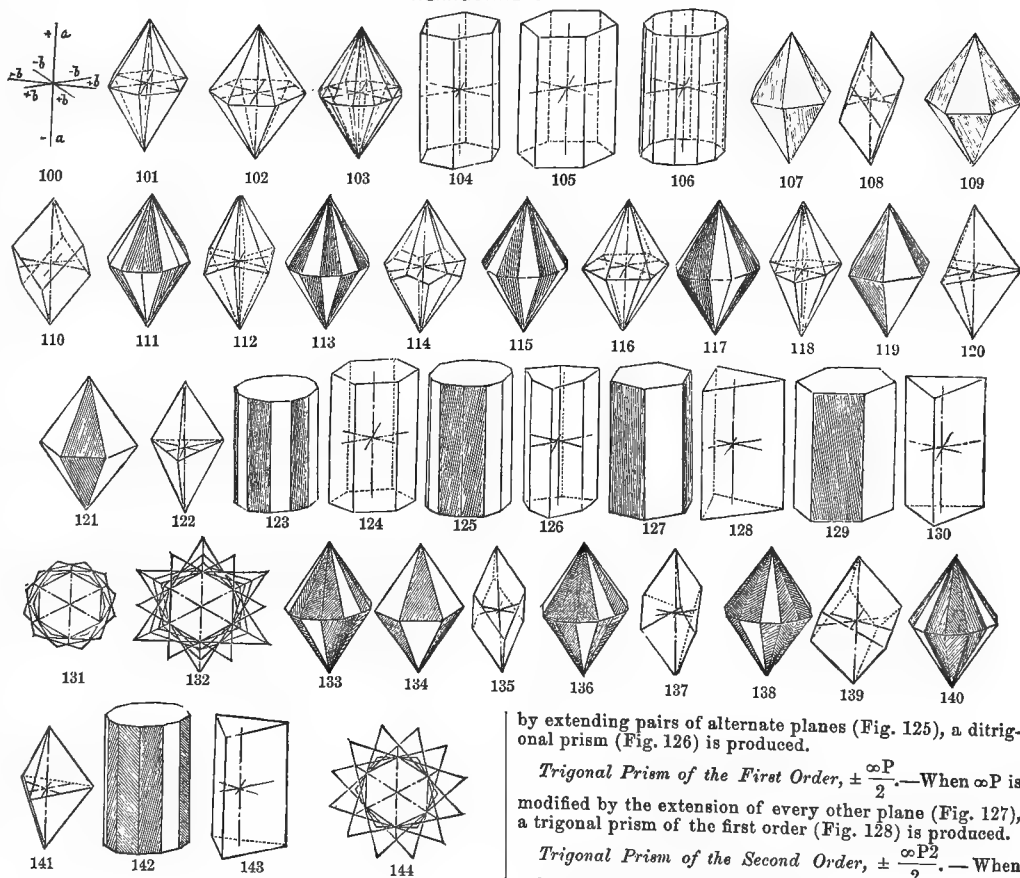
*Hexagonal Pyramid of the Third Order*,  $\frac{r}{l}$  or  $\frac{l}{r} \frac{mPn}{2}$ .—

When  $mPn$  is modified as in Fig. 115, a hexagonal pyramid, in which the basal axes terminate to one side of the centre of the basal edges, is produced (Fig. 116), which, to distinguish it, is called the pyramid of the third order.

(4) *Trigonal Hemihedry.*

*Ditrigonal Pyramid*,  $r$  or  $l \left[ \frac{mPn}{2} \right]$ .—When  $mPn$  is modified so that every alternate pair of planes, but the same planes above and below, are taken (Fig. 117), a ditrigonal pyramid (Fig. 118) is produced; to distinguish the symbol it is written in brackets.

## HEXAGONAL SYSTEM.



*Trigonal Pyramid of the First Order*,  $r$  or  $l \frac{mP}{2}$ .—When  $mP$  (Fig. 119) is modified by extending every other plane, but the same plane above and below, a trigonal pyramid of the first order (Fig. 120) is produced.

*Trigonal Pyramid of the Second Order*,  $r$  or  $l \frac{mP_2}{2}$ .—When  $mP_2$  (Fig. 121) is modified by the same law, a trigonal pyramid is produced.

*Prismatic Hemihedral Forms.*

*Hexagonal Prism of the Third Order*,  $\frac{r}{l}$  or  $\frac{l}{r} \frac{\infty Pn}{2}$ .—

When  $\infty Pn$  is modified by the extension of every alternate plane (Fig. 123), a hexagonal prism of the third order is produced.

*Ditrigonal Prism*,  $r$  or  $l \left( \frac{\infty Pn}{2} \right)$ .—When  $\infty Pn$  is modified

by extending pairs of alternate planes (Fig. 125), a ditrigonal prism (Fig. 126) is produced.

*Trigonal Prism of the First Order*,  $\pm \frac{\infty P}{2}$ .—When  $\infty P$  is modified by the extension of every other plane (Fig. 127), a trigonal prism of the first order (Fig. 128) is produced.

*Trigonal Prism of the Second Order*,  $\pm \frac{\infty P_2}{2}$ .—When  $\infty P_2$  (Fig. 129) is modified by the same law, an obtuse trigonal prism is produced (Fig. 130).

The relation of all these forms to each other is made plain by Figs. 131 and 132. Fig. 131 shows the relative positions of the hexagonal pyramids and prisms of the first, second, and third orders, and the dihexagonal pyramid and prism (Fig. 132) shows the relations of the first, second, and third orders, the scalenohedron, the trigonal and ditrigonal pyramids and prisms.

*Pyramidal Tetartohedral Forms.*

There are two kinds of pyramidal tetartohedry in the hexagonal system, *rhombohedral* and *trapezoidal*.

*Rhombohedral Hemihedry.*

*Rhombohedron of the Third Order*,  $\pm \frac{r}{l}$  or  $\frac{l}{r} \frac{mPn}{4}$ .—When the dihexagonal pyramid or the hexagonal pyramid of the third order is modified as shown in Figs. 133 and 134, a rhombohedron of the third order (Fig. 135) is produced.

*Trapezoidal Hemihedry.*

*Trigonal Trapezohedron*,  $\pm r$  or  $l \frac{mPn}{4}$ .—When  $mPn$  is modified as shown in Figs. 136 and 138, the solids (Figs. 137 and 139) are produced. These solids were formerly called *plagihedra*. They vary in form according as the terminal angle is acute or obtuse.

*Trigonal Pyramid of the Third Order*,  $\pm r$  or  $l \left[ \frac{mPn}{4} \right]$ .—When  $mPn$  is modified as shown in Fig. 140, a trigonal pyramid (Fig. 141) is produced.

*Prismatic Tetartohedral Form.*

*Trigonal Prism of the Third Order*,  $\pm r$  or  $l \frac{\infty Pn}{4}$ .—When  $\infty Pn$  is modified as shown in (Fig. 142), a trigonal prism is produced (Fig. 143). The position of these tetartohedral forms is illustrated in the diagram Fig. 144, which shows the relative position of the hexagonal pyramids of the first and second orders, the dihexagonal pyramid and prism, and the trigonal pyramids and prisms of the third order.

THOMAS EGGLESTON.

**Crystal Palace**, a building erected in London in 1851, in which the great World's Fair of that year was held. It was designed by Sir Joseph Paxton, and was composed of glass and iron, excepting the floors, which were of wood. It was 1851 feet in length, and covered an area of twenty-one acres. During the exhibition it was visited by over 6,000,000 persons. The whole structure was removed soon afterwards. A permanent crystal palace was erected in 1854 at Sydenham, eight miles from London. It cost £1,450,000, and contains an extensive museum, in which almost every department of art and science is represented. In 1853 a crystal palace for another universal exhibition was erected in New York, after a design by Messrs. Carstenson and Gildemeister. It was burned in 1858. Others have since been erected for similar purposes in different cities of Europe.

**Csa'ba**, a market-town of Hungary, 7 miles S. S. W. of Bekes, is well built. It has an extensive trade in grain, wine, and cattle. Previous to 1840 it was but a village. Pop. 30,022.

**Csa'nád**, a county of Hungary, is bounded on the N. by Bekes, on the E. by Arad, on the S. by Torontal, and on the W. by Csongrad. Area, 640 square miles. It consists of a plain, which is very fertile, but the climate and water are unhealthy. The chief products are wheat, wine, tobacco, and fruit. Chief town, Mako. Pop. 95,847.

**Csanád**, a decayed market-town of Hungary, in the county of Csanád, on the Máros, 44 miles N. of Temesvár. Pop. 5250.

**Cserven'ka**, a town of Hungary, in the county of Upper Bács, on the Franzens Canal, 130 miles S. of Pesth. Pop. in 1881, 7025.

**Cson'grad**, a county of Hungary, is bounded on the N. by Szolnok, on the E. by Bekes and Csanád, on the S. by Torontal, and on the W. by Pesth. Area, 1280 square miles. The soil and products are similar to those of Csanád. It is traversed by the Theiss. Chief town, Szegedin. Pop. 207,585.

**Csongrad**, a market-town of Hungary, in a county of its own name, is at the confluence of the Theiss with the Körös, 70 miles S. E. of Pesth. Pop. in 1881, 17,837.

**Cte'noid Fishes** [from the Gr. *κρείς* (gen. *κρενός*), a "comb," from the comb-like teeth of the scales], an order of fishes (in Agassiz's former classification) characterized by having the skin covered with scales whose margins have notches or spines resembling the teeth of a comb. There are sometimes many rows of teeth or little spines, sometimes but one, the rows wearing off successively as new ones are formed. Living fishes of this order are numerous; among them are the turbot, perch, and flounder. Fossil fishes of this class are comparatively few. The word *cte'noid* is retained, as expressing an important character, but no such order as the above is now recognized.

**Cte'sias** [*Κρησίας*], a Greek historian, a native of Cnidos, in Caria, lived about 400 B. C. He passed many years in Persia as physician to King Artaxerxes Mnemon, and afterwards returned to his native place. He wrote a "History of Persia" (*Περικά*) and a "Description of India." His reputation for veracity is not high.

**Ctesibius** [*Κρησιβίους*], a famous Greek mechanician who flourished at Alexandria about 130 B. C. He invented the clepsydra, a pump, and other machines. He is said to have been the first who applied the elastic force of air as a motive-power.

**Ctes'iphon**, an ancient city of Assyria, on the E. bank

of the Tigris, 20 miles S. E. of Bagdad, was the capital of the kings of Parthia. Its ruins still attest its former magnificence. The site is now occupied by a village called Modain.

**Ctesiphon** [*Κτησιφῶν*], an Athenian who proposed that a crown of gold should be given to Demosthenes for his public services. For this act he was prosecuted by Æschines, and defended with success by Demosthenes in his famous oration "On the Crown," 330 B. C.

**Cu'ba**, the largest and westernmost island of the Antilles, and the chief colony of Spain, lying between the Caribbean Sea on the S. and the Gulf of Mexico and Bahama Channel on the N., 130 miles S. of Florida and about equidistant from Yucatan on the W. and Hayti and Jamaica on the E. and S. E. Lat.  $19^{\circ} 50'$  to  $23^{\circ} 9'$  N., lon.  $74^{\circ} 8'$  to  $84^{\circ} 58'$  W. It is 780 miles long from E. to W., and from 25 to 130 miles wide. Its area is 43,320 square miles.

**Topography and Surface**.—Cuba probably had its origin in volcanic action, as demonstrated by the mountain-chain (the Copper Mountains), which traverses its whole length, Pico Turquinos, its highest summit, being about 7750 feet. From the bases of this chain N. and S. the country expands into broad meadows, with frequent lagoons and swamps. The rivers are all small, and none of them navigable. There are good harbors with deep water at Havana, Matanzas, Puerto Principe, Santiago de Cuba, etc. Elsewhere the coasts are shallow and rocky.

**Climate**.—In the hills, healthy and agreeable; in the lowlands, sickly and generally hot; maximum temperature does not often exceed  $88^{\circ}$  F., but the heat is protracted, the mean of the year in the lowlands being  $78^{\circ}$ . It is a moist climate, the annual rainfall in the Havana being 90.66 inches, yet some places in the interior require irrigation. There are some hurricanes and occasional earthquakes.

**Minerals**.—Copper, with some gold, silver, iron, coal, marble, etc. There are productive copper-mines in the mountains.

**Soil and Vegetation**.—The mountains are covered with forests of mahogany, ebony, granadilla, rosewood, cedar, live-oak, fustic, palms, and plantains. The cultivated districts yield large crops of maize, rice, yams, bananas, sugar, coffee, tobacco, cotton, and all tropical fruits, sugar and tobacco being the leading products, while immense herds of cattle are reared on the grazing lands.

**Exports** mainly sugar, tobacco, and cigars; the greater part of these goes to the U. S. In 1880, 405,000 out of 460,000 tons of sugar (the total export) went to U. S.; value, \$57,170,241. Of tobacco and cigars the U. S. received \$7,096,930, and of all other articles, \$1,155,847; total, \$65,422,018. The imports from the U. S. were valued at \$10,924,633, about one-sixth of the exports. They were provisions, wood, manufactured iron and steel, breadstuffs, live stock, and oils.

**Industries**.—Manufacture of sugar, molasses, rum, and cigars, preparation of coffee for market, preserving fruit, bleaching wax, and minor industries. The local consumption of sugar was 70,000 tons.

**Commerce**.—1426 vessels, having a tonnage of 1,018,140, entered the port of Havana in 1880; of these, 663 were American.

**Railways**.—There are over 900 miles of railway now operated in Cuba.

**Finances**.—The debt of Cuba in 1880 was \$35,000,000. Its imports and exports amount to about \$125,000,000 annually, of which the exports exceed \$88,000,000. The taxes are heavy, and the income drawn from Cuba by Spain is large.

**Church and Education**.—Roman Catholic only established religion; common-school education at a low-ebb; there are schools of secondary education in the towns, and a university at Havana.

**History**.—Island discovered Oct., 1492, by Columbus; colonized by Spaniards 1511; Indians cruelly treated by Hernando, Spanish governor, and in 1553 entire Indian population became extinct. In 1534 and in 1554 Havana destroyed by French, but speedily rebuilt and strongly fortified in 1584; in 1624 taken by Dutch, but soon restored to Spain; from 1650 to 1700 often ravaged by filibusters; Puerto Principe plundered and destroyed by them in 1688. After 1700, Cuba prospered greatly. Tobacco monopoly established 1717, and not abolished till 1816. In 1762 Havana taken by English, but exchanged in 1763; its commercial importance rapidly increased, but it became the centre of slave-trade for Spanish America. During the prevalence of the slave-trade, 1789–1845, it is said that over 550,000 slaves were brought into Cuba. There were negro insurrections in 1844 and 1848; more than 10,000 negroes perished in the latter. For forty years past there has been a strong pressure upon the U. S. government, mainly from

the S., to obtain possession of Cuba; President Polk offered \$100,000,000 for it in 1848; in 1854 the Ostend Manifesto, signed by Buchanan, Soule, and Mason, claimed the right to take and annex it if Spain should refuse to sell. Meantime, in 1849-51, there were insurrections, led by American adventurers. The Spanish revolution of 1868 led to an effort for Cuban independence, which continued with varying fortunes for twelve years; the war was a severe one on both sides; Céspedes was the insurgent president. In 1880 it was substantially put down, but the island was left in disorder, and with a debt of \$85,000,000.

**Population and Political Divisions.**—In Jan., 1878, 1,394,576 inhabitants, composed of whites, Spaniards, and Spanish Creoles, 764,164; free people of color, 344,405; slaves, 227,902; Chinese, 58,400. The population had decreased 20,500 since 1870, and the number of slaves 136,000. Cuba is divided into three provinces—West, Central, and South-eastern. The last two have twenty-two cities and towns. The largest cities are Havana (capital), population 250,000; Santiago de Cuba, about 60,000; Matanzas, 36,000; Puerto Principe, 30,000. L. P. BROCKETT.

**Cuba**, N. Y. See APPENDIX.

**Cu'bature**, the measurement of the volume of a solid body. If the equation to the surface enclosing the body be given in rectangular co-ordinates, its volume is expressed by the triple integral  $\iiint dx dy dz$ , where the integration is to be extended to all points of the solid, according to the methods explained in all text-books. When the equation to the surface is given in polar co-ordinates, its volume is expressed by the integral  $\iiint r^2 \sin \theta dr d\theta d\phi$ .

**Cube** [Gr. κύβος, a "die"], in geometry, a solid body contained by six equal squares. It is also called a regular hexahedron, and is one of the five regular solids. It is a form which often occurs in nature, especially among crystals. In arithmetic the cube of a number is its third power, or the product obtained by multiplying that number by its square. The duplication of the cube—that is to say, the finding of a cube having double the volume of a given cube—is one of those problems which admit of no solution by common geometry, on which, as on the quadrature of the circle and the trisection of an angle, a vast amount of ingenuity has been vainly expended in every age since the dawn of mathematical science. The solid contents of a cube may be expressed by the third power of the number which expresses the length of one of its sides.

**Cu'beb** [Lat. *cubeba*; Fr. *cubébe*; Ger. *Kubebe*; Arabic, *kabābēh*], the dried, unripe fruit of the *Cubeba officinalis* (and probably of other species), climbing woody plants belonging to the order Piperaceæ. The cubeb vine resembles that which produces the ordinary black pepper. Cubebes are brought chiefly from Java, Penang, etc., and are used as an aromatic and stimulant diuretic. Their active properties depend on the volatile oil which they contain. They also have a crystallizable principle called "cubebin," and a balsamic resin. The oil, tincture, and extract are used in medicine.

**Cube Root.** See RADICAL and ROOT.

**Cu'bic Equation**, an equation which involves the cube of the unknown quantity. A pure cubic equation contains only two terms; as, *e. g.*,  $x^3 = 27$ ; all others are said to be affected; as, *e. g.*,  $x^3 - 5x^2 + 4x + 7 = 1$ .

**Cu'bic Ni'tre**, a commercial name applied to the nitrate of soda, which is largely obtained from the desert of Atacama in Peru. It is used in the arts and as a manure.

**Cu'bit** [Lat. *cubitus*, *i. e.* the "elbow"; Gr. πῆχυς, the "fore arm"], a linear measure of the ancients, equal to the length of a man's arm from the elbow to the tip of the middle finger. It is generally stated to be eighteen English inches. The ancient Egyptian cubit, or "cubit of Memphis," was about 20.7 British inches. The mean of Sir Isaac Newton's determinations, from the careful measurements of the great pyramid by Professor John Greaves (published in 1737), made it 20.672. The mean of still more careful measurement by Professor C. Piazzi Smyth in 1865 made it 20.73. According to Newton, the cubit of Babylon was very nearly 24 British inches; the royal cubit of Persia, 21.195 inches; the cubit of the Romans, 17.406 inches; the cubit of the Greeks, 18.1308 inches; the Egyptian cubit in use in 1737, 21.888 inches; the sacred cubit of Moses he calculates not to have been greater than 24.9389 inches, nor less than 24.7262, and its probable value to have been 24.7552 inches. Prof. Piazzi Smyth thinks that he has proved that the unit of measure employed by the builders of the Great Pyramid in laying out the ground-plan of their work was identical with the sacred cubit of Moses, and that its value was 25.025 British inches; which is, according to the most recent determinations, almost exactly the 10,000,000th part of the earth's polar radius. He supposes, therefore, that this unit of

measure, which was divinely given, was made by divine intention to be in this exact decimal relation to the invariable line around which the earth revolves. If the British inch be increased by one-1000th part, it becomes what Professor Smyth calls a "pyramid-inch;" and a pyramid-cubit, or sacred cubit, is 25 pyramid-inches, or one-10,000,000th part of the earth's polar radius. Professor Smyth maintains his hypothesis with much ingenuity, but it has not been generally received with favor.

The value of the biblical "cubit of a man" is extremely uncertain. Dr. William Smith, in his "Dictionary of the Bible," has discussed the question pretty fully, and inclines to regard it as having had a value, deduced by Thenius ("Theologische Studien und Kritiken" for 1846) from the Egyptian cubit measure preserved in the Turin Museum, of 23 digits, each digit being 0.7938 British inch = 18.257 British inches. F. A. P. BARNARD.

**Cuck'oo** [Lat. *cuculus*; Fr. *coucou*; It. *cucco*, so named from its peculiar note], a name given to many birds of the order Scansores, of the genus *Cuculus* and its allied genera. The common cuckoo of Europe is fourteen inches long, gray, the breast barred with black. It is migratory, and arrives in Europe in the spring. It feeds on worms and insects, builds no nest, but deposits its egg in the nest of another bird, and the proprietor hatches it with her own. The young cuckoo crowds under the other birds, and throws them over the edge to the ground. The great spotted cuckoo (*Cuculus glandarius*) is a native of Northern Africa; it also uses the nests of other birds. It is said that even the hooded crow, a very sagacious bird, is thus deceived by it, and fosters the young cuckoo with care. It migrates in summer to Southern Europe. The common American cuckoo (*Coccyzus Americanus*), sometimes called the yellow-billed cuckoo, is very slender, of a gray-brown color above, a lighter color beneath, and has a greenish lustre. It feeds upon insects and the eggs of small birds. It is a timid bird, and conceals itself in the foliage of trees. Its eggs, from two to four in number, are of a pale blue-green. It does not lay its eggs in the nests of other birds. The black-billed cuckoo (*Coccyzus erythrophthalmus*) inhabits the same regions as the common American cuckoo. It has a different note, and is less shy; the eggs are of the same color. Other species occur in the U. S.

**Cu'cumber** [Lat. *cucumis*; Fr. *concombre*], a genus of plants of the order Cucurbitaceæ. The common cucumber (*Cucumis sativus*), a native of Middle and Southern Asia, has heart-shaped leaves, rough with hairs, and oblong fruit. It has been cultivated from the earliest times, and forms an important article of food in Europe and the U. S. Many varieties are cultivated, with fruit from four inches to two feet long. Pickles called gherkins are made from young cucumbers. A sunny exposure and a light, rich soil are best adapted to its culture. Many other species with edible fruit belong to this genus.

**Cucumber Tree**, the *Magnolia acuminata*, a noble forest tree of the U. S., found from Niagara Falls southward to Georgia, chiefly along the Alleghanies. It is a tall tree, with duller green foliage than in other magnolias, and with inconspicuous yellowish-green flowers. Its wood is light, and is prized for making pumps and canoes. Its cucumber-like fruit is soaked in spirits, and makes a very bitter drink, popularly used as a tonic and anti-rheumatic.

**Cucurbita'ceæ** [from *Cucurbita* (a "gourd"), one of the most important of its genera], a natural order of exogenous plants, mostly inhabiting the hot countries of both hemispheres, having succulent stems and climbing by lateral tendrils. The fruit (*pepo*) has a thick, fleshy rind, is more or less succulent, and in some species attains a great size. The seeds are flat and ovate, embedded in a pulp, in some kinds dry, and in others juicy. The order contains about 300 species, including the melon, cucumber, gourd, squash, and pumpkin. The roots of some of them, such as the *Momordica dioica* and *Bryonia umbellata* of the East Indies, abound in a bland and edible fecula. The elaterium and the common bryonia, however, are remarkable for their acridity, and are sometimes used as drastic purgative medicine. The colocynth, which is valued for its medicinal properties, belongs to this order.

**Cud'bear** [supposed to be a corruption of *Cuthbert*, from Dr. Cuthbert Gordon, who introduced the manufacture at Leith], a powder obtained from certain lichens by the action of ammoniacal liquids, and used for dyeing various colors. The name of cudbear lichen is often given to one particular species (*Lecanora tartarea*), which abounds on rocks in the Highlands of Scotland, among the Alps, and in the northern parts of Europe. It is often called white Swedish moss, being largely imported from Sweden. The dyestuff is obtained by macerating this for ten or twelve days in urine with chalk and water. Cudbear does not afford a very permanent color. (See ARCHILL.)



**Cud'dalore**, a maritime town of Hindostan, in Arcot, and on the Coromandel coast, 86 miles S. of Madras. It is one of the most populous towns in the south of India. It has a custom-house, and a port from which cotton goods are exported. It was taken from the English by the French in 1782, but restored to the British in 1795. Pop. 40,290.

**Cud'weed**, the name given to many species of the *Gnaphalium*, *Antennaria*, and *Filago*, belonging to the order Compositae and sub-order Tubuliflora. The flowers, which are commonly called "life-everlasting," consist mostly of dry involucre scales, and the stems and leaves are more or less covered with white down. The cudweeds are common in Europe and North America, and some of them are used as diaphoretics in domestic medicine.

**Cud'worth** (Rev. RALPH, D. D., an English philosopher and divine, born at Aller, in Somersetshire, in 1617. His father (also named Ralph Cudworth), a man of genius and learning, was chaplain to James I. He graduated at Emmanuel College, Cambridge; and became master of Clare Hall in 1644, and professor of Hebrew in 1645. In 1654 he was chosen master of Christ's College, and in 1678 was appointed prebendary of Gloucester. He was one of those who were called "Latitudinarians" in theology. His great work, "The True Intellectual System of the Universe" (1678), displays great learning, liberality, and independence of mind. He favored the Platonic philosophy, although in physics he adopted the corporeal theory. He died July 26, 1688, leaving a "Treatise concerning Eternal and Immutable Morality," published in 1731. A number of his unpublished manuscripts are in the British Museum. His sons appear to have died early. His daughter became Lady Masham and a friend of John Locke. (See JANNET, "De Cudworthii Doctrinâ," 1849; MACKINTOSH, "View of the Progress of Ethical Philosophy;" TULLOCH, "Free Thought in England," vol. ii.)

**Cuen'ca**, a province of Spain, in New Castile, is drained by the rivers Tagus and Jucar. Area, 6726 square miles. The surface is partly mountainous; coal, copper, iron, and silver are found here. Capital, Cuenca. Pop. 242,231.

**Cuenca**, a city of Spain, capital of the above province, is picturesquely situated on a rocky eminence on the river Jucar, about 90 miles E. S. E. of Madrid. It has a richly-adorned cathedral, is the seat of a Catholic bishop, and has several convents and hospitals. Here is a fine bridge, erected over the Jucar in 1523. Cuenca was formerly celebrated for its arts, literature, and manufactures. Pop. 7284.

**Cuenca**, formerly sometimes written **Cuenza**, a city of South America, in Ecuador, the capital of the province of Cuenca, is on table-land 8640 feet above the level of the sea, 189 miles S. of Quito, after which it is the most populous city of Ecuador. It is the seat of a Catholic bishop, and has a cathedral and a university; also several sugar-refineries and potteries. Pop. about 20,000.

**Cuero**, Tex. See APPENDIX.

**Cuesmes**, a Belgian town in the province of Hainaut. It has breweries and coal-mines. Pop. 5721.

**Cue'vas de Ve'ra**, a town of Spain, in Granada, is on the river Almanzor at its entrance into the Mediterranean, 42 miles N. E. of Almería. It owes its thriving condition to recently-opened silver-mines. Pop. 7401.

**Cuff'ee** (PAUL), a negro philanthropist, born in Gosnold, Mass., in 1759. He became a sea-captain, the owner of a vessel, the crew of which was composed of negroes, and acquired a competent fortune. He was deeply interested in African colonization. Died Sept. 7, 1818.

**Cufic Writing** [so named from the town of Cufa or Koofa, where the transcribing of ancient manuscripts was extensively carried on] was one of the most ancient forms of Arabic writing, and is supposed to have been introduced into Arabia a short time before the period of Mohammed. It was in common use till the tenth century, and afterwards was confined to coins and inscriptions.

**Cuichunchulli** (*Ionidium parviflorum*), a half-shrubby Peruvian plant of the order Violaceae, having active emetic and cathartic properties. It is reputed a certain remedy for *elephantiasis tuberculata*, and the same medical properties are attributed to other species of *Ionidium*. The root of one kind is called white ipecacuanha.

**Cuirass** [Fr. *cuirasse*, from *cuir*, "leather"], originally a garment of leather for soldiers, so thick and strong as to be proof against a pistol ball. The term was afterwards applied to a breastplate, or a portion of armor made of metal, consisting of a backplate and breastplate hooked or buckled together. The cuirass is still worn by the British Horse Guards and other bodies of heavy cavalry, called *cuirassiers*.

**Cuja'cius**, properly JACQUES CUJAS, a celebrated French jurist, born at Toulouse in 1522. He learned Greek and Latin without a teacher, studied law at Toulouse, and became in 1555 professor of law at Bourges. His lectures on the "Institutes" attracted students from all the countries of Europe. He developed a reform in modern law inaugurated by Alciat. The Roman law received a thorough interpretation from him, and according to its principles, which had until then been adopted partially as expediency suggested, the doctrine of the law was fundamentally renovated. He had in his library 500 manuscripts of the Justinian laws. His works (1st ed. 1577; complete ed. Fabrot, 1658, 10 vols.) have been often reprinted, lately by Prato (1859). Died Oct. 4, 1590. (See PAPIRE MASSON, "Vie de Cujas," 1590; BERNARDI, "Eloge de Cujas," 1775; SPANGENBERG, "J. Cujas und seine Zeitgenossen," 1822.)

**Culbertson**, on R. R., capital of Hitchcock co., Neb. (see map of Nebraska, ref. 7-H, for location of county). Pop. in 1880, 108; in 1885, 393.

**Culdees'**, or **Kildees'** [from the Keltic; according to one etymology, meaning "servants of God;" to another, "men of the recess"]. The name was first used in the eighth century, as some say, of Keltic Christians generally in Great Britain and Ireland; or, as others say, of Keltic missionaries of the sixth and subsequent centuries, who carried the gospel to Scotland and other countries. (See SKENE'S "Celtic Scotland," 3 vols., 1876, 1877, 1880.)

R. D. HITCHCOCK.

**Cul-de-Sac** [Fr. the "bottom of a bag"], the name given to a street or alley open at one end only, sometimes called a blind alley. Also, in natural history, in buildings, in topography, and in military language, the term is used in an analogous sense for a passage with only one outlet.

**Cul'enborg**, a Dutch town in the province of Gelderland, 6 miles N. N. W. of Tiel, on the Leek. It is surrounded with a wall. There are manufactures of furniture, stoves, etc., and a trade in corn. Pop. in 1880, 6725.

**Culiacan'**, a town of Mexico, capital of Sinaloa, on the river Culiacan, 105 miles S. E. of the city of Sinaloa. It has a bishop, a seminary, and a mint. Pop. 7878.

**Culil'awan Bark**, called also **Clove Bark**, a valuable aromatic bark, the product of the *Cinnamomum Cudilawan*, a tree which grows in the Molucca Islands. It has a pungent taste and an odor resembling that of nutmeg and cloves.

**Cullen** (PAUL), D. D., CARDINAL, born in Dublin April 27, 1803, was educated at Rome, became archbishop of Armagh (1850), archbishop of Dublin (1852), and cardinal-priest in 1866. In his "Pastoral Letters" he opposed the mixed system of education, and he was the main supporter of the Catholic University of Dublin. D. Oct. 24, 1878.

**Cullen** (WILLIAM), M. D., a celebrated British physician, born of poor parents in Lanarkshire, Scotland, Dec. 15, 1712. He acquired his profession amid great embarrassments. In 1756 he obtained the chair of chemistry in Edinburgh, where he practised medicine with success. He published "First Lines of the Practice of Physic" (1775), his chief work, in which novel pathological theories are propounded, and which was translated into all European languages; a "Synopsis of Methodical Nosology" (in Latin, 1780), a "Treatise of the Materia Medica," in which numberless errors were dispelled (1789), and other works. Died Feb. 5, 1790. (See Dr. JOHN THOMSON, "Life and Writings of William Cullen," 1832. This biography was completed by Dr. CRAIGIE in a second volume, 1859.)

**Culle'ra**, a fortified seaport-town of Spain, in the province of Valencia, is on the Mediterranean at the mouth of the Jucar, 24 miles S. S. E. of Valencia. Grain, wine, and fruits are exported. Pop. 9814.

**Cullman**, on R. R., capital of Cullman co., Ala. (see map of Alabama, ref. 2-C, for location of county). Pop. in 1880, 426.

**Culloden**, also called **Drumossie Moor**, a battlefield of Scotland, is a desolate table-land, now partly cultivated, in Inverness-shire, 6 miles E. N. E. of Inverness. Here the royal army, commanded by the duke of Cumberland, totally defeated the Young Pretender, April 16, 1746.

**Cullom** (SHELBY M.). See APPENDIX.

**Cul'lum** (GEORGE W.), an American officer, born Feb. 25, 1809, in New York City, graduated at West Point in 1833; colonel of engineers May 7, 1867, and brigadier-general of volunteers Nov. 1, 1861. He served in the construction of Fort Adams, R. I., 1833-34, 1836-38, and 1858-64; as assistant to chief engineer 1834-36; in building pier, dyke, and lighthouse at Goat Island, R. I., 1836-38; in erecting defences of New London harbor, Conn., 1838-55; in constructing sea-walls and fortifications

at Boston harbor, Mass., 1846-47; in organizing engineer troops and preparing engineer and ponton equipage for the war with Mexico 1846-47; as instructor of practical military engineering, etc. at the Military Academy 1848-55, except while travelling abroad for recovery of his health; in building New York assay-office 1853-54; in charge of public works in North and South Carolina, particularly the construction of the defences (including Fort Sumter), lighthouses, and channel improvements of Charleston harbor 1855-58; as member of special boards 1858-60; and in charge of sea-board defences from New Bedford, Mass., to Sound entrance to New York harbor, 1858-64. In the civil war he was A. D. C. (rank of colonel) to Lieutenant-General Scott, general-in-chief, 1861; chief of staff and of engineers to Major-General Halleck while commanding the departments of Missouri and Mississippi and general-in-chief of the armies of the U. S. 1861-64; engaged in establishing defensive works, directing at Cairo operations auxiliary to the Western armies in the field, making armed reconnaissances of Columbus, Ky.; as chief of engineers in campaign and siege of Corinth, and fortifying its approach after its evacuation; as member of special and engineer boards, and in organizing the defences of Nashville, Tenn., the great dépôt of supplies for Western armies; and as superintendent of U. S. Military Academy 1864-66; brevet colonel, brigadier-general, and major-general Mar. 13, 1865, for faithful, meritorious, and distinguished services; member of the board of engineers for fortifications since 1866. He is author of a work on "Military Bridges with India-rubber Pontons," 1849; of "Register of the Officers and Graduates of the U. S. Military Academy," 1850; of "Systems of Military Bridges," 1863; of a "Biographical Register of the Officers and Graduates of the U. S. Military Academy," 1868; of various military memoirs, reviews, reports, etc., 1833-73; and translator and editor of Duparcq's "Elements of Military Art and History," 1863. Retired from active service Jan. 13, 1874.

**Culm** [Lat. *culmus*, "straw"], the botanical name of the peculiar cylindrical hollow and jointed stem of the grasses. Culm is also a popular name given in some parts of England to anthracite coal.

**Culm**, a town of Prussia, regularly built on an eminence on the Vistula, 23 miles N. N. W. of Thorn. It pursues weaving, corn trade, and shipping. It was a Hanse town. Pop. in 1880, 9937.

**Culmina'tion** [from the Lat. *culmen* (gen. *culminis*), a "top"], an astronomical term signifying the passage of a celestial body over the meridian at the upper transit. The sun culminates at noon or midday, and the full moon culminates at midnight, 12 p. m.

**Cul'peper** (THOMAS), SECOND LORD, was one of the persons to whom Charles II. granted the territory of Virginia in 1673. He was the governor of Virginia from 1680 to 1683. Died in 1719. This name in the baronage of England is written Colepeper.

**Culpeper**, or **Fairfax**, on R. R., capital of Culpeper co., Va. (see map of Virginia, ref. 5-G, for location of county), 62 miles S. W. of Alexandria. Pop. in 1880, 1613.

**Culross**, a seaport-town of Scotland, in Perthshire, on the N. shore of the Frith of Forth, 22 miles N. N. W. of Edinburgh. It is a place of great antiquity. The monastery of St. Serf was founded here about the sixth century. It has remains of Culross Abbey, successively the seat of the Bruce and Dundonald families. Pop. 500.

**Cul'tivator**, an agricultural implement used in England and the U. S. before planting crops, and in the latter country for loosening the earth between rows of plants. American cultivators are either triangular or rectangular frames, with handles like those of a plough, a greater or less number of plough-like teeth, and with their centre-beams projecting in front for the attachment of wheels and draught clevises. Cultivators are very extensively used and manufactured in the U. S. They are of late frequently called horse-hoes.

**Cul'verin** [Fr. *couleuvrine*; etymology uncertain], a long cannon used from the fourteenth to the sixteenth century, generally carried a shot of eighteen pounds, and weighed about fifty hundredweight. A demi-culverin was a nine-pounder.

**Cul'vert** [perhaps from the Fr. *couvert*, "covered"], an arched channel of masonry for the purpose of conveying water under ground. It is often built under canals, and in such cases it may be either a siphon or a surface-drain.

**Cumæ**, an ancient and famous Greek city of Campania, situated on the Mediterranean, 11 miles W. of Naples. It was founded conjointly by colonists from Chalcis and Cyme in Asia Minor. According to Strabo, it was the most ancient of the Greek colonies in Italy. It became an opu-

lent commercial city, built several harbors or port-towns,—among which was Neapolis, the present Naples, which has outlived the mother-town—and for a period of 200 years (700-500 B. C.) it was the most important city of Southern Italy. The people of Cumæ waged war against the Etruscans, who disputed their supremacy as a maritime power, and for a time they were successful. But eventually it proved impossible for the Greek colonies in Italy to maintain themselves against the rising power of the native states. Cumæ was conquered by the Samnites in 420 B. C., and became a Roman *municipium* in 338. In the second Punic war Hannibal tried to capture it, but failed. Cumæ was famous as the residence of the SIBYL (which see). It was the last stronghold of the Goths in Italy, and held out for a long time against the Byzantine army, which captured it from them in 552 A. D. In the ninth century it was completely burnt down by the Saracens, and in the thirteenth, it having become the rendezvous of a desperate gang of robbers, it was razed to the ground by the inhabitants of Naples. But few remains of Cumæ are now in existence.

**Cumaná**, a department of Venezuela, is bounded on the N. by the Caribbean Sea and on the S. by the Orinoco. Capital, Cumaná. Pop. 75,828.

**Cumaná**, a seaport-town of South America, in Venezuela, 1 mile from the Gulf of Cariaco, 180 miles E. of Caracas; lat. 10° 28' N., lon. 64° 16' W. It is the oldest European city in America, having been founded in 1521 by Castellon. It has a good roadstead, and an export trade in cattle, cocoa, smoked meat, etc. It has been nearly destroyed by earthquakes several times. Pop. 9724.

**Cum'berland** [from CYMRU (which see)], the most north-western county of England, is bounded on the N. by Scotland and the Solway Frith, E. by Northumberland and Durham, S. by Westmoreland and Lancashire, and W. by the Irish Sea. Area, 1565 square miles. The surface is mountainous and picturesque. The highest points are Sca Fell, 3100 feet, and Skiddaw, 3022 feet, above the sea. The chief rivers are the Esk, Eden, and Derwent. The scenery is adorned by numerous beautiful lakes, including Derwentwater and Ulleswater, the latter of which is 9 miles long. The land is divided into small freeholds. A generation ago the smaller holdings were generally occupied by their owners, the so-called "statesmen"—that is, "estatesmen," a class of people which was noted for its sturdy independence and attachment to husbandry. But the class has gradually become extinct, and many of the small holdings have now fallen into the hands of the larger proprietors. The main crops are wheat, oats, and turnips. Nearly three-fourths of the corn crops consist of oats. That variety of oats which is known under the name of the potato oat, and which now is cultivated in every part of the United Kingdom, was first discovered in Cumberland in 1788. Coal, copper, iron, lead, plumbago, limestone, marble, and Silurian slate are found here. A curious phenomenon is the occasional appearance—generally at intervals of from two to five years—of the so-called floating island, just in front of the Falls of Lodore, at the upper end of the Lake of Derwentwater. The most probable explanation of this phenomenon seems to be, that the matted weeds which form the floor of the lake become detached from the ground and are raised to the surface. The chief town is Carlisle. This county formed part of the ancient CUMBRIA (which see). Pop. in 1881, 250,630.

**Cumberland**, R. R. centre, capital of Allegany co., Md. (see map of Maryland, ref. 1-B, for location of county), is romantically situated on the Potomac. In population and commerce it is the second city in the State. It is the head of navigation of the Chesapeake and Ohio Canal (leading to Georgetown, D. C.) and the shipping-point for the semi-bituminous coal produced in the vicinity, and which constitutes the principal traffic of that canal. It is 178 miles W. by N. from Baltimore. Its manufacturing industries comprise extensive rolling-mills for rails and bars and factories for other railroad iron, a factory for the manufacture of steel, foundries, machine-shops, flour and cement mills, and numerous minor enterprises. Its mercantile interests employ a large capital. An admirable system of waterworks (on the Holly plan) furnishes an abundance of water. The steadily developing coal trade of Cumberland, in connection with its growing iron industries, forms the chief source of its prosperity. Pop. in 1870, 8056; in 1880, 10,693.

**Cumberland**, Wis. See APPENDIX.

**Cumberland** (WILLIAM AUGUSTUS), DUKE OF, the third son of George II., king of England, was born April 26, 1721. He commanded the allied army which was defeated by the French at Fontenoy in 1745. He defeated the army of the Pretender at Culloden in April, 1746, and was censured for his cruelty in that battle. During the Seven

Years' war he commanded an English army, which was defeated at Hastenbeck in 1757. Died Oct. 31, 1765.

**Cumberland and Teviotdale, DUKE OF** (Great Britain, 1799), and earl of Armagh (Ireland, 1799), are titles borne by the ex-king of Hanover, who is a prince of the blood in Great Britain, being first cousin to Queen Victoria. His full name is GEORGE FREDERICK ALEXANDER CHARLES ERNEST AUGUSTUS. He was born at Berlin May 27, 1819, and was married Feb. 18, 1843, to the princess Alexandrina Marie of Saxe-Altenburg. He succeeded to the throne of Hanover Nov. 18, 1851, as George V., on the death of his father, Ernest Augustus. He took sides with Austria against Prussia in 1866, and was deprived of his kingdom, which was annexed to Prussia Sept. 20, 1866. D. June 12, 1878.—His eldest son and the heir to the dukedom is PRINCE ERNEST AUGUSTUS, born Sept. 21, 1845.

**Cumberland Court-house**, capital of Cumberland co., Va. (see map of Virginia, ref. 6-G, for location of county). Pop. not in census.

**Cumberland Gap**, a narrow pass through the Cumberland Mountains, on the line between Kentucky and Tennessee and at the western extremity of Virginia. It was an important strategic point in the late civil war, and was strongly fortified by the Confederates. It was abandoned by them June 18, 1862, and on the same day was occupied by the national troops under Gen. G. W. Morgan. In Aug., 1862, Gen. E. Kirby Smith outflanked this position by a march through Big Creek Gap, and Gen. G. W. Morgan in consequence was compelled to destroy and evacuate the works. He was hotly pursued northward by a force of Confederates under John H. Morgan. On Sept. 9, 1863, Gen. Frazier, who held the gap with a brigade of Buckner's troops, surrendered after a siege of only four days to Gen. Burnside's troops. The gap itself is a cleft 500 feet deep, and in some places is only wide enough for a road. If well provisioned, it might have been held by a small force against any opposing army.

**Cumberland Island**, of North America, forms a portion of that coast of Davis Strait which lies between Hudson's Strait and Lancaster Sound.

**Cumberland Mountains**, a range of the Appalachian system, forming part of the boundary between Virginia and Kentucky. The range extends in a generally S. W. direction across Tennessee, dividing East from Middle Tennessee. These mountains here form an elevated plateau, seldom over 2000 feet high, but at some points nearly 50 miles across. North-eastern Alabama and North-western Georgia are broken by the southernmost extremity of the range. The Cumberland Mountains abound in caves, and in Tennessee they are very rich in coal and iron, containing nearly all the coal this State affords. The range in Tennessee has been described as capable of furnishing "a highway from Kentucky to the Alabama line along its flat top, along which a traveller may pass without once descending, or even without discovering at any time his elevation." On both sides the plateau breaks off in steep sandstone cliffs, the western side much notched, the eastern quite regular. Its immediate sides are from 800 to 1000 feet high on either side. There are places where its upper surface is much broken by ridges and valleys. The iron deposits of this region are very remarkable, and there is every prospect that from the vast mineral wealth, delightful and healthful climate, good soil, and other great natural advantages, the Cumberland Mountain region of Tennessee will become one of the most wealthy and populous regions of the U. S.

**Cumberland Presbyterian Church, The**, is a growth of the present century. In 1797 a very remarkable revival of religion began to develop itself in South-western Kentucky. The principal minister connected with its early developments was Rev. James McGready. Mr. McGready was a Presbyterian, and was educated in Western Pennsylvania, at what became afterwards Jefferson College, but he commenced his ministry in North Carolina. He was a man of unusual earnestness and power in the pulpit. His earnestness and zeal brought him into collision with the community in which he was laboring. The result was a removal from North Carolina to Kentucky in 1796. He was settled in charge of three congregations—two in Logan co., Ky., Gaspar River and Little Muddy River; and one in Tennessee, Red River, near the dividing-line between the two States.

Mr. McGready's great zeal soon began to show itself in his new field of labor, and in order to bring his people into sympathy and co-operation with him, he proposed to them a written covenant, which they were to subscribe as a pledge of their earnest intention to fulfil its conditions. The measure was an incipient effort towards what was felt to be so necessary—a great revival of religion. A copy of

this covenant is embodied here, as an illustration of the views and feelings, at the time, of a country pastor and a Christian people, surrounded as they were by a literal and a spiritual wilderness. "When we consider," say the covenanters, "the work and promises of a compassionate God to the poor lost family of Adam, we find the strongest encouragement for Christians to pray in faith—to ask in the name of Jesus for the conversion of their fellow-men. None ever went to Christ, when on earth, with the case of their friends that were denied, and although the days of his humiliation are ended, yet for the encouragement of his people he has left it on record 'that where two or three agree upon earth to ask anything in prayer, believing, it shall be done.' Again, 'Whatsoever ye shall ask the Father in my name, that will I do, that the Father may be glorified in the Son.' With these promises before us we feel encouraged to unite our supplications to a prayer-hearing God for the outpouring of his Spirit, that his people may be quickened and comforted, and that our children, and sinners generally, may be converted. Therefore, we bind ourselves to observe the third Saturday in each month for one year as a day of fasting and prayer for the conversion of sinners in Logan county and throughout the world. We also engage to spend one half hour every Saturday evening, beginning at the setting of the sun, and one half hour every Sabbath morning, beginning at the rising of the sun, in pleading with God to revive his work."

This covenant was evidently not a mere formality. The hearts of the preacher and people were in it. In May of 1797 occurred the first developments of the desired work. It is remarkable, too, that its first appearance was in the case of a female member of the church. She was in full communion, but was led to a re-examination of the ground of her hopes, and the result was a conviction that she "was still in the gall of bitterness and in the bond of iniquity." She sought and found peace and joy in believing. This was a beginning. This occurrence, and a great many like it, made the impression upon the mind of Mr. McGready that a large proportion of the membership of the church were strangers to true religion. This impression gave a coloring to his preaching which it retained as long as he lived. He was terribly severe upon what he regarded as mere formalism. To have a name to *live*, and still to be *dead*, was to him the worst of conditions.

The work advanced slowly until 1799. In this year, at the customary sacramental meeting at Red River in July, there was a great movement. Says Mr. McGready: "Great solemnity pervaded the congregation from first to last, and particularly on Monday the presence of God had an overwhelming influence upon the assembled crowd. The boldest and most daring sinners in the country hid their faces and wept bitterly; and such were the deep impressions made upon their minds that when the congregation was dismissed many remained around the doors of the church, unwilling to retire." They were called back into the house; the preachers encouraged and prayed for them, and many were converted. In the following month, at Gaspar River church, the work went forward in still greater power. The following are specimens: A woman in the assembly in deep distress sent for Mr. McGready, and addressed him thus: "Sir, I was a member of your congregation in North Carolina, and in full communion, but I was deceived; I have no religion, and am going to hell." "An aged man in great distress addressed his wife and children thus: 'We are all going to hell together; we have lived prayerless and ungodly lives; the work for the salvation of our souls is yet to be begun; we must all have religion or we will be damned.'"

In July of 1800 occurred the first camp-meeting that ever was held in Christendom. The plan of the meeting was suggested by the circumstances of the country, and the fact that vast crowds were in the habit of assembling at the sacramental meetings from distances varying from ten to a hundred miles. Great numbers professed religion at the camp-meetings and upon other occasions, and the work spread with wonderful rapidity and power over South-western Kentucky and what was called the Cumberland Country—now Middle Tennessee—lying adjacent.

A large element of the population of these countries was either Scotch-Irish or of Scotch-Irish descent, and the Scotch-Irish are generally Presbyterian in their religious proclivities. It was so in this case. The ministers who co-operated with Mr. McGready were Messrs. William McGee, Samuel McAdoo, William Hodge, John Rankin, Presbyterians, and Mr. John McGee, Methodist. These men were all of Scotch-Irish origin, and had emigrated from North Carolina. It may be mentioned here that when the Cumberland Presbyterian Church came to be fully organized nine-tenths of its ministry, and at least four-fifths of its membership, were of Scotch-Irish descent. This fact is mentioned that the reader may know something of the

material of which this communion was originally composed. Some characteristics are charged upon Cumberland Presbyterians which are in direct conflict with what would be inferred from their paternity. Everybody knows that a Scotch-Irishman is neither a patron of ignorance nor a fanatic in religion. Yet Cumberland Presbyterians have been charged with being fanatical in religion and the patrons of ignorance. Facts, as we shall see, as well as philosophy, vindicate them from the charge. It is utterly without foundation.

The rapid progress and widespread influence of the revival produced the necessity of organizing a great many new congregations; and this, of course, created a necessity for more ministerial laborers. The Presbyterian Church could not supply them in the ordinary way. There were no schools, and if schools had been abundant the congregations could not wait until young men would be able to go through such a course of literary and theological training as is customarily required in the Presbyterian Church preparatory to licensure and ordination. No one complained of the requisition, but its fulfillment seemed impracticable under the circumstances. The patriarch\* of Presbyterianism in Kentucky visited the region of the revival, and seeing the necessities of the congregations, advised the ministers and leading laymen of the Church to select such young men as they thought promised usefulness, and direct their attention to the work of the ministry, although they might not be able to obtain what was considered a full ministerial education. The counsel seemed practical, and three young men at first were encouraged to prepare themselves for the work as well as they could. These young men presented themselves to the Transylvania Presbytery in Oct., 1801. The presbytery hesitated, but at length, in Oct., 1802, they were all licensed as probationers for the holy ministry. At the same presbytery two others were received as candidates for the ministry. Opposition, however, at once developed itself. In Oct., 1802, the Transylvania Presbytery was divided, and the Cumberland Presbytery was formed, embracing the more immediate region of the revival. The Cumberland Presbytery from time to time licensed a few others and ordained two or three. These were all what were called uneducated men; they were all, however, men of promise, and some of them became distinguished in subsequent years. The opposition was continued in the new presbytery.

There was difficulty from another source. The revival ministers were warm-hearted, and controlled less by theological and technical than by practical, and what they regarded as spiritual, considerations. The young men, too, had not learned to split all the metaphysical hairs of theology, and there were some expressions in the Confession of Faith which seemed to them to teach the doctrine of fatality. This they could not receive, and were allowed to except to it in their licensure and ordination.

There were thus two subjects of dissension between the parties: one was educational, the other theological. The revival ministers did not object to education for the ministry, but to the rigid application of the rule in the circumstances surrounding them. The young men did not object to the Confession of Faith, but to those expressions in it which seemed to them to imply the doctrine of fatality. Their warm-hearted and liberal fathers thought proper to indulge them in their skepticism on this subject. They adopted the Confession of Faith with the single exception. The difficulties became serious, and were finally brought before the synod of Kentucky. The synod of 1804 appointed a committee to attend a meeting of the Cumberland Presbytery and inquire into the condition of things. None of the committee fulfilled the appointment except one, and he was notoriously a persecutor of the presbytery, and was regarded as a spy. Nothing good, of course, resulted. The synod at its next meeting, in 1805, appointed a commission consisting of fifteen members to visit the region in which the difficulties existed, to confer with the Cumberland Presbytery, and to endeavor to restore quiet and harmony. The commission met on Dec. 3, 1805, at Gaspar River meeting-house, in Logan co., Ky. The first measure of the commission was to require of the presbytery a surrender of all the young men who had been licensed and ordained in what they regarded a questionable manner, for a re-examination by the commission, with a view to a confirmation or an annulling of the proceedings of the presbytery in each particular case. It is to be borne in mind that several of the men thus required to be surrendered to the commission were themselves members of the presbytery. The presbytery declined compliance, upon the ground that the constitution of the Presbyterian Church gives to the presbytery alone the power "to examine and license candidates for the holy ministry; to ordain, install, remove,

and judge ministers;" that it gives no such power to a synod, much less to a commission of synod, nor to any other judicature of the Church. The commission then called upon the young men to submit themselves for re-examination; they also declined, whereupon the commission passed the following resolution: "Resolved, That as the above-named persons never had regular authority from the presbytery of Cumberland to preach the gospel, etc., the commission of synod prohibit, and they do solemnly prohibit, the said persons from exhorting, preaching, and administering the ordinances, in consequence of any authority which they have received from the Cumberland Presbytery, until they submit to our jurisdiction and undergo the requisite examination."

The names of the persons thus proscribed are omitted as a convenience. Four of them were ordained ministers and members of the presbytery; the others, eight in number, were either licentiates, candidates for the ministry, or exhorters. The presbytery took the ground in the controversy that the proceedings of the commission were unconstitutional, and of course that the proscribing act was unconstitutional and void. Nevertheless, from a general respect to authority, and from an obvious desire to procure a reconciliation, and enjoy peace and quietude as far as possible, both the proscribed members, and those who had promoted their induction into the ministry and sympathized with them, constituting a majority of the presbytery, organized themselves into what they called a *council*, determining in this manner to endeavor to carry forward the work of the revival, to keep the congregations together, but to abstain from all proper presbyterial proceedings, and await what they thought would be a redress of their grievances. The synod of Kentucky at its sessions in 1806 dissolved the Cumberland Presbytery, and annexed the members who had not been placed under the ban of the commission to the Transylvania Presbytery.

The council continued their organization from Dec., 1805, to Feb., 1810. By that time they became satisfied that they had nothing to hope either from the synod or the General Assembly. As a last resort, and in order to save what they represent to the General Assembly as "every respectable congregation in Cumberland and the Barrens of Kentucky," two of the proscribed ministers, Finis Ewing and Samuel King, assisted by Samuel McAdam, one of those who had been placed under an interdict by the commission for his participation in what they denominated the irregularities of the presbytery, reorganized the Cumberland Presbytery at the house of Mr. McAdam, in Dickson co., Tenn., on the 4th of Feb., 1810. It was organized as an independent presbytery. It will be observed that it was a reorganization of a presbytery which had been dissolved, and which had received its name from its locality. The Church which grew up from these beginnings naturally took the name of its first presbytery as a prefix. Hence this Church is called, from the circumstances of its origin, "The Cumberland Presbyterian Church." It extends now from Pennsylvania to the shore of the Pacific, but it originated in what was called, at the time, the "Cumberland Country" and from the Cumberland Presbytery. It is hoped that these details will not be considered useless. They are intended to enable the reader to understand what most readers remote from the scene of the transactions do not understand—that a Church of some extent should be so local in its name. The name suggests nothing connected with the denomination except the locality of its origin, and this was accidental, or rather providential.

The new presbytery immediately set forth a synopsis of its theology and the principles of action by which it proposed to be governed. Its theology was Calvinistic, with the exception of the offensive doctrine of predestination, so expressed as to seem to embody the old pagan dogma of *necessity* or *fatality*. Its rules of action were to be presbyterial.

There is no probability that these good and earnest men had any adequate conception of what became the magnitude of the work upon which they were entering. They hardly thought of anything beyond an organization which would enable them, and perhaps their immediate successors, to labor with greater vigor and efficiency in promoting the work to which they thought God in his providence and by his Spirit had called them. We judge now that they did not think of originating a Church, but simply a presbytery. But God rules, and we have a thousand evidences that he ruled in this case.

The new presbytery held its first adjourned meeting in March, the month following its organization. There were present four ordained ministers, six licentiates, and seven candidates for the ministry. These men constituted really the fathers and founders of the Cumberland Presbyterian Church. At the fourth session of the presbytery, held in Oct., 1811, a committee was appointed to meet committees

\* Rev. David Rice.

from two of the neighboring presbyteries of the Presbyterian Church, with a view to "conferring on the subject of a reunion, and other matters relative to that harmony which should exist between the members and people of Jesus Christ." This well-meant measure, however, failed of any good effect. Early in the year 1813 the presbytery had become so large that it divided itself into three presbyteries, and constituted the Cumberland Synod. This synod, at its sessions in 1816, adopted a Confession of Faith, catechism, and system of church order in conformity with the principles avowed upon the organization of the presbytery. The Confession of Faith is really a modification of the Confession of Faith of the Presbyterian Church. It was intended by the framers to exclude only the offensive doctrine which had been a principal cause of all the difficulties. The government is Presbyterian.

In 1826 its first college was organized under the supervision of the Church. It was located at Princeton, Ky. It was a manual-labor school. In 1830 its first paper was published under the patronage of the Church. It was a weekly religious and literary journal, also published at Princeton. In 1828 the Cumberland Synod was divided into three synods, and a General Assembly succeeded. The first meeting of the Assembly was held in May, 1829.

At the last meeting of the General Assembly, which was held in May, 1880, there were reported 27 synods, 117 presbyteries, 1386 ministers, 2457 congregations, 98,408 communicants, 59,932 persons engaged in Sabbath school work, and \$475,287 in contributions to church purposes. All these estimates are made from defective reports. The stated clerk of the General Assembly says that they would be increased by full reports. Probably a full estimate would place the membership at 120,000.

The Church has under its patronage three weekly newspapers, one quarterly, and two monthlies—one devoted to the interest of females. It has also under its patronage three chartered universities and several colleges, both male and female and mixed. Two of its universities give instruction to both males and females; the other has regular collegiate, theological, law, and medical departments. Cumberland Presbyterians make no great parade of their character, numbers, or work, but they are willing that the world should know both what they are and what they do.

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**Cumberland River**, an affluent of the Ohio, rises among the Cumberland Mountains in Kentucky, near the S. E. boundary of that State. It flows nearly westward, crosses the southern boundary of Kentucky, describes an extensive circuit in Middle Tennessee, passes by Nashville, and returns into Kentucky. It afterwards flows north-westward, and enters the Ohio at Smithland. The Cumberland and Tennessee rivers are only about 3 miles apart at a point nearly 20 miles from Smithland. Length, estimated at 650 miles. Steamboats can ascend it to Nashville, about 200 miles from its mouth, and it is navigable above Nashville, at certain seasons, 400 miles.

**Cumberland University**, at Lebanon, Tenn., belonging to the Cumberland Presbyterians, was founded in 1842. Its presidents have been as follows: F. R. Cossitt, D. D., 1842-44; T. C. Anderson, D. D., 1844-66; B. W. McDonald, D. D., LL.D., 1867. Its departments are—arts, theology, medicine, natural science, commercial and polytechnic, preparatory.

**Cum'bre, La** (the summit), a principal pass across the Andes, between Santiago in Chili and Mendoza in the Argentine Republic. Elevation, 12,454 feet above the level of the sea. Men travelling on foot can pass over the Cumbre from May to the end of October.

**Cum'bria** [named from the CYMBRY (which see), its ancient inhabitants], an ancient British principality, comprising Cumberland in England and that part of Scotland which now forms the counties of Ayr, Dumbarton, Dumfries, Lanark, Peebles, Lanfrew, and Selkirk. It was ruled by its own kings until about 950 A. D. Scottish Cumbria then became the kingdom of STRATHCLYDE (which see).

**Cum'brian Mountains**, a range or group of mountains in the N. of England, occupying parts of Cumberland, Westmoreland, and Lancashire. This region, called the "English Lake District," is remarkable for its picturesque scenery, and is much frequented by tourists. Here are numerous lakes, the largest of which are Windermere and Ulleswater. These mountains are mostly formed of granite and Silurian rocks. The highest point, Sca Fell Pike, rises 3166 feet above the sea.

**Cum'min**—(or **Cumin**)—Seed [Lat. *cuminum*], the fruit of the *Cuminum Cuminum*, a plant belonging to the order Umbelliferae. It is the only known species, and is found in Egypt and the adjacent countries. It is an annual with

branched stem, thread-like leaves, with umbels of small white or pink flowers. It has been cultivated from remote times for the sake of its seeds, which have an aromatic taste somewhat resembling caraway. In Germany and Holland it is used in cookery. As a medicine it is mostly limited to veterinary practice. It is cultivated in Northern Africa, India, and Southern Europe; but the seed are mostly imported from Sicily and Malta. Oil of cummin is abundantly obtained from the seed. The oil of cummin consists of a mixture of two distinct oils, one called cymene ( $C_{20}H_{14}$ ); the other regarded as a hydride of cumyl ( $C_{20}H_{11}O_2.H$ ). This oil is of a strong bitter, disagreeable taste, with the general properties of the other essential oils.

Cummin is mentioned both in the Old and the New Testament (Isa. xxviii. 25-27; Matt. xxiii. 23) and in the works of Hippocrates and Dioscorides. Among the Romans it was taken medicinally, the seeds being ground and mixed with water and wine. It was believed to produce pallor of the face (Horace, "Epist." 1. 19; Persius, "Satyr." 5. 55), and Pliny tells us that the followers of the famous rhetorician Porcius Latro commonly used it in order to produce a complexion bespeaking close application to study. In the Middle Ages cummin was one of the most common spices grown in Europe and much appreciated. It was used as a stimulant also, and the seeds brought in the thirteenth and fourteenth centuries a price of about 1s. 4d. per pound. At present it is quite generally raised in gardens, though only for household use, and employed to flavor cheese, bread, strong drinks, etc.

**Cum'ming**, capital of Forsyth co., Ga. (see map of Georgia, ref. 2-G, for location of county), about 40 miles N. N. E. of Atlanta. Pop. in 1870, 267; in 1880, 250.

**Cumming** (ALEXANDER), a Congregational minister, born in Freehold, N. J., in 1729, was ordained to the Presbyterian ministry in New York in 1747, and preached in New York 1750-53, when he was relieved at his own request of his colleague pastorate. In 1761 he was ordained colleague pastor of the Old South church, Boston, Mass., where he thenceforth remained. He died Aug. 25, 1763.

**Cumming** (ALFRED), a Confederate brigadier-general, was born in Georgia in 1829, graduated at West Point in 1849, became captain in the Tenth U. S. Infantry in 1856, resigned in 1861, entered the Confederate service, and fell at the battle of Jonesboro', Ga., Sept. 1, 1864.

**Cumming** (JOHN), D. D., F. R. S. E., a popular Scotch preacher, born in Aberdeenshire Nov. 10, 1810. He became in 1833 minister to the Scottish church in Crown court, Covent Garden, London. He published interpretations of the apocalyptic prophecies, "The Great Tribulation," "The Destiny of Nations," etc. He was a zealous opponent of the Roman Catholic Church and a defender of the National Church of Scotland. D. July 5, 1881.

**Cumming** (ROYALEYNE GORDON), known as the "lion-hunter," was born at Alyre, Scotland, Mar. 15, 1820. He was the son of a baronet, was educated at Addiscombe, and entered a cavalry regiment in the East India service, and afterwards took a commission in the Cape Mounted Rifles in South Africa. While there he distinguished himself by his exploits in killing lions, elephants, and other wild beasts. Of his surprising adventures he wrote an account in book-form, which was highly popular, but after a time fell into a discredit which it hardly deserved. He afterwards became a popular lecturer in Great Britain upon sporting subjects. Died Mar. 24, 1866.

**Cumming** (WILLIAM), U. S. A., was born in Georgia in 1788, became in 1813 major of the Eighth U. S. Infantry, was wounded at Chrysler's Fields, Nov. 11, 1813, became colonel and adjutant-general in 1814, was wounded a second time at Lundy's Lane, and in 1847 declined a major-generalship. A lawyer by profession, he never practised, being the possessor of a large fortune. In a political contest with George McDuffie of South Carolina he was involved in a duel, in which McDuffie was wounded in the spine. Died at Augusta, Ga., in Feb., 1863.

**Cummings** (A. B.), U. S. N., born June 22, 1830, in Pennsylvania, entered the navy as a midshipman April 7, 1847, became a passed midshipman in 1853, a lieutenant in 1855, and a lieutenant-commander in 1862. He served in the steamer Richmond at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862, at the passage of Vicksburg, June 28, 1862, and in the engagement with the batteries at Port Hudson, Mar. 14, 1863, where he fell mortally wounded "while he was cheering the men at the guns." The loss which the country and the navy sustained in the death of this gallant officer may be gathered from the following extract from the address of Captain Alden to the officers and crew of the Richmond on Mar. 22, 1863: "With deep sorrow I call you together to announce the death of our late executive officer, Lieutenant-



Commander A. B. Cummings, at New Orleans. It has pleased God to take from among us our gallant friend in the fullness of his energies and usefulness. You all well know the importance of his services in this ship; his conscientious devotion to duty; his justice and even temper in maintaining discipline; his ability in preparing for emergencies, and his coolness in meeting them. All these qualities he brought to his country in the hour of need, and he has sealed his devotion with his life. The fatal cannon-shot struck him when he stood on the bridge, cheering the men at their guns and directing their fire. He was thrown down upon the deck, but his presence of mind still remained. He said, 'Quick, boys! pick me up; put a tourniquet on my leg; send my letters to my wife; tell her I fell in doing my duty.' When below he said to the surgeon, 'If there are others worse hurt, attend to them first. Nolan, are you here, too?' He inquired about Howard, and his thoughts were directly of others and of success in the fight. When told that the noise he heard was from the escape of steam, and that the ship could no longer stem the current, he exclaimed, 'I would rather lose the other leg than go back; can nothing be done? There is a S. wind; where are the sails?'  
FOXHALL A. PARKER.

**Cummings** (JOSEPH, D. D., LL.D., a Methodist Episcopal theologian, was born at Falmouth, Me., Mar. 3, 1817, and graduated at Wesleyan University in 1840, entered the ministry in 1841, became in 1853 professor of theology in the biblical institute at Concord, N. H., was pres. of Geneva College (1854-57), and in the latter year became pres. of Wesleyan Univ., at Middletown, Conn. Elected pres. of North-western Univ., Evanston, Ill., in 1881.

**Cum'mins** (FRANCIS, D. D., born near Shippensburg, Pa., in 1752, was one of the framers of the Mecklenburg Declaration of Independence (May, 1775), and in 1780 was licensed by the presbytery of Orange, N. C., to preach. For many years he was the honored pastor of Presbyterian churches in the Carolinas and Georgia. Died Feb. 22, 1832.

**Cummins** (GEORGE DAVID, D. D., an American clergyman, was born near Smyrna, Del., Dec. 11, 1822. He was graduated from Dickinson College in 1841, and was a licentiate in the Methodist Episcopal Church for two years. In 1845 he studied for orders in the Protestant Episcopal Church, in October of the same year was ordained a deacon, and in 1847 a presbyter. For six years he was rector of Christ church at Norfolk, Va., and then successively rector of St. James's church, Richmond, Trinity church, Washington, St. Peter's church, Baltimore, and Trinity church, Chicago. In 1866 he was elected assistant bishop of Kentucky. In Nov., 1873, he resigned his position, withdrew from the Protestant Episcopal Church, and founded the Reformed Episcopal Church, of which he was made presiding bishop Dec. 2, 1873. He was for a long time the leader of the evangelical party in the Protestant Episcopal Church, but he believed that a revised Prayer-book would meet the needs, and as late as 1869 he saw no necessity for separating from the Church. After the general conference, however, of the Evangelical Alliance in Oct., 1873, he felt that the breach had become necessary. Died at Lutherville, Md., June 26, 1876. J. P. BISHOP.

**Cummins** (MARIA S.), a popular novelist, was born at Salem, Mass., April 10, 1827. Her most successful novels were "The Lamplighter" (1853), translated into French and German, "Mabel Vaughan" (1857), "El Fureidis" (1860), and "Haunted Hearts" (1863). Died Oct. 1, 1866.

**Cumulative Voting.** See PROPORTIONAL REPRESENTATION.

**Cunard'** (SIR SAMUEL, BART., was born in Nov., 1787. He was the eldest son of a gentleman in Halifax, Nova Scotia. He became the head of the extensive firm of steamship owners, Cunard & Co. He married a lady of Halifax, and in 1859 was made a baronet. Died April 28, 1865, leaving eight children.—He was succeeded in the baronetcy by his son, SIR EDWARD, who married Miss Mary McEvers of New York. Sir Edward Cunard died April 6, 1869.—SIR BACHE CUNARD, the present baronet, was born May 15, 1831. He resides chiefly in the U. S. Became M. P. in 1874.

**Cunax'a**, the ancient name of a place in Babylonia, on the E. bank of the Euphrates, about 45 miles N. of Babylon. In 401 B. C. a battle occurred here between Artaxerxes Mnemon, king of Persia, and his brother Cyrus (the Younger), who was defeated and killed.

**Cundinamar'ca**, one of the United States of Colombia, separated by the Central Cordilleras from Antioquia and Cauca on the W., by the Orinoco from Cauca and Venezuela on the E., and bordering S. on Cauca, and N. on Boyaca and Antioquia. The climate varies from the *tierra caliente* of the valleys to the *tierra fria* of the high plateaux, and the products are very abundant. The chief exports are tobacco and cinchona. Chief city, Bogotá. Pop. 409,602.

**Cunduran'go**, or **Condurango**, a twining plant of the order Asclepiadaceae, apparently belonging to the genus *Nantonia*, though its botanical relations are not well known. It grows in Ecuador, and has been sold in the U. S. and Europe at fabulous prices as a cure for cancer. It has, however, no favorable effect upon that disease, though it probably has active properties. Its name signifies "condor root," and it is believed by the Indians that the condor uses it as a medicine.

**Cu'neiform** [Lat. *cuneiformis*, from *cuneus*, a "wedge," and *forma*, "form"], having the form of a wedge; applied to one of the bones of the wrist and to three of the tarsus; also to certain wedge-shaped characters found on ancient monuments. (See next article.)

**Cu'neiform (or Arrow-headed) Inscriptions.** The cuneiform characters used in the Euphrates valley had their origin in a hieroglyphic or picture system of writing. A few inscriptions, in a more primitive style than usual, retain considerable resemblance to the original hieroglyphics, though most of the Assyrian inscriptions preserve very little resemblance to their original pictures. The ordinary characters are made up entirely of wedges, differently arranged, and ranging from a single one to a combination of twenty. Each character is either a syllable or a word, the analysis into consonant and vowel sounds being quite beyond the capacity of the Chaldean scribes. The choice of the wedge as the basis of all the characters is not arbitrary, but results from the employment of soft clay (instead of parchment), which was inscribed with a pointed stylus.

From the earliest historical period, as now, the Euphrates valley has contained races existing side by side, but speaking diverse languages. At present the Persian, the Arabic, and the Turkish represent the three great families of languages, the Indo-Germanic, the Shemitic, and the Turanian; and the same three families are represented by the languages which we find in the early trilingual cuneiform inscriptions—one being in the Turanian Accad language, another in the Shemitic Assyrian, and the third in the Indo-Germanic Persian, or Achaemenian.

The earliest civilization of the Euphrates was Turanian. It is indicated by the genealogy of Genesis x., which represents Asshur as having descended from Cush. This Turanian people, called *Accad*, invented the form of writing which, with the modifications produced by ages of use, was adopted by all the other languages about them. But not being originally an alphabet of simple sounds, but characters representing words, it naturally became encumbered in the transfer with a multiplicity of sounds, which has been a great stumbling-block to those who have not made the language a study.

Thus, for example, in Turanian the word *par* means "the sun," and had its appropriate hieroglyphic, afterwards abbreviated into a conventional character, consisting of one upright wedge with two very short parallel wedges set obliquely by its left side. The meanings "light" and "day" were naturally enough attached to the same character, just as we say that the *sun* is very bright when we mean that its *light* is brilliant, and as an Indian speaks of three *suns* when he means three days. Any other word besides *par*, signifying in Turanian "sun," "light," or "day," was attached to this hieroglyphic as its variant significations and pronunciations. When the character was transferred into the Assyrian language, it kept its significations, but utterly altered its pronunciations. In its sense of "the sun," from *par* it became *samas*; in its sense of "day," it became *imma*; and so with other significations. The same was true in its transfer to the Persian. But another stage of change remains, the syllabic.

It was a very simple step to abbreviate the sound allowed to a character. Thus, in Accad the word *Annap* means God, and is represented by two successive short horizontal wedges followed by a longer upright one. This character was not only employed to represent the idea of God, pronounced *Annap* in an Accad and *Ilu* in an Assyrian inscription, but also to represent the first syllable *an* of *Annap*. In a similar way the character pronounced *pih*, "ear," in Accad, came to represent the simpler syllable *pi*. There were thus as many simple syllables formed as could be made by the combination of twenty consonants with three vowels; it being remembered, however, that when the consonant followed the vowel no distinction was made between the different consonants of a class, whether sibilant, labial, dental, or guttural. Thus *ab* and *ap* are represented by the same character, and so is *us*, *uz*, and *u* followed by either one of two other sibilants. When these simple syllables were combined to form words, it became necessary to duplicate the vowel sound of a closed syllable, as in the word *habba*, "sea," which is written with the characters pronounced *ha-ab-ba*.

These different stages of writing will be more or less com-

bined in any Assyrian inscription, so that we may have in the same line simple syllables, like those in *ha-ab-ba*, "sea," complex syllables, like those in *gul-lul-tu*, "curse," and ideographic signs, like that for *rabu*, "great." And a single sign may have several different values; and cases occur in which, by a perversity of the scribes, the same character is used in two successive syllables of the same word with different values, the practice which allows us to pronounce *viz* one way in "vizier," and another in the contraction for "namely," being carried to an extreme extent, so that there are cases of polyphony in which a single character has as many as five or six distinct values.

The complexity of the Assyrian system of writing is so great that there was for a long time much skepticism about the trustworthiness of the decipherment, although there is scarce a feature of the system that is not paralleled in the existing Japanese writing. But the proofs of its correctness are beyond cavil. They are found in trilingual inscriptions of considerable length, where it is easy to compare the Assyrian with the Persian; in some long inscriptions of which we have a large number of copies, and in which the scribes have written the same word in several different ways, more or less contracted; and finally in the extensive syllabaries are grammatical texts of the monuments, which were prepared, as we prepare dictionaries and spelling-books, for the instruction of learners, and which explain the values of the characters. The proof of the correctness of these readings was first given, so as to make it beyond reasonable question, in 1857, when Sir Henry Rawlinson, William H. Fox Talbot, Esq., Rev. E. Hincks, D. D., and Doctor Jules Oppert prepared independent translations from copies of a long inscription of Tiglath-Pileser. These translations were transmitted in sealed packets to a committee of the Royal Asiatic Society, and opened and compared by them. It was found that they were so nearly identical that it was preposterous to suppose that the true foundation had not been laid for the decipherment of the inscriptions. The amount of these inscriptions collected by Botta and Layard is very great, and includes the complete historical annals of several kings, embracing the details of their various campaigns, a very large number of grammatical and lexicographical tablets, legal and commercial documents, such as bills of sale, despatches to the king from the generals in the field, chronological tables, accounts of eclipses and lunar conjunctions, and indeed almost everything that a people greatly given to writing would care to record. The fortunate discovery of libraries or record-chambers of Sennacherib and Assurbanipal has been of incalculable service.

**Language.**—Its entire vocabulary and its grammar clearly prove that the Assyrian language belongs to the Semitic family, and to the same branch of it as the Hebrew and Phœnician, rather than to the Aramæan or to the Arabic branch. And yet it preserves many forms which are nearly or quite obsolete in Hebrew, such as the three case-endings of the noun, and the conjugations of the verb formed with *s* and *t*. The Assyrian is peculiar in its exceedingly rare use of the perfect (preterite) tense. So rarely is it used that the French scholars deny its existence entirely. A large majority of the roots are the same as in Hebrew; the sibilants are preserved, and not changed into dentals, as in Aramaic, which is considerably more remote from the Assyrian than is the Arabic.

**Mythology.**—The chief Assyrian deity was Asshur, called "chief of the gods," and replaced in Babylon by a deity called *Il* or *Ra*. It is remarkable that no temples were built to this tutelary god of Assyria, although the oldest capital of the country, built before Nineveh, and the country itself, bear his name. His emblem was a winged circle enclosing or surmounted by a human bust.

Subordinate to Asshur is the triad of Anu, Bel, and Hea or Ao, also called Sin. Anu was a very old deity, and in later mythology seems to have presided over the lower regions, and perhaps to have ruled Chaos. Bel, the organizer of the world, judging from his Semitic name, meaning "lord," corresponds to the Roman Jupiter. Hea, or Ao, is the god of wisdom, the Orantes of Berosus. To this triad succeeds another, consisting of Iva (Bin), the "ether;" Shamas, the sun; and Sin, the moon. The five planets were identified with the gods Ninip (Adar?), Saturn; Merodach, Jupiter; Nergal, Mars; the goddess Ishtar, Venus; and Nebo, Mercury. With most of the gods were connected corresponding female divinities, of whom the best known is Beltis, wife of Bel, who is the Mylitta of Greek writers, in whose temple every Babylonian woman was obliged to prostitute herself once in her life.

The ancient Babylonians were familiar with the story of the Deluge, as is proved by some very curious mythological tablets lately deciphered by Mr. George Smith, and probably reaching back to the extreme antiquity of over 2000 B. C. In this story Sisit (the Xisuthrus of Berosus) takes

the place of Noah, and is warned by Hea to build a ship, that he and his family and individuals of all the animals may escape a flood sent to punish the wickedness of men. The vessel is calked with bitumen and roofed with reeds. Its dimensions are missing, but its breadth and height, unlike those of the biblical ark, are equal. Unlike the ark, it has a pilot. The rain lasts but seven days, and the birds sent out are a dove, a swallow, and a raven. The ark rests on the mountains east of Babylon, when the god lets Sisit and the animals out, and he offers a sacrifice. As a reward for his services he receives the gift of immortality. This story of the Deluge is on the eleventh of twelve tablets, of which one was for each month, this being for the "rainy month."

**History.**—The most important result of the decipherment of the cuneiform inscriptions is the addition of an almost entirely new chapter to the history of the ancient world. The Babylonians and Assyrians, unlike the early Hindoos, were exceedingly careful to preserve their historical records for posterity. Hundreds of copies exist of a single inscription giving an abstract of the victories of Assurnazirbal; and the very bricks of which a palace was built were stamped with the name of the ruling monarch. The fragmentary and contradictory accounts of Berosus, Ctesias, etc. have been supplemented by an immense mass of contemporary records, quite complete in some reigns, from which we can gain a very clear view of the rise and fall of the Assyrian and Babylonian powers.

The earliest dynasty was an indigenous one, called by various authors Accad, Chaldæan, or Cushite. It began about 2200 B. C., and the names of a few kings are preserved, among whom are Ur-hammu (perhaps the Orchamus whom Ovid reports to have been the seventh after Bel), his son Ilgi, Ismidagon, and Hammurabi, extending to the middle of the sixteenth century B. C., when Thothmes III. overran Mesopotamia, and established a line of Egyptian rulers whom Berosus calls Arabian. After two or three centuries, during which the Egyptians were paramount, we meet the name of Assur-bel-nisis as the founder of the first Assyrian dynasty. He was an insignificant ruler, like his immediate successors, and not till Tiglath-ninip I., about 1300 B. C., was Babylon conquered by the king of Nineveh. Of his successors the most powerful was Tiglath-Pileser I., whose history is quite fully given, and who conquered the Moschi of the Black Sea, Armenia, Western Media, the Syrian Hittites, and a portion of the Phœnician coast. He records it as an extraordinary exploit that he entered a vessel of Aradus and killed a dolphin with his own hand. After some reverses in attempting to subdue the revolted city of Babylon, he succeeded in recovering for Nineveh the political supremacy. His third successor, Assur-rabu-amar, was conquered about 1070 B. C. by the Hittites, and lost all his Syrian conquests, thus allowing the development of the Jewish kingdom under David and Solomon.

The earlier kings of a second Assyrian dynasty, beginning with the usurper Beletaras, are obscure, but with one of them, Vul-nirari II., chronology becomes certain, as we have a nearly complete list of the eponyms for each year for some centuries after his reign, with the names of the corresponding kings, the Assyrians having the habit of naming each year after some public functionary, who corresponded in this respect to the Greek archons and the Roman consuls. The first king of note is the great conqueror Assurnazirbal, who carried his arms to the Mediterranean Sea on the west, and into Media and Persia on the east. His son, Shalmaneser II., extended his conquests—or rather his campaigns, which often issued in only a temporary subjection—into regions beyond those visited by his father, but the most interesting are those in which he conquered Benhadad and Hazael, the successive kings of Damascus, the former of whom was aided by 10,000 troops from Ahab, king of Israel, though his successor, Jehu, gave tribute to Shalmaneser, and thus incurred the enmity of Hazael. Of the successors of Shalmaneser, the second, Vul-nirari III., was a great conqueror, and his wife, Sammuramat, is the Semiramis of Herodotus.

The Assyrian annals give no account of the fall of Nineveh under Sardanapalus, and the identification of his name with that of Assur-nirari by the French Assyriologists depends on a very doubtful conjecture that the character read *nirari* by George Smith, and which appears sometimes to be equivalent to *gabai*, may, in a rare inflectional form of that root, have been *tanagbal*. The resulting name, Assur-tanagbal, would readily become Sardanapalus in Greek. Equally obscure is the biblical Pul, king of Assyria, who about this time received tribute from Menahem, king of Israel. Some scholars assume at this time, which closes the first Assyrian empire, a break in the table of eponyms of forty years, which reconciles these annals with the Jewish history. If this break does not occur, the dates

given for the previous kings must be brought down forty years.

In 744 B. C., Tiglath-Pileser II. commenced a new line of Assyrian monarchs, founding the second Assyrian empire. The reconquest of Babylonia occupied the earlier portion of his reign, while the latter portion was taken up with expeditions against Syria, Phœnicia, and Israel. Pekah, king of Israel, was dethroned by him, and Menahem occupied the throne for eight years, until, taking advantage of Tiglath-Pileser's campaign against Armenia, Pekah again recovered his position. This fact, given by the monuments, explains a discrepancy of eight years between the biblical dates of the Jewish and Israelite kings. Ahaz is mentioned, in the Assyrian as in the biblical records, as an ally of Assyria against Israel, and as doing homage with other kings to Tiglath-Pileser at Damascus. His son, Shalmaneser IV., succeeded him, and after a reign of five years was succeeded by his tarta (or general) Sargon in 721 B. C. Sargon was a great conqueror. It was he who carried Samaria captive, though the biblical record has been thought to imply that it was Shalmaneser. He extended his conquests over Syria, Phœnicia, and Palestine, and conquered the army of Egypt that was assisting the Philistine cities. The king of Egypt and the queen of Arabia gave him tribute. He then ravaged Armenia, portions of Media, Parthia, Albania, Cilicia, and Pisidia. When Babylon revolted he subdued it, placing a satrap of his own in command. He even received the submission of Cyprus, as a granite column discovered in Citiun contains the cuneiform record and the representation of Sargon. He was assassinated in 704 B. C., and succeeded by his son Sennacherib, also a famous conqueror. We possess long records of his reign, including full accounts of his campaign against all the countries ravaged by his father, among which was Judah, then ruled by Hezekiah. His son Esarhaddon (681-667) was also a warlike king. He had been viceroy of Babylon before his father's assassination, and made that city his place of residence. He increased the Assyrian domain by an expedition into the Arabian peninsula and by the conquest of Egypt. His son Assurbanipal, the Greek Sardanapalus, was equally successful in war, and reconquered the rebellious Egyptians in three successive campaigns. Tyre was forced to yield after a stout siege, and the daughter of King Bahlul and other princesses were taken into the harem of the conqueror, who here first shows his sensuality. Then followed his treaty with Gyges, king of Lydia (of whose relations with the wife of Candaules, Herodotus tells so curious a story), and his war with Elam, concluded about 655 B. C. by the complete submission of Elam. The Assyrian empire had now reached its greatest extent, including all the known world. From this time till his death, in 726 B. C., his task was to retain his unwieldy conquests, and especially to crush the rebellion of his brother, Saul-Mugina, at Babylon, aided by Tamaritu of Elam. Assurbanipal was a munificent patron of learning, and founded large libraries, a large portion of which is now in the British Museum. He also built many temples and palaces. But his reign, which marks the grandest era in Assyrian history, was the immediate precursor of the overthrow of the empire under his successor by the combined armies of Babylon and Media.

In the cuneiform inscriptions we also have full records of the Babylonian monarchy which succeeded the Assyrian. This empire lasted for less than a century, and of the six kings only three have any note—Nabopolassar, its founder, his son Nebuchadnezzar, who raised it to its highest pitch of power, and Nabonidus, under whom it was overthrown. None of these monarchs were remarkable as warriors, although Nebuchadnezzar in the early part of his reign drove an Egyptian army as far as Pelusium, and destroyed Jerusalem and Tyre. His annals are mainly filled with descriptions of the magnificent public buildings which he erected. Of his lycanthropy the inscriptions give no record. About the time of his death (561 B. C.) the Persian power arose, and gradually assumed more threatening dimensions until Nabonidus, as related by the Greek historians, was conquered, and his son Belshazzar—whom the inscriptions mention as regent under him in Babylon—was killed as described by Daniel. The subsequent history of Babylon belongs to Persian and Greek history.

The inscriptions have greatly increased our respect for the historical authority of Herodotus, and especially of Berossus, whose accounts are always confirmed. The same may be said of the biblical records, which receive great light from these historical monuments in confirmation of their general historical accuracy, although such facts as the overthrow of Sennacherib's army and the insanity of Nebuchadnezzar are omitted.

(Of the works which have appeared on this subject since the decipherment of the inscriptions, the most important are the following: Of Assyrian texts, E. BORRÀ and E. FLANDIN, "Monuments de Nînevé," 5 vols., Paris, 1849-50

(the vols. i., ii., and v. are filled with representations of Assyrian art); A. H. LAYARD, "Inscriptions in the Cuneiform Character from Assyrian Monuments," British Museum, 1851 (untrustworthy copies); RAWLINSON, FOX TALBOT, HINCKS, and OPPERT, "Inscription of Tiglath-Pileser Translated" (translated in 1857, but published in the "Journal of the Royal Assyrian Society," 1860); RAWLINSON and NORRIS, "The Cuneiform Inscriptions of Western Asia," vols. i., ii., iii., London, 1861-66-70 (the most important body of inscriptions, but without translations); MENANT, "Inscr. Ass. de Hammourabi," Caen, 1863; OPPERT and MENANT, "Les Fastes de Sargon" (with translation), Paris, 1863; also "Grande Inscription de Khorsabad" (with translation), 2 vols., Paris, 1865; GEORGE SMITH, "History of Assurbanipal" (with translation), London, 1871. Of special grammatical and lexicographical value are the following: RAWLINSON, "Commentary on the Cuneiform Inscriptions of Babylon and Assyria," London, 1850; "Babylonian Translation of the great Persian Inscription of Behistun," London, 1851; HINCKS, "On Assyrian Verbs" (the first successful attempt at Assyrian grammar), in the "Journal of Sacred Literature," 1855-56; also "The Polyphony of the Assyrio-Babylonian Cuneiform Writing" (from the "Atlantis"), 1863, and "Specimen Chapters of an Assyrian Grammar" (of great value), in "Journal R. A. S.," 1866; OPPERT, "Éléments de la Grammaire Assyrienne," Paris, 1860 (first attempt at a complete grammar; uses Hebrew type for Assyrian words—an excellent work, and considerably improved in the second edition of 1868); MENANT, "Exposé des Éléments de la Grammaire Assyrienne," Paris, 1868 (nearly the same as Oppert's first edition, only using Assyrian type); NORRIS, "Assyrian Dictionary," vols. i., ii., iii., London, 1868-70-72 (very valuable from the abundance of quotations in Assyrian type); A. H. SAYCE, "Assyrian Grammar," London, 1872 (the most comprehensive manual yet published; uses English letters for Assyrian words). Other important works on Assyrian history, mythology, art, etc. are LAYARD's "Monuments of Nineveh," vols. i., ii., London, 1851-53 (very fine plates); G. RAWLINSON, "Herodotus," vol. i., London, 1858 (contains valuable essays by Sir Henry Rawlinson); OPPERT, "Expédition Scientifique en Mésopotamie," vols. i., ii., Paris, 1863; LENORMANT and CHEVALIER, "Manual of the Ancient History of the East," vol. ii., Philadelphia, 1869 (contains full abstracts, mainly trustworthy, of Assyrian and Babylonian discoveries); E. SCHRADER, "Die Keilinschriften und das Alte Testament," Giessen, 1872 (goes through the Old Testament, giving whatever illustrations are suggested from cuneiform discoveries); also "Die Assyrisch-Babylonischen Keilinschriften," Leipzig, 1872 (an exhaustive defence of the readings of the inscriptions).

WILLIAM H. WARD.

**Cu'neo**, a province of Northern Italy, forming part of Piedmont. Area, 2755 square miles. One-half of the province is level, the other half hilly. The chief river is the Tanaro. It produces wheat, maize, hemp, rice, and silk. Pop. in 1881, 635,978.

**Cunningham** (ALLAN), a Scottish author, born at Blackwood, Dumfries-shire, Dec. 7, 1785, worked as a stone-mason in his youth. He removed to London in 1810, and began to write for the newspapers. He was employed as foreman in Chantrey's studio from 1814 to 1841. His "Traditional Tales of the English and Scottish Peasantry," "Songs of Scotland," "Life of Wilkie," and "Lives of British Sculptors, Painters, and Architects" are his best known productions, besides some favorite songs. Died Oct. 29, 1842.—His son, CAPT. J. D. CUNNINGHAM, has written a "History of the Sikhs."—A second son, ALEXANDER CUNNINGHAM, born Jan. 23, 1814, major-general in the Bengal Engineers, has published numerous papers on Indian archaeology.—Another son, PETER CUNNINGHAM, born April 7, 1816, an industrious writer, is known as the editor of Goldsmith and author of *Lives of Drummond of Hawthornden*, *Inigo Jones*, and *Turner*. D. May 18, 1869.

**Cunningham** (SAMUEL B.), M.D., a medical practitioner of East Tennessee, was born there Oct. 9, 1797. He received his degree at Transylvania University, Ky. He served his generation most faithfully at Jonesboro', Tenn., for nearly fifty years, and his loss was mourned as a public calamity, for to the profession he was one of its purest and brightest ornaments. Died Sept. 4, 1867.

PAUL F. EVE.

**Cunningham** (WILLIAM), born at Hamilton, Oct. 2, 1805, died in Edinburgh Dec. 14, 1861; was appointed pastor of Trinity College Church in Edinburgh in 1834, and professor of theology in the New College in 1843. Most of his works ("Historical Theology," 1862, 2 vols.; "Discussions on Church Principles," 1863; "Lectures on Evidences," etc.) were published after his death.

**Cupar-Fife**, capital of Fifeshire, on the Eden, 32 miles

N. of Edinburgh. It has a public library, several newspaper-offices, and manufactures of coarse linens, earthenware, etc. A castle or fortress of the Macduffs, thanes of Fife, formerly stood here. Pop. 5105.

**Cu'pel** [Fr. *coupelle*, a "little cup"], a shallow and porous vessel, somewhat cup-shaped, generally made of bone-earth. It is used in the process of assaying gold and silver, which are fused with lead upon a cupel. The lead is oxidized in the process and sinks into the substance of the cupel, leaving the metal pure.

**Cupella'tion** [for etymology see preceding article] is the process of refining precious metals on a cupel, or the separation of one metal from another by the use of a cupel heated in a muffle furnace. (See ASSAY.)

**Cu'pid** [Lat. *Cupido*], the Roman name of the god of love, corresponding to the Eros [Ἔρως] of the Greek mythology. He was usually represented as the son of Venus, but ancient authorities differ respecting his paternity. He is represented as a beautiful winged boy, bearing a bow and arrows.

**Cu'pids**, a post-village of Brigus district, on the N. side of Conception Bay, Newfoundland, 2 miles from Brigus. Farming and cod and salmon fishing are carried on. Pop. 1200.

**Cu'pola** [Fr. *coupole*], a spherical vault or concave ceiling raised over a building. Cupolas are sometimes hemispherical, and are constructed in various other forms. (See DOME.) Cupola is also the name of one form of blast-furnace for the reduction of metallic ores.

**Cup'ping** [Lat. *cucurbitatio* (from *cucurbita*, a "gourd" or "cup"); Fr. *la ventouse*; Ger. *Schropfen*], in surgery, the application to the skin of small cups from which the air is partly expelled. If it be designed to withdraw blood from the patient, the skin is first scarified, a partial vacuum is produced in the cup by direct suction or by the flame of alcohol or of burning paper, and the mouth of the cup is applied to the scarified surface. "Dry cupping" is the same process without scarification. In this case no blood is drawn, the object being to stimulate a diseased surface or to produce derivative action.

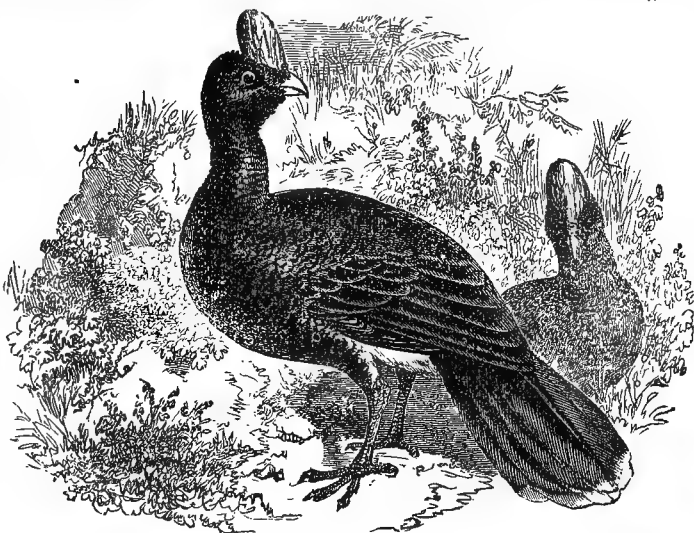
**Curaçoa**, or **Curaçao**, ku-rā-sō', one of the West India Islands, of a like-named group, belonging to the Dutch, is off the N. coast of Venezuela. Area, 164 square miles. Its N. point is in lat. 12° 24' N. and lon. 69° 17' W. The chief article of export is salt, and more recently also cochineal. It is governed by a stadtholder and council. Capital, Willemstadt. Pop. 23,988.

**Curaçoa**, a liqueur which is made of Curaçoa oranges or orange peel, by digesting in sweetened spirits along with a little cinnamon, and often a little mace or cloves. The spirits used contain nearly three and a half pounds of sugar to the gallon. It is imported from Holland.

**Cura'ri**, **Woorā'li**, or **Woorā'ra**, a celebrated arrow-poison used by the South American Indians. Its nature and origin are still unknown, but the principal ingredient is believed by some to be the juice of the *Strychnos toxifera*, a woody vine covered with long reddish hairs, having ovate leaves, rough and pointed, and large round fruit. This is not its probable origin. It is, however, a vegetable extract, and not a snake-poison, as many have conjectured. There is more than one variety of the drug. The poison, when it enters the blood through a wound, causes paralysis, with convulsive motions, followed by death. It may be swallowed in considerable doses with impunity. It is regarded as the most powerful of all sedatives, and the employment of it in cases of tetanus and hydrophobia has been suggested. The best means of preventing its deadly effect is found in artificial respiration.

**Curas'sow**, the name of several species of birds belonging to the order Gallinæ, having a strong bill, surrounded at the base with a skin sometimes of brilliant color, and on the head a crest of feathers which can be raised or lowered at pleasure. The species are found in the warmer parts of South America, Mexico, and Central America, where they congregate in flocks. They are about the size of turkeys, and their flesh is highly esteemed. They are also very easily domesticated and reared, and are common

in the poultry-yards of South America. Among the best-known species are the crested curassow (*Crax allector*), the



Galeated Curassow.

red curassow (*Crax rubra*), and the *Ouarax pauzi*, or galeated curassow.

**Cu'rate** [Lat. *curatus* (from *cura*, "care"); Fr. *curé*], one who has the cure of souls. The term has been variously appropriated to different officers of the Church, but since the close of the sixteenth century in England has been restricted to assistant clergy, deputies, or substitutes. The bishop, or some officer having episcopal authority, appoints the curate's salary and grants his license. There are "temporary" and "perpetual" curates. The temporary or *stipendiary* can be removed at the will of the bishop or vicar. Perpetual curates cannot be thus removed. Their salary is paid from tithes established at the foundation of the chapel, and it becomes the duty of the impropriators to support them. The salaries of curates are too often disproportionate to their services, and they are almost destitute of legal rights, being entirely subject to episcopal authority.

**Curcu'lio** [the Latin for "weevil"], a name given to many weevils or coleopterous insects of the family Curculionidæ, but perhaps most frequently applied to the *Conotrachelus nenuphar*, a small dark-brown insect, speckled with yellowish-white and black. In spring and early summer it attacks the young fruit, such as apples, pears, apricots, etc., but its object of special attack is the plum. The female makes a crescent-shaped puncture in which she deposits her egg. The egg soon hatches, and the maggot feeds upon the young plum, which generally falls to the ground in a short time, and the larva burrows in the earth, becoming a perfect insect in about three weeks. Several generations are said to appear in one season. The destruction caused by this insect upon all kinds of smooth-skinned fruits is a very serious loss. Another destructive curculio is the plum-gouger (*Anthonomus prunivida*), which occurs very abundantly in the Western States. It makes a round puncture. It undergoes transformation inside the kernel of the plum. Another insect of this genus makes numerous holes in the apple; still another lays her eggs in the cranberry, and then cuts off the stem. The grape curculio (*Oceliodes inæqualis*) and other species are very destructive to grapes. Fruit trees and grapevines should be frequently shaken in summer, when the falling curculios may be caught upon a sheet and burned. Swine and sheep render great service by devouring the fallen fruit with the larvæ contained in it. Nearly 10,000 species of this family have been described. They are arranged in more than 630 genera.

**Curculionidæ.** See WEEVIL.

**Curcuma.** See TURMERIC.

**Cu'res**, an ancient and famous city of Italy, the capital of the Sabines, was near the Tiber, about 25 miles N. N. E. of Rome. It was celebrated in the early history of Rome as the birthplace of Numa, as well as the city of Tatius. The site is occupied by the modern village of Correse. Cures was colonized by Sulla about 100 B. C.

**Cur'few Bell**, or simply **Curfew** [Fr. *couvre-feu*, i. e. "cover the fire" (from *couvrir*, to "cover," and *feu*, "fire")], was a bell rung at eight in the evening as a

signal for extinguishing lights and fires—a practice said to have been introduced into England by William I. in 1068. As the custom existed in France, Spain, and other countries at the same time, it is probable that it was not originated by William I., but the strictness with which he compelled its observance caused it to be attributed to him. The stringency of this law was relaxed by Henry I. in 1103. In the reigns of Edward I. and Edward III. persons were not permitted to be abroad in the city, armed, after curfew. In many parts of England and the U. S. the practice of ringing the bell at eight or nine o'clock still prevails.

**Cu'ria** (plu. **Curiae**), the name of the building in which the senate held its sessions in the cities of ancient Italy. Also a subdivision of the Roman patrician tribes, each of which was divided into ten *curiae*. These tribes were three in number, the Ramnes, Tities, and Lucrees, so that there were thirty *curiae*. These *curiae* contained only the patricians or *populus* proper, but clients were regarded as passive members of the *curia* of their superior. In early times the *curiae* were of the greatest importance. Each *curia* had its own name, but only a few of these names have come down to us. In later times the *curiae* lost their political importance, but long retained their ancient and mysterious religious rites, which were maintained by the priests called *curio* and *flamen curialis*. In still later times even these old offices were sometimes conferred upon plebeians. The *curiae* voting together constituted the *comitia curiata*, once a highly important public body with legislative powers; but before the fall of the republic this body had fallen almost into disuse and oblivion, though it still had a formal existence. In it each of the *curiae* had one vote, and in each *curia* each member had one vote. In the language of modern Europe, *curia* is the Latin word for court or place of justice.

**Curico'**, a province of Chili, is bounded on the N. by the province of Colchagua, on the E. by the Andes, on the S. by the province of Talca, and on the W. by the Pacific Ocean. Area, 2948 square miles. The country is mountainous and the soil fertile. Chief town, Curico. Pop. in 1881, 104,273.

**Curico**, a town of Chili, founded in 1742, is a progressive place, with a college, on the Mataquito. Pop. 5953.

**Cur'lew** (*Numenius*), a name of a genus of birds of the

*irostris*) of all the temperate parts of North America. It is twenty-five inches long, the wing measuring about eleven inches. The bill is often eight inches long. It is of a pale-reddish color, with ashy tints and brown-black marks, and longitudinal lines of black. The short-billed curlew (*Numenius hudsonicus*) of the Eastern and Western coasts is two-thirds the size of the foregoing, with a bill about four inches long. The Esquimaux curlew (*Numenius borealis*) is still smaller.

**Curl'ing**, the name of a Scottish game which has been introduced into Canada and other countries where ice can be found of sufficient thickness. It is played with stones weighing from thirty to forty-five pounds, having handles by which they are hurled over the ice. Sides are made up, generally four against four; a length of ice is chosen, from thirty to forty yards long, and eight or nine feet across. At each end of this rink, as it is called, marks are made consisting of several concentric rings called brougs, and a centre called the tee. The object of the player is to hurl his stone towards the tee with strength and precision, and the interest of the game depends on the skill displayed by the players in placing their stones in good positions, and in driving those of their rivals out of such places. At a certain distance from the tees a score is drawn across the ice, and a stone not passing beyond this counts for nothing.

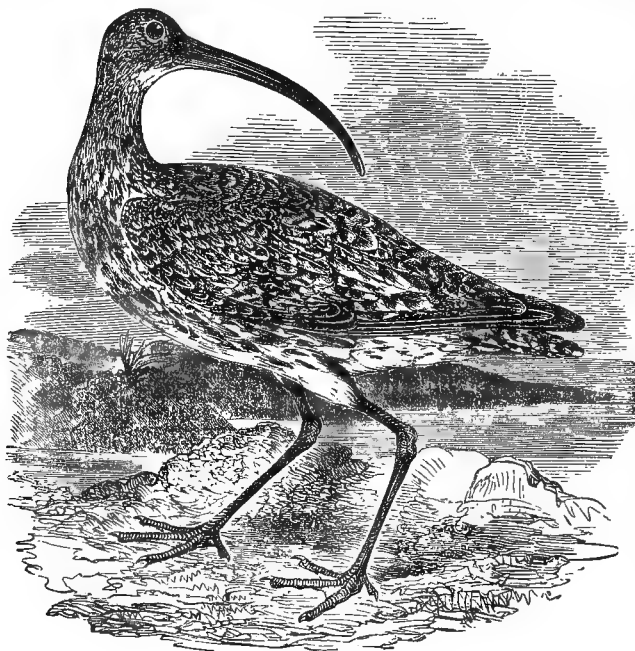
**Curling** (THOMAS BLIZARD), M. R. C. S., F. R. S., an eminent English surgeon, born in Jan., 1811, became an assistant surgeon in the London Hospital in 1834, lecturer on surgery in 1846, surgeon to the hospital in 1849, examiner in the University of London in 1859, and fellow of the Royal Society in 1850. He wrote a prize treatise on tetanus (1835), "Diseases of the Testis" (1843), and "Diseases of Rectum" (1851).

**Currach**, or **Courach**, a word of Celtic derivation, denotes a canoe or boat made of a slender frame of wood or wicker, covered with skins, and used by the Britons of the earliest times. Descriptions of the currach have been given by Cæsar, Pliny, Lucan, Sidonius, and Apollinaris.

**Curran** (JOHN PHILPOT), an Irish orator, born at Newmarket, near Cork, July 24, 1750, was educated at Trinity College, Dublin, studied law in the Middle Temple, London, and was called to the Irish bar in 1775. As a barrister he was very successful, and was distinguished for his humor and sarcastic speech. He became in 1783 a member of Parliament, in which he acted with the opposition party, of which Grattan was the leader. In 1806 he was appointed master of the rolls in Ireland. Died Oct. 14, 1817. (See CHARLES PHILLIPS, "Curran and his Contemporaries," 1850; T. DAVIS, "Life of Curran," 1846.)

**Cur'rant** [from *Corinth*, in Greece, from which port this fruit was formerly exported], a common name of a kind of small raisin (*Uva passula minor*), the dried berry of a seedless variety of grape which is cultivated in the Levant. Currants are exported from Zante and some of the other Ionian Islands, and are used in cookery as an ingredient in cakes and puddings. Attempts to introduce the currant grape into other regions have thus far been unsuccessful.

**Currant** [so called from its resemblance to the above fruit], the popular name of the berries of certain species of *Ribes*, low shrubs of the order Grossulaceæ, distinguished from the gooseberries by the flowers, which grow in racemes, and by the fact that the currant bush is never thorny. The red currant (*Ribes rubrum*) is a native of Europe, Asia, and North America, is cultivated in gardens for its pleasant acid fruit, and is much used for the table and for jellies, conserves, etc. "Currant wine" is a domestic drink, made of currant juice, sugar, and water, which is allowed to undergo alcoholic fermentation. The black currant (*Ribes nigrum*) is also cultivated, and in France large quantities of *liqueur de casse*, a very agreeable and popular variety of currant wine, are prepared from it. More than sixty species of currant are described, about two-thirds of which are American. Several are highly ornamental in cultivation. The varieties of fruit-bearing currants in cultivation are very numerous. They are very readily propagated by cuttings, and in ordinary years will, with a little care, yield a large supply of agreeable and useful fruit. If the ground between the rows is ploughed, hoed, and kept clear of weeds, the productiveness and profit, as well as quality of the fruit, will be much increased.



Curlew.

order Grallatores, natives of Europe and North America. Curlews have long, slender, and curved bills, long legs, and short tails. They frequent the sea-shore and open moorlands, feeding on worms, mollusks, insects, etc. The common curlew of England (*Numenius arquata*) is pursued by sportsmen partly for its flesh, which is delicate and well flavored, and partly because its wild and shy habits render the pursuit exciting. Among the curlews of North America may be mentioned the long-billed curlew (*Numenius long-*



**Currency** [from the Lat. *curro*; It. *corrente*, to "run"] is the circulating money of a country. Some writers include bank deposits, bills of exchange, promissory notes, and generally whatever serves as a substitute for money or whatever has "purchasing power." But the great weight of authority and practice confines the meaning of currency to money. If ever finance is to acquire that degree of order and certainty in its relations by which it will be entitled to rank as a science, all the terms of its vocabulary must have a definite and invariable signification. Worcester defines currency to be "the circulating medium; that which passes for money in a country; the aggregate of coin, bills, notes, etc. in circulation;" as "a metallic currency; a mixed currency." The identity of money and currency is established in the U. S. by the co-ordinate use of the two terms; and the character and office of money as a measure and expression of value are so clearly recognized in the Constitution and laws, and in the official acts and documents of the government, as to bar all dispute on the subject. We are not aware of any different use of the term in the official records of any government.

The first care of every society at its origin has been to establish a current money. It is difficult to conceive how the multiplied transactions of modern trade could be carried on without such a medium. Before the precious metals were produced in sufficient quantity to answer the purpose some special commodity was selected, as salt, tobacco, leather, etc. The rudier metals were next adopted. Iron was commonly used by the old Spartans, and copper by the Romans. The revenues of the ancient Saxon kings were paid in kind. William the Conqueror originated the custom of paying them in money. In the time of Servius Tullius (B. C. 578), who was the first to coin money at Rome, the *as* or *pondo* contained a Roman pound of good copper. It was divided into twelve ounces, like the Troyes pound. The English pound sterling in the time of Edward I. contained a pound of silver, Tower weight of a known fineness. The Tower (Tour or Saxon) pound was something more than the Roman, and something less than the Troyes, which was not introduced into the mint of England till the 18th of Henry VIII. The French livre contained a pound Troyes weight in the time of Charlemagne, who took for his monetary unit the pound weight of silver. A gold currency was adopted in France under Saint Louis, and since that time gold and silver have circulated side by side. It was not till Edward III., in the early part of the fourteenth century, that a gold currency was established in England. The Scots money pound contained from the time of Alexander I. to that of Robert Bruce a pound of silver of the same weight and fineness as the English pound sterling. English, French, and Scots pennies contained originally a real pennyweight of silver, the 20th part of an ounce and the 240th part of a pound. The shilling, too, seems to have been originally a denomination of weight. An ancient statute of Henry III. says: "When wheat is at twelve shillings the quarter, then wastel bread of a farthing shall weigh eleven shillings and fourpence." The proportion, however, between the shilling and either the penny or the pound was not constant or uniform. "In every country of the world, I believe," says Adam Smith, who is the authority for most of these details, "the avarice and injustice of princes and sovereign states, abusing the confidence of their subjects, have by degrees diminished the real quantity of metal which had been originally contained in their coins. The Roman *as* in the latter ages of the republic was reduced to the 24th part of its original value." In the latter part of the eighteenth century the English pound and penny contained one-third only, the Scots 1-36th part, and the French 1-66th part of its original value. "The honor of a state," says Adam Smith, "is surely very poorly provided for when, in order to cover the disgrace of a real bankruptcy, it has recourse to a juggling trick of this kind. Almost all states, however, ancient as well as modern, when reduced to this necessity, have, upon some occasions, played this very juggling trick. The Romans at the end of the first Punic war . . . raised two ounces of copper to a denomination which had always before expressed the value of twelve ounces. The republic was in this manner enabled to pay the great debts which it had contracted with the sixth part of what it really owed."

The currency of modern times in all active industrial countries has consisted of gold and silver, and paper money redeemable in coin of those metals. Gold is the common international standard. The greater bulk of silver renders it unsuitable as a medium in the heavy exchanges of commerce, and the more stable value of gold adapts it in all respects to the required service. The more limited production of silver, together with its greater proportionate use in the arts, made it more liable to fluctuation relatively with gold. The fact of its being legal tender on the same footing with gold, made it possible to perpetrate

indefinite frauds under cover of the law. "It was only necessary to compare alternately the value of gold with that of silver, and the value of silver with that of gold, to diminish successively the burden of the national debt. Thus, when gold shall have risen in value in comparison with silver, the state would only pay in the latter metal, and private debtors would not fail to follow the example." (*Chevalier*.) England escapes all embarrassment from the double standard by making silver a legal tender to the amount of forty shillings only, and rating the silver coin slightly above its intrinsic value.

The constitution of gold as the medium of international payment has made it indispensable for each nation to adopt a supplemental home medium as a defence against the possibility of being left without any currency whatever for the transaction of its business. It is a normal condition of commerce that the balance of accounts between nations shall alternate from one to another. The most important consequences attend this simple operation. The debtor market, if not provided with a local medium, is at once prostrated and disabled from the prosecution of those productive labors by which alone it can restore itself to rotation as a creditor. The necessity of a supplemental currency as a protection against such ill consequences must have promptly commended the bank-note to the favorable consideration of economists and statesmen. Every argument in its favor has been strengthened by the beneficent influence it has exerted over industrial employments. The next step to that of supplying a local currency was the adoption of a test or standard to which it should be kept equal; otherwise, the inevitable result must follow of its depreciation, whereby the superior currency of gold, the international medium, would be expelled from the country; and so long as that medium could not flow in by commercial law, the nation must remain prostrate and subject to all the disadvantages of an adverse exchange. Such a condition history proves to be a condition of poverty and weakness. There could be no other standard than the international medium itself, gold, and hence its adoption. The primary and fundamental law of a standard is *permanency, invariability*. But at the very threshold of this proposition we encounter a grave obstacle to the attainment of scientific organization in the theory advanced by eminent economists—that the redeeming medium itself is deficient in the essential quality that constitutes a test or measure. "To the qualities which originally recommended gold and silver as currency," says John Stuart Mill, "another came to be added, the importance of which only unfolded itself by degrees. Of all commodities they are among the least influenced by any of the causes which produce fluctuations of value. They have sustained since the beginning of history one great permanent alteration of value, from the discovery of the American mines. . . . In the present age the opening of new sources of supply so abundant as the Ural Mountains, California, and Australia may be the commencement of another period of decline." To this proposition, which is a logical result of the theory that money is nothing more than a selected commodity, it may be answered that the constitution of money is a social agreement to take a certain substance out of the category of commodities, and to put in complete abeyance those properties which make it a subject of trade. To speak of money after this as a commodity of variable price is to break the social agreement, and to restore the subject to its former relations—in fact, to undo what has just been done. But does not Mr. Mill leave out half the case when he assumes that gold has undergone "a great permanent alteration of value"? The only evidence adduced of that alteration is "the increase of prices throughout the commercial world." And are there not other known causes which have contributed to that result? The half of the case overlooked by Mr. Mill is that the human family quadrupled itself or much more in the period named—that it extended its labors, developed countless resources, and opened new markets of consumption in all quarters of the globe. If the world had stood still while the quantity of gold increased, there can be no question that the relation of gold as the standard of the circulating medium would have undergone a change. But the reverse is the fact. A proposition involving consequences so fatal to the construction of a scientific system of currency and finance as that of variability in the standard of value, challenges our scrutiny the more rigorously because of the eminence of the authority by which it is advanced. It is therefore with satisfaction that we quote dissenting opinions from sources equally eminent, and not less deserving of respect. "If any other commodity," says Mr. Ricardo, "less variable could be found, it might very properly be adopted as the future standard of our money; but while gold and silver are the standard, the currency should conform in value to them; and whenever it does not, and the market-price of bullion is above the mint-price, the cur-

rency is depreciated. This proposition is unanswered, and is unanswerable." Likewise, Sir Henry Thornton, who says: "The precious metals when uncoined (or in the state of bullion) are themselves commodities, but when converted into money they are to be considered as a measure of the value of other articles. They may indeed be converted back into commodities; and it is one recommendation of their use as coin that they are capable of this conversion." The theory of invariability was maintained by John Locke also, who believed that "a pound of gold or silver must always be worth a pound of gold or silver, and therefore the apparent variation in the price of gold was only a variation in the price of bank-notes." (For an able exposition of the opposite theory see *Colwell*, p. 404 *et seq.*)

The paper part of a currency is local to the country where it is issued, passing its boundaries, if at all, only into contiguous districts, where the profits of trade outweigh the cost of its conversion into gold. A solitary exception is that of the notes of the Bank of England, which carry a premium above specie in most commercial countries. It was said that the notes of the second Bank of the U. S. were at one time current in China. Even the coins of one country do not circulate as money in another, but are mostly bought up at a discount by the bullion-dealers and sold to shippers. An attempt made some years since to introduce into China a Victoria silver dollar coined at the British mint for the purpose of establishing a convenient medium of remittance, and otherwise encouraging a prestige in favor of British commerce, failed through the jealousy of the Chinese, provoked by the traditional aggressiveness of British commercial policy.

It has already been said that that part of the currency of every country which is composed of gold, being also the international medium of payment, is liable to be drawn off by the creditor markets, whence arises the apprehension that the banks of the debtor markets may be forced into suspension on their bills. For this reason an extraordinary export of specie creates alarm among the banks of the exporting country, and obliges them to turn upon their customers to pay up their borrowings. The advocates of an exclusively metallic currency build their most plausible argument on this ground. "If there are no bank-bills to protect," they say, "the export of specie pays a debt and strengthens the home market. But with bank-bills to defend, though it likewise pays a debt, it weakens the market as against the bills, and creates pressure and panic." This argument connects the subject of the currency with the tariff, since low duties encourage large importations and drain the country of its specie. The advocates of an exclusively paper currency construct their most specious argument on the same facts. "If the whole body of the currency be of a material that cannot be exported, the instrument will always remain to us intact; and whatever inconveniences we may suffer in consequence of the loss of the precious metals, we shall never suffer paralysis of our productive labors through want of money." Or, as the famous Scotch financier, Law, wrote, "If we establish a money which has no intrinsic value, or whose intrinsic value is such that it will never be exported, and the quantity of which shall never exceed the demand in the country, we shall have reached wealth and power." In reply to this the most eminent of the French contemporary economists declared it to be an axiom that "a purely conventional money is an impossibility." (*Turgot, Reflexions sur la formation et la distribution des richesses.*) For one of the most fruitful sources of information and argument on the subject at large we cannot do the reader a greater service than refer him to the brilliant publications on economy that issued from the French press in the period of Louis XIV. and following, in which the ideas of Colbert, Richelieu, Say, Montesquieu, Law, Turgot, Quesnay, Necker, Forbonnais, Gournay, and the elder Mirabeau (the author of the doctrine *laissez-faire*) were in fierce conflict. The economical controversies of this period are full of vivacity, and possess an interest bordering on the romantic.

The amount of national-bank circulation outstanding on Nov. 1, 1884, was \$332,473,693; the amount of U. S. legal-tender notes, \$346,681,016, in denominations as follows:

DENOMINATIONS.	National-bank notes.	Legal-tender notes.	Aggregates.
Ones.....	\$495,741	\$26,763,098	\$27,258,839
Twos.....	288,468	26,778,738	27,067,206
Fives.....	85,309,155	78,054,050	163,363,205
Tens.....	111,319,950	69,171,938	180,491,888
Twenties.....	79,206,580	56,070,509	135,277,089
Fifties.....	22,221,850	22,395,195	44,617,045
One-hundreds.....	32,520,700	33,649,990	66,170,690
Five-hundreds and over..	1,111,249	33,797,500	34,908,749
Totals.....	\$332,473,693	\$346,681,016	\$679,154,709

In accordance with law, no national-bank notes of a less

denomination than five dollars have been issued since Jan. 1, 1879, and the amount has been reduced \$4,732,698 to Nov. 1, 1883, but during the same period the legal-tender notes of these denominations have been increased \$19,009,794.

Comptroller Knox, in his report for Dec., 1883, gives the amount of coin and paper currency in the country, and its distribution on Jan. 1, 1879, the date of the resumption of specie payments, and at subsequent dates, to which have been added similar estimates for 1884, as follows:

	January 1, 1879.	November 1, 1880.	November 1, 1882.	November 1, 1884.
Gold coin.....	\$278,310,126	\$449,327,404	\$547,356,262	\$585,611,872
Silver coin.....	106,573,803	158,653,630	208,744,424	275,735,439
Legal-tender notes.....	346,681,016	336,881,016	346,681,016	346,681,016
National-bank notes.....	223,791,674	343,854,107	362,727,747	585,559,619
Totals.....	\$1,055,356,619	\$1,289,496,157	\$1,465,509,449	\$1,541,588,140

The amount of gold, silver coin, and bullion and paper currency held by the U. S. treasurer and by the national and State banks on the same dates was as follows:

	January 1, 1879.	November 1, 1880.	November 1, 1882.	November 1, 1884.
Gold.....	\$158,680,855	\$253,632,511	\$260,455,297	\$277,784,854
Silver.....	38,679,008	54,472,628	131,411,701	185,012,536
Currency.....	211,375,639	147,563,225	160,580,473	187,504,897
Totals.....	\$408,335,502	\$455,668,362	\$552,447,473	\$650,302,487

If this amount be deducted from the total amount given in the first table, the remainder will be, approximately, the amount then in the hands of the people, as follows:

	January 1, 1879.	November 1, 1880.	November 1, 1882.	November 1, 1884.
Gold.....	\$119,629,771	\$195,694,893	\$286,900,965	\$307,826,018
Silver.....	67,893,895	69,181,004	77,332,723	90,722,903
Currency.....	438,097,051	342,531,898	345,828,282	492,755,582
Totals.....	\$646,420,717	\$507,827,795	\$519,061,976	\$591,285,633

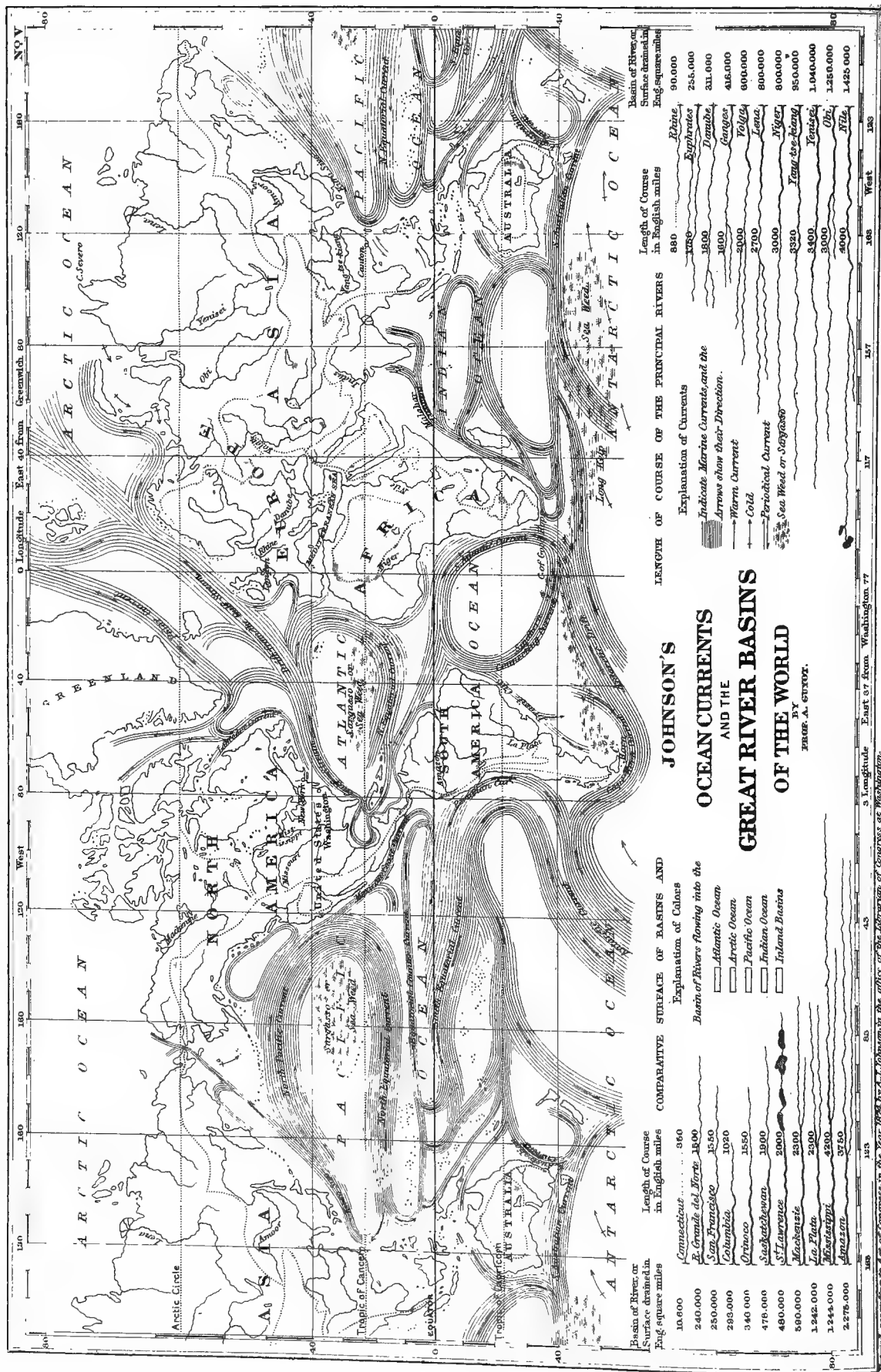
The silver certificates outstanding, which represent standard silver dollars in the treasury, at dates corresponding with those given in the preceding table, were on Jan. 1, 1879, \$413,360; Nov. 1, 1880, \$19,780,240; Nov. 1, 1882, \$65,620,450; Nov. 1, 1883, \$85,334,381. The amount of gold certificates issued under the act of July 12, 1882, which represent gold coin in the treasury, was on Nov. 1, 1882, \$6,962,280; on Nov. 1, 1883, \$48,869,940.

It is evident that the amount of coin and paper currency used in any country depends largely upon the number of banks and bankers it contains, and upon the method of doing business; and no theory is more absurd than that which has been so frequently urged during the currency discussions of the past few years—that the amount of money required is in proportion to population. Tables showing the per capita of coin and currency in use in any country are curious and interesting, but almost valueless in determining the amount of paper money required. Through the machinery of the bank, with the system of checks, bills of exchange, and clearing-houses, large amounts of business may be settled without the use of coin or circulating notes. Checks and drafts are substitutes for money, and in every case, if these were not used, the latter would be required. Yet, notwithstanding the almost exclusive use of these substitutes for money in large business transactions, all payments, great and small, depend for their integrity upon a true measure of value, and that measure is a piece of gold coin of standard weight and fineness. All other coins not subsidiary and intrinsically worth less than the general standard recognized at commercial centres, and all kinds of paper money which are not immediately redeemable in gold coin, are worse than useless, for they disturb values.

In England banks and bankers are numerous, and large numbers of such instruments of exchange are used, particularly in the principal cities. In France, on the other hand, their use is much more infrequent, for, except the Bank of France with its ninety branches, there are no incorporated banks in that country, and thirteen of these branches were conducted in 1880 at a loss of more than \$30,000.

There are now in this country 7448 banks and bankers, located in all its principal cities and villages, and the number of checks and drafts in daily use by our own people is consequently greater than anywhere else in the world. In some countries a charge is made to the depositor for keeping his account. In others, bank-accounts are refused unless the depositor comes well introduced, and it is believed that his account will be of considerable pecuniary benefit to the bank. In this country the bank is in many instances a convenience to the depositor rather than the depositor of benefit to the bank, for the latter keeps the cash account of the depositor and pays out amounts upon his order, and at his request returns to him his





checks, properly endorsed, which are then held by the depositor as vouchers or receipts for the payment of his debts.

If the daily receipts or payments of the banks were to be made exclusively in gold and silver coin, the total coinage of the fiscal year ending June 30, 1883, amounting to 65 millions, would be sufficient only to supply the banks for less than one-third of a day in making payments. The whole of the coin estimated to be in the country (825 millions) would not be sufficient for three days' payment of the national banks, and the whole coinage of the country from the date of its organization, amounting to 1713 millions, or the total coin and currency now in circulation, if used exclusively in making payments, would be sufficient to supply the banks of the country for only about five and one-half days. The use of coin and currency is almost nothing in proportion to the use of the modern instruments of checks, which we find upon the remotest frontier. They are a part of the machinery of the banker, and were first introduced into English use only about one hundred years ago. A single check pays for house and lands, for mines of gold and silver, and for long lines of railway. Coin and currency are useful only in small transactions and in paying the daily balances.

The comptroller, in his report for 1881, gives the only complete tables ever compiled in reference to the amount and proportion of paper currency, coin, checks, and drafts used in this country in the business of banking. In response to a circular, returns were received from all the national banks then in operation, 2132 in number, giving their receipts on Sept. 17, 1881. The gold coin equalled 1.38 per cent. of the total receipts; the silver coin, 0.17 per cent.; the paper currency, 4.36 per cent.; while the checks and drafts and clearing-house certificates were equal to 95.09 per cent. The total percentage of currency and of coin was 5.91 only, as may be seen from the following table:

LOCALITIES.	Number of banks.	Receipts.	Gold coin.	Silver coin.	Paper currency.	Checks, drafts, etc.
New York City.....	48	\$165,199,347	0.54	0.01	0.65	98.80
Other reserve cities....	169	77,922,247	1.86	0.18	5.61	82.35
Banks elsewhere.....	1995	52,118,185	3.31	0.76	14.27	81.74
* United States.....	2132	\$295,235,779	1.38	0.17	4.36	94.09

The proportion of checks and drafts used in London does not greatly differ from that in New York, but the use of checks and drafts in the country districts of the U. S. is nearly 9 per cent. greater than in the corresponding districts in England, as may be seen from the following table, which also gives the percentages in Edinburgh and Dublin:

LOCALITIES.	Coin.	Notes.	Checks.
	Per cent.	Per cent.	Per cent.
New York.....	.55	.65	98.80
London.....	.73	2.04	97.23
Edinburgh.....	.55	12.67	86.78
Dublin.....	1.67	8.53	89.90
Country banks in 261 places, Great Britain.....	15.20	11.94	72.86
Country banks, 1895 in number, U. S.	3.39	14.27	81.74

There are other important propositions connected with the subject of the currency which fall more appropriately under the head of BANK (which see). (For tables of currency in circulation at various periods from the foundation of the government to the present time, see RAGUET, 2 vols.; ELLIOTT'S *Funding System*; *Treasury Reports and Reports of the Comptroller of the Currency* from 1866 to 1884.)

REVISED BY JOHN JAY KNOX.

**Current River**, of Missouri and Arkansas, rises in Texas co., Mo., flows south-eastward into Arkansas, and enters the Black River in Randolph co. Length, estimated at 250 miles. It is a remarkably clear stream, abounding in fish of good quality. It is navigated by flatboats and steamers to some extent. Jack's Fork enters the main stream from the W. in Shannon co., Mo., and steamboats can ascend nearly to the union of the forks in good stages. The river flows through a hilly mineral region, whose resources are not much developed.

**Currents, Electric**, etc. See ELECTRICITY, by PRES. HENRY MORTON, PH. D., and MAGNETISM, by PROF. A. M. MAYER, PH. D.

**Currents, Marine**. The ocean-currents are the great rivers of the sea. They move on steadily through waters comparatively tranquil, often distinguished by a different color and temperature; but unlike the inland streams, which are but threads on the surface of the continents, they are scores, nay hundreds, of miles broad, and their course, as in the American Gulf Stream, extends over a large portion of the globe. The ocean streams are not only found

at the surface, but also in deep waters, where they are often moving in different directions.

The main cause of these vast movements of the ocean is found in the difference of temperature between the polar and tropical regions, which acts directly on the waters, and indirectly on them by the winds.

The cold and heavier waters of the polar regions tend incessantly to flow into, and so to displace, the warm and lighter waters of the tropical zone; when both meet, the cold waters sink and disappear below the warm waters, which return as surface-currents towards the polar regions. Hence two series of currents, the cold from the polar, the warm from the tropical, regions. Both, however, are deflected from their straight course by the steady action of the earth's rotation—the polar currents more and more to the W., the tropical currents more and more to the E. The polar currents unite in the tropical zone, and, aided by the powerful influence of the trade-winds, form the so-called *Great Equatorial Current*, which flows westward around the whole globe. These general currents are further modified by the form of the basins of the three great oceans in which they move, in the following manner.

*Currents in the Pacific Ocean*.—The vast expanse of the Pacific Ocean gives full sway and great regularity to the course of the main currents.

The *Great Equatorial Current* begins to be felt at a distance from the American continent, and, soon embracing the whole width of the tropical zone, flows majestically, at the rate of two or three miles an hour, across that immense basin, being separated into two branches by a central counter-current flowing eastward. Arrested by the coasts of Asia and Australia, it divides.

The S. branch sends an arm southward along the coast of Australia, the *Australian Current*, while the remainder is broken into numerous irregular currents among the islands of the Eastern Archipelago.

The N. branch, reaching the Philippine Islands and Formosa, bends to the N. and N. E., and becomes the *Japanese Current* (or *Kuro-Siwo*), the Asiatic Gulf Stream. This noble stream, with its vast body of deep blue and warm waters, flows swiftly along the eastern coasts of Japan, and, continuing its slanting course across the North Pacific, reaches the peninsula of Alaska. Turning thence southward, it glides along the coast of Oregon and California, as a cool current, and leaves again the continent of America to re-enter the *Great Equatorial Current*. Thus the North Equatorial, the Japanese, and the North Pacific Currents form one immense whirlpool in the North Pacific Ocean.

The polar currents are almost absent in the North Pacific Ocean, owing to the shallowness and narrowness of Behring Straits, which are the only passage open to them; but they are all the more mighty in the South Pacific. Here the broad *Antarctic Drift Current*, obeying the impulse of the prevailing winds of that region, carries the polar waters north-eastward to the W. coast of South America. Striking the continent in the southern part of Chili, it divides. The main branch, called the *Peruvian* or *Humboldt Current*, flows to the N. along the coast of Peru, which it bathes with its cool waters, and leaving the continent at its extreme western projection, Punta Parina, flows thence westward, becoming the main feeder of the South Equatorial Current. The smaller branch, turning S. along the coast of Patagonia, bends around Cape Horn, and enters the Atlantic Ocean.

*Currents in the Atlantic Ocean*.—Owing to the narrowness and irregularity of the basin of the Atlantic Ocean, the Equatorial Current in it has neither the size nor the symmetry it shows in the Pacific Ocean. The northern branch is less marked, and the equatorial counter-current is well defined only near the coast of Africa. The course of the S. branch, however, is very apparent. Proceeding westward from the coast of Africa, it crosses the basin of the Atlantic to the opposite shore of South America, where, at Cape St. Roque, it divides, one branch flowing southward, forming the *Brazil Current*; another to the N. W., the *Guiana Current*. The Brazil Current proceeds along the coast of South America, but a part of its waters, sweeping back towards the S. and E., forms the *South Connecting Current*, which merges itself in the *South Atlantic Current*, and returns with it along the W. coast of Africa into the Equatorial Current. The Guiana Current runs from Cape St. Roque northward across the mouth of the Amazon, along the coast of Guiana, and, uniting with the waters of the North Equatorial in the Caribbean Sea, enters the Gulf of Mexico.

The *Gulf Stream* originates in the Gulf of Mexico. It is the outlet of the accumulation of the waters of the Equatorial Current in the Gulf of Mexico. It becomes fully apparent at the N. W. of the island of Cuba, where it proceeds with feeble force to the E. Its course is then changed, by striking against the Bahama Banks, to the N.; and it



flows with great rapidity along the coast of the U. S., gradually expanding in volume and diminishing in velocity as it proceeds northward. Reaching the latitude of New York, it gradually turns to the E., and crosses the Atlantic basin to the islands of the Azores. Here it divides; the main branch, bending its course southward, enters the tropical regions on the coast of Africa, and is swept back by the force of the North Equatorial Current to the Gulf of Mexico. Thus a great whirlpool is formed also in the North Atlantic Ocean, in the midst of which is accumulated the vast amount of sea-weed which bears the name of *Mar de Sargasso*. The northern branch continues its slanting course to the British Isles and Norway, and often carries to their shores the tropical seeds and driftwood coming from the West Indies.

The high temperature of the Gulf Stream, as well as its blue color and motion, distinguishes it from all other portions of the ocean. It carries warmth from the tropics to the W. coast of Europe, and gives to the British Isles the genial climate they enjoy even in the high northern latitude in which they are situated.

The Atlantic Ocean is almost the only outlet of the N. polar waters towards the equatorial regions, as the Pacific is that of the Antarctic waters. Under the influence of the earth's rotation the polar currents all crowd to the W. on the American coast. Two main currents, on each side of Greenland, carry the waters and masses of ice from the Frozen Ocean towards the warmer latitudes; the *Greenland Current* along the eastern coast and the *Labrador Current* on the W. form Baffin's Bay. Joining their waters and their icebergs, they flow to Newfoundland, where they meet the outskirts of the warm waters of the Gulf Stream, and, condensing the moisture of that mild atmosphere, produce the everlasting fogs peculiar to that region. Thence following the coast between it and the Gulf Stream, the Polar Current makes itself felt as far as the latitude of New York, where it sinks under the warm waters of the Gulf Stream.

*Currents in the Indian Ocean.*—In this ocean, surrounded on three sides by continents, the North Equatorial Current is destroyed by the influence of the season winds, called monsoons, which blow alternately from the S. W. and the N. W., and the waters mostly obey the direction of the winds. But the South Equatorial is quite regular, and extends from Australia to Madagascar, where it divides, one branch passing N. of the island, the other along its eastern coast. The N. branch, uniting with the waters from the N., forms the strong current of Mozambique, with which the eastern branch soon joins, and the united current moves on to the Cape of Good Hope. Here the current, slackened by the earth's rotation and the meeting of the Antarctic waters, turns back and returns with them to the E., and reaching the coast of Australia re-enters northward the Great Equatorial. Thus in the three great oceans is kept up a constant circulation of the marine waters on a scale of magnitude which far transcends all similar movements on the surface of the continents.

ARNOLD GUYOT.

**Currer Bell.** See BRONTÉ (CHARLOTTE).

**Currey** (RICHARD O.), M. D., born in Nashville, Tenn., Aug. 28, 1816. He graduated in the University of Nashville, and acquired from the celebrated Dr. Troost a taste for geology, mineralogy, and chemistry. He took the degree of M. D. in the University of Pennsylvania. He was elected professor of chemistry in the University of East Tennessee at Knoxville in 1846; he assisted in founding the Shelby Medical College in Nashville, in which he occupied the chair of chemistry. For six or seven years he was editor of the "Southern Journal of Medicine and Physical Sciences," and in 1859 was ordained a minister in the Presbyterian Church. Dr. Currey was a man wholly devoted to duty, and while in charge of 2000 Federal prisoners, as surgeon in the Confederate army, at Salisbury, N. C., he contracted the disease of which he died (1865), by his devotion to them. The U. S. government ordered all of Dr. Currey's property restored to his family when the war ended.

PAUL F. EVE.

**Currie**, capital of Murray co., Minn. (see map of Minnesota, ref. 11-B, for location of county). Pop. in 1880, 78.

**Currie** (JAMES), born at Kirkpatrick Fleming, in Dumfriesshire, Scotland, May 31, 1756, died in Liverpool Aug. 31, 1805. He was destined for mercantile business and sent out to Virginia while still very young. After the outbreak, however, of the Revolutionary war he returned to Scotland, studied medicine in Glasgow, and settled in 1781 in Liverpool as a physician. His "Medical Reports on the Effects of Water, Cold and Warm, as a Remedy in Fevers and other Diseases," ran through several editions, but he is best known by his edition of Burns's works (1800).

**Currituck Court-house**, capital of Currituck co., N. C. (see map of North Carolina, ref. 2-K, for location of county), is about 200 miles E. N. E. of Raleigh. Pop. not in census of 1880.

**Curry** (DANIEL), D. D., LL.D., a Methodist divine and journalist, born near Peekskill, N. Y., Nov. 26, 1809, graduated at the Wesleyan University, Conn., in 1827, was the same year principal of Troy Conference Academy, entered the ministry in Georgia in 1841, and occupied pulpits in Athens, Savannah, and Columbus, S. C. He returned to the North after the division of his denomination through the slavery controversy, and joined the New York Conference, had pastoral charge of important churches in New York and other cities, was three years president of the Indiana Wesleyan University, resumed his labors in the East, contributed largely and ably to the periodical literature of his Church, and in 1864 was appointed editor of its chief official journal, "The Christian Advocate," New York City, which office he held till 1876. He is author of a "Life of Wycliff" and "Metropolitan City of America." He has edited Southey's "Life of Wesley."

**Curry** (JABEZ LAMAR MONROE), D. D., LL.D., born in Lincoln co., Ga., June 5, 1825, graduated at the University of Georgia in 1843 and at Dane Law School (Harvard College) 1845. He served in 1846 as a Texan ranger during the Mexican war. In 1847, 1853, and 1855 he was a member of the legislature of Alabama; in 1856 presidential elector; from 1857 to 1861 member of Congress; in 1861 elected to the Congress of the Confederate States; in 1864 entered the Confederate army, and at the close of the war was in command of a regiment of cavalry. In 1865 he was elected president of Howard College, Ala.; in 1866 ordained to the Baptist ministry; since 1868 professor of the English language and literature in Richmond College, Va. For twenty-five years past Dr. Curry has deservedly held an influential position in the Southern States.

**Cursor'es** [Lat., the "runners"], an order of birds comprising comparatively few species, but these mostly large, with large, strong, and often long legs, and wings not usually enough developed for flight. The bones are nearly destitute of air-cells, and the breast-bone has little or no trace of a keel. The hinder toe is generally wanting. The running powers of these birds are remarkable. Among these birds are the ostrich, the rhea, the emeu, the cassowary, the apteryx, and the bustards, though these last are by some placed among the waders and by others among the rasoires. Unlike the others, the bustards can fly. The fossil cursores include the *Notornis*, the *Argyornis*, the *Dinornis*, etc., huge birds, which were undoubtedly much larger than the ostrich, which is the largest of living birds.

**Curtain** [Fr. *courtine*], in fortification, that part of the rampart of the body of the place which lies between two bastions and connects their adjacent flanks. In a regular siege the first object is to batter down the curtains, and, in order to prevent this from being done, outworks are constructed by the defenders.

**Curtin** (ANDREW GREGG), governor of Pennsylvania, born April 22, 1817, was the son of Roland Curtin, one of the earliest iron-manufacturers in Centre co., who came to this country from Ireland in 1793. He studied law in Dickinson College, canvassed the State in 1844 for Henry Clay, was appointed secretary of the commonwealth in 1854, and was elected governor in 1860, in which post he displayed great energy and promptitude when the first call for troops came at the opening of the civil war. In 1863 he was re-elected by a large majority, and in 1869 was appointed minister to St. Petersburg.

**Curtis** (BENJAMIN ROBBINS), LL.D., an American lawyer, born in Watertown, Mass., Nov. 4, 1809, graduated at Harvard in 1829, and was admitted to the bar in 1832, after which he practised law in Boston. He was appointed a judge of the Supreme Court of the U. S. in 1851, but he resigned that office in 1857. He was one of the counsel who defended President Johnson in his trial before the Senate in April, 1868. He was the author of several volumes of legal reports. Died at Newport, R. I., Sept. 15, 1874.

**Curtis** (EDWARD). See APPENDIX.

**Curtis** (GEORGE TICKNOR), an eminent legal writer, a brother of the preceding, was born in Watertown, Mass., Nov. 28, 1812, graduated at Harvard in 1832, was admitted to the bar in 1836, and practised law in Boston. He has published, besides other works, a "Treatise on the Rights and Duties of Merchant Seamen" (1841), a "Treatise on the Law of Copyright" (1847), and a "History of the Origin, Formation, and Adoption of the Constitution of the U. S." (2 vols., 1855-58); also "Life of Daniel Webster" (2 vols. 8vo).

**Curtis** (GEORGE WILLIAM), LL.D., a popular American author and orator, born at Providence, R. I., Feb. 24, 1824.

He visited Europe, studied in the University of Berlin, and made an extensive tour in the Levant, from which he returned home in 1850. He published, besides other works, "Nile Notes of a Howadji" (1851), "The Howadji in Syria" (1852), "Lotus-Eating" (1852), "The Potiphar Papers" (1854), "Prue and I," and "Trumpa." He has also distinguished himself as a popular lecturer on various subjects, and as an orator of the Republican party. President Grant appointed him chairman of the advisory board of the civil service. He is editor of "Harper's Weekly" and of the "Easy Chair" in "Harper's Magazine." He received a gold medal from the city of Boston for his memorable eulogy on Wendell Phillips, delivered there in 1884.

**Curtis** (JOSEPH BRIDGEMAN), second son of George, and Julia Bridgman, Curtis, was born in Providence, R. I., Oct. 25, 1836. He graduated at the Lawrence Scientific School, Cambridge, Mass., in July, 1856. In 1857 he was employed as a civil engineer on the New York Central Park, and on the breaking out of the civil war he was appointed engineer, with the rank of captain, in the Ninth regiment N. Y. S. M., April, 1861. On Sept. 16, 1861, he became second lieutenant of the Fourth regiment Rhode Island Volunteers, and was made first lieutenant of the regiment Oct. 2 of the same year. He served with Burnside in North Carolina, and was made assistant adjutant-general with General Rodman, June 9, 1862. In Aug., 1862, he became lieutenant-colonel of the Fourth regiment Rhode Island Volunteers. He fought at South Mountain and at Antietam, and while in command of his regiment was killed at Fredericksburg Dec. 13, 1862. (See a memoir by his half-brother, GEORGE WILLIAM CURTIS, in "Rhode Island in the Rebellion," by J. R. BARTLETT.) CLARENCE COOK.

**Curtis** (SAMUEL RYAN), an American officer, born Feb. 3, 1805, near Champlain, N. Y., graduated at West Point in 1831, serving at Fort Gibson in Seventh Infantry till he resigned June 30, 1832, civil engineer 1836-41; counsellor-at-law 1841-46; adjutant-general of Ohio 1846; and colonel Second Ohio Volunteers in the war with Mexico 1846-48, serving as governor of Camargo, and by his operations against Gen. Urrea opening Gen. Taylor's communications, and after his regiment was disbanded on Brig.-Gen. Wool's staff and governor of Saltillo. Chief-engineer of several important works 1847-55; counsellor-at-law at Keokuk, Ia., 1855-61; and member of Congress 1857-61, being prominent on the committee on military affairs and Pacific R. R., of which he was a warm advocate. In the civil war he promptly resumed his sword to go to the relief of the capital; was subsequently elected colonel Second Iowa Volunteers, and obtained the rank, Mar. 21, 1862, of major-general U. S. volunteers, serving in various capacities in Missouri 1861-62; in command of Army of the Southwest 1862, engaged in driving the enemy from Missouri, battle of Pea Ridge, and numerous actions on his difficult march of over 1000 miles to Helena, Ark.; on leave of absence to attend the Chicago Convention (its president), which inaugurated the Pacific R. R.; in command of the department of Missouri 1862-63; organizing and directing the forces in the field; in command of the department of Kansas 1864-65, engaged against hostile Indians and forcing Gen. Price to the Arkansas; in command of the department of the North-west 1865, and as U. S. commissioner to negotiate Indian treaties 1865, and to examine the Union Pacific R. R. 1865-66, with which, from its first initiation, he had been closely identified, continuing on the same duty, though mustered out of volunteer service April 30, 1866, till he died, Dec. 26, 1866, at Council Bluffs, Ia., aged sixty. GEORGE W. CULLUM.

**Cur'tius** (ERNS), a German Hellenist, born at Lübeck Sept. 2, 1814. In 1837 he visited Athens, where he passed several years. He became, in 1856, professor in Göttingen, and in 1865 in Berlin. He published "The Acropolis of Athens" (1844), "The Peloponnesus" (1852), "Attic Studies," a "History of Greece" (3 vols., 1857-66), translated into English by A. W. Ward (London, 1868-70, 3 vols.), "Seven Maps, illustrating the Topography of Athens" (1868), "Die Gastfreundschaft" (1870), etc.

**Curtius** (GEORGE), a German classical scholar, brother of the preceding, born at Lübeck April 16, 1820, became prof. of classical philology at Leipzig in 1862. Among his works are a "Greek Grammar" (1855; 9th ed. 1870), "Grundzüge der Griech. Etymologie" (5th ed. 1879), "The Greek Verb" (2d ed. 1880; trans. 1880), and "Studies in Greek and Latin Grammar" (10 vols., 1868-78). D. Aug., 1885.

**Curtius** (MARCUS), a patriotic Roman youth, who is said to have sacrificed his life for his country about 362 B. C. According to tradition, a chasm opened in the Forum of Rome, which the soothsayers declared could not be filled except by the sacrifice of the chief wealth or strength of the Roman people. Curtius, completely armed, plunged on horseback into the chasm, which immediately closed up.

**Curtius** (QUINTUS). See QUINTUS CURTIUS.

**Curule Chair** [Lat. *sella curulis*; the latter word is supposed to be of Etruscan origin], among the ancient Romans, a throne or chair of state, one of the emblems of ancient kingly power, which was retained by the magistrates of the republic. Its use was limited to the consuls, prætors, curule ædiles, censors, the flamen dialis, and to the dictator or his deputies. In later times the emperors, as well as many inferior officers, sat upon it. Curule chairs were at first ornamented with ivory, and later sometimes made of ivory and inlaid with gold.

**Curule Magistracies** were those of the greatest dignity in ancient Rome, and were so called because the persons who held them enjoyed the privilege of sitting on curule chairs (*sella curules*) when engaged in their public duties. (See preceding article.)

**Curupaity**, a fort on the left bank of the Paraguay River, in the republic of Paraguay, was in the late war between Paraguay and Brazil, Uruguay, and the Argentine Republic an important position. It was an advanced work of Fort Humaita, and was only taken by the allies in Mar., 1868, after it had been abandoned by its garrison, and Fort Humaita had been cut off from the interior.

**Curve** [from the Lat. *curvus*, "bent"], in geometry, a line which continually changes its direction in accordance with some uniform law, which is expressed by the equation of the curve. In a plane curve all the points lie in the same plane. Other curves are called twisted or curves of double curvature.

**Curwensville**, on R. R., Clearfield co., Pa. (see map of Pennsylvania, ref. 4-D, for location of county). It has a graded school and several factories. Iron ore and coal are abundant. Pop. in 1870, 556; in 1880, 706.

**Curzon, de** (PAUL ALFRED), a French landscape-painter, born Sept. 7, 1820, was a pupil of Cabat, and exhibited for the first time in 1843. He made tours through Southern France, Italy, and Greece, and painted from the sketches collected.

**Cusanus** (NICOLAUS), whose true name was **Nicolai Krypffs**, or **Krebs**, and who is also known under the name **Nicholas de Cusa**, received his surname from Cues, or Cusa, a village on the Moselle, in the diocese of Treves, where he was born in 1401. He was of poor and humble parentage, and early entered the service of Count Ulrich of Manderscheid; but his great natural gifts soon became apparent, and the count sent him to be educated in the school of the Brethren of Common Life at Deventer. Thence he went to the University of Padua, where he studied law and took his degree. As he lost the first case he pleaded, at Mayence, he at once abandoned the legal career and entered the Church. He soon obtained preferment. His knowledge of mathematics and astronomy, of Hebrew and Greek, of philosophy and theology, gave him a great authority. He was made archdeacon of Liège, and as such he was sent to the Council of Basel in 1433. While there he wrote his "De catholica concordantia," in which he attacked the secular power of the pope and the donation of Constantine, and his "De autoritate presbiterii in concilio generali," in which he defended the supreme authority of the oecumenical council and the independence of the secular princes. Nevertheless, a few years later on, as the intimate friend of Eugenius IV., who sent him as papal legate on many important missions, and of Nicholas V., who made him a cardinal in 1448 and bishop of Brixen in 1451, he maintained and propagated the very opposite views. This singular change has generally been ascribed to ambition and cowardice, but the simplicity, honesty, and ascetic tendency of his private life forbid such an explanation, while his philosophy seems to proffer another. In his "De docta ignorantia" and "De conjecturis," his two principal philosophical works, he starts from the proposition that absolute truth is completely incongruous with the human mind, that the human mind can only form opinions, conjectures about absolute truth, etc. But this doctrine, which made him a mystic, and not a sceptic, goes far to explain the above change of views; and it must be added that his mysticism was of a rather obscure and confused description. He carried it along with him also into his scientific studies; though he actually anticipated the improvements of the Julian calendar, introduced by Gregory VII., the Copernican view of the earth's position in the solar system, etc., he also wrote "De quadratura circuli," in which he asserted that that problem was solved, and "De novissimis diebus," in which he prophesied that the world should be destroyed in 1734. The last years of his life were very much troubled. Archduke Sigismund would not recognize him as bishop of Brixen. The duke imprisoned the bishop, and the bishop excommunicated the duke. Cusanus died at Lodi Aug. 11, 1464, before an agreement was reached.

The best edition of his works is that by Henri Petri (Basel, 1565). (See RICHARD FALKENBERG, "Philosophie des Nicolaus von Cusa," Breslau, 1880.)

**Cush**, in the Old Testament, is the name of a person, the first son of Ham; of a land, the Nile valley southward of Egypt from Syene to the junction of the Blue and the White Nile; and of a people, the Ethiopians, akin to the Egyptians and distinct from the negroes. In the Egyptian records the people of Cush are always distinguished from the negroes in both name and appearance, they being always depicted with Caucasian features and of brown color.

**Cushing** (CALEB), LL.D., an able American jurist and scholar, born at Salisbury, Mass., Jan. 17, 1800. He graduated at Harvard College, visited Europe in 1829, and published "Reminiscences of Spain." In 1835 he became a Whig member of Congress, in which he served four consecutive terms. As a political friend of President Tyler he separated from the majority of the Whigs in 1841, and joined the Democratic party. He gained distinction as an eloquent debater. In 1843 he was nominated as secretary of the treasury, but was rejected by the Senate. He was appointed commissioner to China in the same year, and negotiated the first treaty between the U. S. and that empire. Having equipped a regiment at his own expense, he served as colonel in the Mexican war in 1847. He was appointed a justice of the supreme court of Massachusetts in 1852, and was attorney-general of the U. S. in the cabinet of Mr. Pierce from Mar., 1853, to Mar., 1857. He was one of the three lawyers appointed by President Grant to advocate the interests and rights of the Americans before the tribunal of arbitrators who met in Geneva in 1871 for the settlement of the "Alabama claims." Appointed minister to Spain in Dec., 1873, and held that office till Jan. 6, 1877. D. at Newburyport, Mass., Jan. 2, 1879.

**Cushing** (LUTHER STEARNS), an American jurist, born in Lunenburg, Mass., June 22, 1803. He was reporter to the supreme court of that State, and published eight volumes of reports. He also published a "Manual of Parliamentary Practice" (1845), well known as "Cushing's Manual," and "The Law and Practice of Legislative Assemblies in the U. S." (1855), etc. Died June 22, 1856.

**Cushing** (THOMAS), LL.D., born at Boston, Mass., Mar. 24, 1725, graduated at Harvard in 1744. His father, Thomas, was a prominent and public-spirited citizen. The younger Cushing was Speaker of the Massachusetts house of representatives 1762-74, and a member in 1774 of the provincial and the Philadelphia Congresses. He was regarded in Great Britain as the principal leader of sedition. "One object of the Americans," says Dr. Johnson in "Taxation no Tyranny," "is said to be to adorn the brows of Mr. Cushing with a diadem." He was occupied throughout the Revolution with the affairs of Massachusetts, where he was a judge, and afterwards lieutenant-governor. Died Feb. 28, 1788.

**Cushing** (WILLIAM), LL.D., a jurist, born at Scituate, Mass., Mar. 1, 1733. He became chief-justice of the superior court of Massachusetts in 1777, and associate justice of the Supreme Court of the U. S. in 1789. Died Sept. 13, 1810.

**Cushing** (WILLIAM B.), U. S. N., born Nov. 4, 1843, in Wisconsin, was appointed to the Naval Academy in 1857, and, being found "deficient in his studies," resigned in 1858. He entered the service as a volunteer officer in 1861, and received a commission as lieutenant in the navy July 16, 1862. He became a lieutenant-commander in 1864, and a commander in 1872. In 1861, Cushing distinguished himself on the Blackwater, in the Sounds of North Carolina, and at New River Inlet; in 1863 he added to his fame by his expedition upon the Cape Fear and Little rivers and his brilliant operations on the Nansemond; and in 1864 he covered himself with immortal glory by blowing up the ram Albemarle at Plymouth, N. C. His own boat was sunk, and he had to swim ashore; and he escaped only by using one of the picket-boats of the rebels, on which he reached the fleet. His adventures during the late civil war at Smithfield and Wilmington would alone have sufficed to establish his character for bravery, ability, and sound judgment, while his leading the men of the Monticello in the assault upon Fort Fisher—an act of which any other officer might well be proud—sinks into insignificance compared with his greater and more perilous exploits. Always complimented by his superior officers for his "courage and conduct," several times thanked by the navy department and once by Congress for "distinguished services," Commander Cushing may surely be regarded as the most adventurous of our naval heroes since Decatur died, and stands as such in our naval history. Died Dec., 1874.

FOXHALI A. PARKER.

**Cush'man** (CHARLES H.), U. S. N., born Dec. 6, 1831,

in Maine, entered the navy as a midshipman Mar. 24, 1849, became a passed midshipman in 1853, a lieutenant in 1856, and a commander in 1866. He served in the Pembina at the battle of Port Royal, Nov. 7, 1861, and in the iron-clad Montauk at the first attack on Fort Sumter April 7, 1863, and in the many fights of that vessel with the defences of Charleston harbor during the summer and fall of 1863. He was at both the Fort Fisher fights, and led one of the storming-parties in the assault on the fort of Jan. 15, 1865, where he was severely wounded. He was recommended for promotion by Rear-Admiral Porter. Retired Apr. 24, 1877. Died Nov. 11, 1883.

FOXHALI A. PARKER.

**Cushman** (CHARLOTTE SAUNDERS), a distinguished American actress, born in Boston July 23, 1816. She made her *début* in 1835, and performed with success in tragedy and comedy. She visited England in 1845, and performed there for several years. Her public readings from Shakespeare and other writers, in the large cities of the U. S. in 1872, were highly successful. In the opinion of many critics she was not surpassed in genius and power by any tragedienne of her time, and she was generally admitted to be the greatest of American actresses. D. Feb. 18, 1876.

**Cushman** (HENRY WYLES), born at Bernardston, Mass., Aug. 9, 1805, was educated at Norwich University, Vt., became lieutenant-governor of Massachusetts, 1851, and a member of the constitutional convention, 1853. Died Nov. 21, 1863.

**Cushman** (ROBERT), one of the founders of the Plymouth Colony, was born in England about 1580. He emigrated to Plymouth in 1621, and preached Dec. 9 of that year the first sermon that was ever printed in America. Died early in 1625.

**Cusk, Tusk, or Torsk**, popular names of a marine fish of the cod family, and of the genus *Brosimius*. Various varieties occur along the European and American coasts.

**Cusp** [from the Lat. *cusps*, a "point"], in architecture, is the point formed by the meeting of two small arches or foils, one of the projecting points of the featherings or foliations in Gothic panels, arches, or tracery.

**Cusp**, in astronomy, is a point or horn of the moon or of one of the inferior planets.

**Cusp**, in geometry, a point at which two tangents to a curve coincide. The two branches of the curve may either lie on the same side of the tangent, in which case the cusp is called *ramphoid*, or on opposite sides, when the cusp is *ceratoid*. The cisoid of Diocles furnishes an example of a cuspidate curve with a ceratoid cusp; the cusps of the new moon are ramphoid.

**Cusset**, a town of France, in the department of Allier, is noted for its healthful and beautiful surroundings. It has manufactures of cotton and wool, vineyards, and mineral springs. Pop. in 1881, 6330.

**Cusseta**, capital of Chattahoochee co., Ga. (see map of Georgia, ref. 5-F, for location of county), about 18 miles S. E. of Columbus. Pop. in 1870, 216; in 1880, 166.

**Custard Apple**. See ANONA.

**Custer, Dak.** See APPENDIX.

**Cus'ter** (GEORGE A.), an American officer, born in 1840 in Ohio, graduated at West Point in 1861; lieutenant-colonel Seventh Cavalry July 28, 1866, and brigadier-general U. S. volunteers April 15, 1865. He served in the civil war in the Manassas campaign 1861, engaged at Bull Run; in the Virginia Peninsula 1862, engaged at Yorktown, and aide-de-camp to Maj.-Gen. McClellan in the subsequent operations of the campaign; in the Maryland campaign 1862, engaged at South Mountain and Antietam; in the Rappahannock campaign 1863, engaged on "Stoneman's raid" and at Brandy Station; in Pennsylvania campaign 1863, engaged at Gettysburg (brevet major) and various minor actions; brig.-gen. of vols. in 1863, in operations in Central Virginia 1863-64, engaged in numerous skirmishes, etc.; in the Richmond campaign 1864, engaged at Wilderness, Todd's Tavern, Yellow Tavern (brevet lieutenant-colonel), Meadow Bridge, Haw's Shop, Cold Harbor, Trevillian Station, etc.; in the Shenandoah campaign 1864-65, engaged at Opequan (brevet colonel), Cedar Creek; brevet major-general for gallantry at Winchester or Cedar Creek and numerous smaller engagements; in command of the cavalry division in the pursuit of Lee's army 1865, engaged at Dinwiddie Court-house, Five Forks (brevet brigadier-general), Sailor's Creek, and Appomattox (brevet major-general); in command of the cavalry division in the military division of the South-west and Gulf 1865; as chief of cavalry in the department of Texas 1865-66; maj.-gen. U. S. vols. after Gen. Lee's surrender. After the war he was on Western frontier duty, where he was killed June 25, 1876.

GEORGE W. CULLUM.

**Custine, de** (ADAM PHILIPPE), COUNT, a French gen-

eral, born at Metz Feb. 4, 1740. He served as colonel at Yorktown, Va., in 1781. He commanded brilliantly an army on the Rhine in 1792. His popularity and talents excited the jealousy of the Jacobins, and he was guillotined Aug. 28, 1793. (See his memoirs by D'HILLIERS, 1795.)

**Custine, de** (ASTOLPH), MARQUIS, a grandson of the preceding, born in 1793, travelled through England, Scotland, Switzerland, Italy, Spain (1835), and Russia, and died in 1857. His work "*La Russie en 1839*" (4 vols., 1843) created at the time of its publication a profound sensation, and the Russian government deemed it necessary to have an answer to it published.

**Cus'tis** (GEORGE WASHINGTON PARKE), an adopted son of Gen. Washington, was born in Maryland April 30, 1781. He was a grandson of Mrs. Martha Washington. He produced several plays and orations, and wrote a volume of "*Recollections of Washington*," which was published in 1860. Died Oct. 10, 1857.

**Cus'tom-house** [Fr. *douane*], the office at a port of entry where merchants and others are required to pay duties on imported goods, and where vessels are entered and cleared. They are also established at frontier inland towns. The chief officer connected with the custom-house is called a collector of customs.

**Cus'tos Rotulo'rum**, a Latin term signifying "keeper of the rolls," is the title given in England to the chief civil officer of a county, who is appointed to keep the county records.

**Cu'stria'**, a fortified town in Prussia, in the province of Brandenburg, at the confluence of the Oder and Warthe, 52 miles E. of Berlin. It consists of the town proper, situated within the fortifications and forming a fortress of first rank, and two suburbs, one on the left bank of the Oder and one on the right bank of the Warthe. It is surrounded by marshes. The Oder is crossed by a bridge 900 feet in length. Pop. 14,069.

**Cutch**, or **Kutch**, a portion of Western Hindostan, on the Indian Ocean, lies between Sind and Guzerat, and is separated from the desert by the Runn of Cutch, 7000 square miles of arid land encrusted with salt. Cutch is under the protection of the British. The natives are hardy sailors. The exports are cotton, glue, and oil. The political system is like feudalism, with a sovereign called a *rao* over about 200 chieftains. Capital, Bhooj.

**Cutch**, a variety of CATECHU (which see). It is used in tanning and in dyeing.

**Cutch Gunda'va**, the most important province of Beloochistan, between lat. 27° and 29° 50' N., and lon. 67° 20' and 69° 15' E., E. of the Brahooick Mountains. Area, about 10,000 square miles. Surrounded by deserts, it is exceedingly fertile, exporting grain, cotton, and indigo. The inhabitants are Juts, with some Hindoos trading in the towns.

**Cuthæ'ans**, a name given by the Jews to the SAMARITANS (which see), from Cutha, one of the countries from which colonists were sent by the Assyrians.

**Cuth'bert**, R. R. junction, capital of Randolph co., Ga. (see map of Georgia, ref. 6-F, for location of county), 118 miles S. W. of Macon. It has two female colleges and a high school. Pop. in 1870, 2210; in 1880, 2129.

**Cuthbert** (illustrious for skill), or **Guthbert** (worthy of God), one of the early English saints, born near Melrose-on-the-Tweed, entered the abbey there in 651, and in 664 became its prior, and afterwards prior of Lindisfarne. He took also the bishopric of Lindisfarne in exchange for that of Hexham, to which he was chosen in 684. He had the credit of working miracles. His life was written by Bede. Died Mar. 20, 687.—CUTHBERT, abbot of Jarrow, wrote a moving description of the death of the Venerable Bede, 735. (In TWYSDEN'S "*Decem Scriptores*," 1652).—CUTHBERT, twelfth archbishop of Canterbury (741-758), was a friend of Boniface, and sympathized with Pope Zacharias in his efforts to build up the papacy. His letter to Saint Boniface describing ecclesiastical abuses is in HUSSEY'S Bede's "*Historia Ecclesiastica*."

**Cutler** (HANNAH CONANT TRACY). See APPENDIX.

**Cutler** (LYSANDER), a native of Maine, became colonel of the Sixth Wisconsin Volunteers in 1861, served with the greatest honor in the Army of the Potomac, where he became a major-general, and was twice wounded. Died at Milwaukee, Wis., July 30, 1866.

**Cutler** (MANASSEH), LL.D., an American botanist and Congregational minister, born at Killingly, Conn., May 3, 1742, graduated at Yale in 1765. He described 350 species of plants indigenous in New England. He was a leader of a party that settled at Marietta, O., in 1788. He was also a lawyer and physician, and was a member of Congress (1800-04). Died July 28, 1823.

**Cutler** (TIMOTHY), D. D. OXON., an American clergyman, born in Massachusetts in 1685. He became president of Yale College in 1719, a member of the Episcopal Church in 1722, and rector of a church in Boston in 1723. Died Aug. 17, 1765.

**Cut'lery** [from the Lat. *cultellus*, diminutive of *cultus*, a "knife"], a term used to designate sharp and cutting instruments made of iron or steel. The most primitive cutting instruments were flints, shells, etc., which were succeeded by bronze implements and weapons. These were probably used to some extent by the Romans until about the commencement of the Christian era, as bronze surgical instruments have been found at Pompeii. During the Middle Ages several cities of Spain and Northern Italy were renowned for the manufacture of cutting instruments, especially swords. The cutlery of Sheffield in England has been generally regarded as superior to any other, but other European countries and the U. S. now rival England in the quality of their cutlery. Good table-knives are made of steel and iron welded together; the tang (which goes into the handle) and the shoulder are of iron, and the blade is steel. The blades of knives, razors, etc. are usually forged into shape while attached to the bar; they are smithed—that is, beaten upon an anvil—to condense the metal, and slightly ground on a rough stone to finish the shaping and remove the black oxidized surface, which would interfere with the color of the tempering. Cheap table-knives are made of iron entirely, and the difference of price is owing to the greater facility of working, as well as the cost of the material. In many articles made of steel and iron the saving of steel is not the only advantage, for as steel is more brittle than wrought iron, it is desirable that every part except the cutting edge should be of iron. The great value of steel for all cutting implements or those exposed to wearing friction depends on its property of acquiring a great degree of hardness when heated and suddenly cooled, and of softening again by moderately reheating. The dry-grinding of forks, etc. is very injurious to the health of those engaged in it, owing to the particles of steel causing irritation of the lungs and a disease called "grinders' asthma." Pocket-knives are the work of many hands. There are, besides the blades, the separate pieces of the spring, handle, rivets, etc.; the making of each is a distinct trade. The pieces are all finally fitted and put together by the finisher; a two-bladed knife sometimes passes through his hands from seventy to a hundred times.

**Cutt** (JOHN), one of the founders of the CUTTS families of Maine and New Hampshire, is said to have been a Welshman. He came to America before 1646 with Robert and Richard, his brothers, and became a wealthy merchant of Portsmouth, N. H. His brothers became prominent citizens of Portsmouth and Kittery. John was for a time president of New Hampshire. Died Mar. 27, 1681.

**Cut'tack**, a city, the capital of a district of like name, is on the Mahanuddee River, 250 miles S. W. of Calcutta. It is healthy, and has a temple and mosques, chapels, and manufactures of shoes, brass, and salt. Pop. about 40,000; of district, 1,984,600.

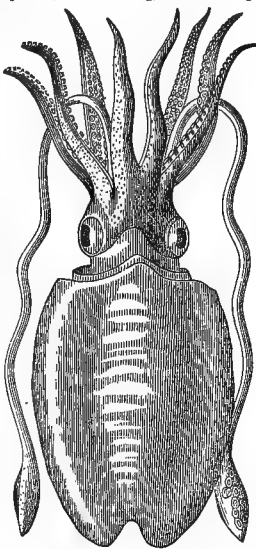
**Cut'ter**, a small vessel with one mast and a bowsprit, built with especial reference to speed. The distinction between a cutter and a sloop is that in a cutter the jib has no stay to support it. The term "revenue cutters" is applied to those which are employed in the pursuit of smugglers. The cutters belonging to ships of war are clincher-built boats, about twenty-five feet long.

**Cut'ting** (FRANCIS BROCKHOLST), born in New York City in 1805, graduated at Columbia College in 1825. He was a distinguished lawyer and a prominent Democratic member of Congress in 1853-55. Died June 26, 1870.

**Cutting** (SEWALL SYLVESTER), D. D., born Jan. 19, 1813, at Windsor, Vt., graduated at the University of Vermont in 1835, ordained pastor of a Baptist church in West Boylston, Mass., 1836, pastor of a Baptist church in Southbridge, Mass., 1837-45, editor of the "*New York Recorder*" 1845-50 and 1853-55, editor of the "*Christian Review*" 1850-53, professor of rhetoric and history in the University of Rochester 1855-68, secretary of the American Baptist Educational Commission from 1868 to the present time (1873). He was author of "*Historical Vindications of the Baptists*," Boston, 1858. D. Feb. 7, 1882.

**Cut'tings**, portions of branches of trees or shrubs employed to produce new plants by the insertion of the lower end into the earth. The willow, currant, and gooseberry are easily propagated in this mode, and many other trees or shrubs will grow from cuttings under favorable circumstances, such as warmth, moisture, and shade. The branches which are young, but not less than a year old, are most adapted for this purpose.

**Cuttle-fish** [Ger. *Kuttelfisch*; Fr. *sèche*], a name applied to many dibranchiate cephalopodous mollusks, especially to those of the family Sepiadæ, the species of which are numerous and almost world-wide in distribution. The term popularly includes nearly all the dibranchiate cephalopods. They are characterized by the presence of an ink-bag filled with black or brown "sepia," a substance which the animal ejects when pursued, so as to conceal itself from view by coloring the waters around it. This substance was formerly much employed in making sepia or India ink (now made of lampblack, etc.). This coloring-matter is so permanent that it has occasionally been prepared from fossil specimens. "Cuttle-fish-bone" is in reality the calcareous internal shell of these animals, especially that of the *Sepia officinalis* of Europe. When powdered it is sold under the name of "pounce," and is used for polishing, for tooth-powder, and in making moulds for delicate castings. It was formerly much used in medicine, but is only valuable for its feebly antacid properties. Cuttle-fish have been found of two tons weight in the tropical seas. They are all marine. Many fossil species occur. Several species are found on the Atlantic coast of the U. S. (See SQUID.)

Cuttle-fish: *Sepia officinalis*.

**Cutty-Stool** [Scottish, *cutty* or *kittie*, a woman of light or worthless character], or **Creep'ie Chair**, formerly a seat in Scottish churches where offenders against chastity were obliged to sit for three Sundays, and receive a reprimand from the minister.

**Cut-Worm**, a name given by agriculturists to many larvæ, mostly belonging to lepidopterous insects of the family Noctuelitæ, and especially to those of the genus *Agrotis*. They cut off corn, cabbage, and other plants just below the surface of the ground; and one species at least (*Agrotis Cochranii*) climbs apple and pear trees and destroys the young buds. No effective remedy for their ravages is known.

**Cuvier** (GEORGE CHRÉTIEN LÉOPOLD FRÉDÉRIC DAGOBERT), BARON, a celebrated French naturalist, was born at Montbéliard, then in Wurtemberg, whither the family had removed from Jura in the sixteenth century upon embracing Protestantism, Aug. 23, 1769. His father was an officer in a French regiment of Swiss mercenaries. He studied political science at the Carolinian academy in Stuttgart, through the interest of the duke. He was an enthusiastic student from boyhood, and his passion for natural history showed itself in his thirteenth year. He became in 1788 tutor to the son of Count d'Héricy, who lived in Normandy, and remained in this situation nearly six years, at the same time pursuing his studies. Early in 1795 he removed to Paris, where he associated with Jussieu and Geoffroy Saint-Hilaire. He became in July, 1795, professor of comparative anatomy in the Museum of Natural History, and began to form his great cabinet of comparative anatomy. In 1796 he was admitted into the Institute, then just founded. He displayed his genius for classification in a work called "Tableau Élémentaire des Animaux" (1798), and succeeded Daubenton as professor of natural history in the College of France in 1800. In 1801 he commenced the publication of the important "Leçons d'anatomie comparée" (1801-05, 5 vols.; new ed. 1840). He married Madame Duvaucel, the widow of a farmer-general, and was chosen perpetual secretary of the Academy of Sciences in 1802. In 1808 he was appointed councillor to the Imperial University. He displayed a rare faculty of expressing scientific truths in popular and elegant language in his "Discourse on the Revolutions of the Surface of the Globe," in which he propounds the theory of the correlation of forms in organized beings. He was appointed master of requests by Napoleon in 1813, and councillor of state in 1814. He published in 1817 his celebrated "Animal Kingdom" ("Règne Animal distribué d'après son Organisation," in four volumes; new edition by his pupils, 11 vols., with 993 plates, 1836-49), in which he proposed the arrangement of animals in four divisions—the Vertebrata, Mollusca, Articulata, and Radiata. Soon after the restoration of the

Bourbons he was appointed chancellor of the University of Paris by Louis XVIII. He was elected a member of the French Academy in 1818, and received the title of baron in 1820. He wrote many able notices of scientific men for the "Biographie Universelle." Among his other works is an excellent "Natural History of Fishes" (1818-30, with the continuation by Valenciennes, 22 vols.), of which eight volumes were finished during his life. As a professor he was distinguished for facility of elocution, clearness of ideas, and the art of fixing the attention in philosophical or historical digressions. He first applied to zoology the natural method, and founded a system on the basis of the invariable characters of anatomical structure. He is regarded as the founder of the science of comparative anatomy, and his knowledge of that science was such that a bone or small fragment of a fossil animal enabled him to determine the order, and even genus, to which it belonged. During the last twelve years of his life he rendered important services as president of the committee of the interior. He was created a peer of France in 1831. Died May 13, 1832. He had several children, but none of them survived him. His disposition was amiable, and his moral character unimpeachable. (See A. DE CANDOLLE, "Notice sur la Vie et les Ouvrages de G. Cuvier;" R. LEE, "Memoir of Baron Cuvier," 1833; L. DE LOMÉNIE, "G. Cuvier, par un homme de rien," 1841; FLOURENS, "Cuvier, Histoire de ses Travaux," 1845.)—The brother of the naturalist, FRÉDÉRIC CUVIER, born June 28, 1773, published, with Geoffroy St.-Hilaire, "Histoire naturelle des mammifères."

**Cuvillier-Fléury** (ALFRED AUGUSTE), born in 1802, was educated in Collège Louis-le-Grand, and became in 1819 private secretary to Louis Bonaparte, ex-king of Holland. In 1827 Louis Philippe chose him as tutor for the duke of Anmale, and in 1834 he entered the staff of the "Journal des Débats." Of his articles there exist various collections: "Portraits politiques et révolutionnaires" (1851-52, 2 vols.), "Études historiques et littéraires" (1854, 2 vols.), "Nouvelles Études" (1855), "Voyages et Voyageurs" (1854), "Dernières études historiques et littéraires" (1859, 2 vols.), "Historiens, Poètes et Romanciers" (1863, 2 vols.), "Études et Portraits" (1865-68, 2 vols.), "Posthumes et Revenants" (1879). A great sensation was produced in 1872 by the letter which he published in the "Journal des Débats" against the monarchist party and their manoeuvres.

**Cuxhaven**, a town of Germany, is on the left bank of the Elbe, at its entrance into the German Ocean, about 60 miles W. N. W. of Hamburg, to which it belongs. It has a good harbor, and is the port whence Hamburg steamers depart when the Elbe is frozen. Pop. in 1880, 2200.

**Cuya'ba**, or **Cuiaba**, a town of Brazil, the capital of the province of Matto Grosso, stands on a river of the same name, an affluent of the Paraguary, in lat. 15° 20' S. It was founded in 1722, gold having been discovered in its vicinity; but its prosperity dates from 1856, when a line of steamers brought it into easy communication with Rio Janeiro and Montevideo. It is a bishop's seat and a military station. Pop. estimated at about 20,000.

**Cuyahoga Falls**, Summit co., O. (see map of Ohio, ref. 2-H, for location of county), on R. R. and the Cuyahoga River, 34 miles S. E. of Cleveland. The river is here enclosed between rocky walls nearly 200 feet high, and affords abundant water-power, employed in several paper-mills, wire-works, rolling-mills, foundry, soap and glue factory, etc. Pop. in 1870, 1861; in 1880, 2294.

**Cuyler** (THEODORE LEDYARD), D. D., born at Aurora, Cayuga co., N. Y., Jan. 10, 1822, graduated at Princeton College in 1841, at Princeton Seminary in 1846, preached three years at Burlington, N. J., was first pastor of the Third Presbyterian church at Trenton, N. J., then pastor of the Market Street Reformed church in New York City, and is now pastor of Lafayette Avenue Presbyterian church, Brooklyn, N. Y., enrolling more members than any other Presbyterian church in the U. S. The twenty-fifth anniversary of his pastorate was celebrated Apr. 5, 1885. He had then preached there 2300 sermons, delivered over 1000 addresses, and received into membership in the church 3610 persons, 1566 of them by conversion. He is the author of several works, such as "Cedar Christian," "Empty Crib," "Heart-Life," and "Thought-Hives," all of which have been republished in England. Has also published over 2700 letters and articles in newspapers and magazines, many of which have been reprinted in Europe.

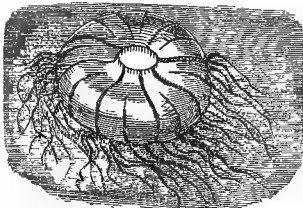
**Cuyp** (ALBERT), pupil of his father, Jacob Gerrits Cuyp (1675-1650), was born at Dort in 1606. He is remarkable for his versatility, but is perhaps best known as a landscape-painter, in which department he attained great excellence. He is one of the few Dutch painters whose talent



can be best studied outside of Holland. Many of his finest works are in England. A good figure-piece attributed to him, but perhaps painted by his father, is in the Bryan gallery, New York Historical Society. Died after 1683. CLARENCE COOK.

**Cuz'co**, a city of Peru, capital of the department of Cuzco, is 200 miles N. of Arequipa, and 11,380 feet above the level of the sea; lat. 13° 31' S., lon. 72° 4' W. It was formerly the capital of the Incas. It contains a fine cathedral, a university, several convents, and a mint, and is the seat of a bishop. Massive specimens of ancient Peruvian architecture are visible. Pop. 18,370.

**Cyana'a** [probably named from the nymph *Cyane*], a genus of radiate animals of the class Discophora (jelly-fishes), allied to the Medusæ. The *Cyanea capillata* is one of the species which are known as sea-nettles. Its severe sting is one of the terrors of sea-bathers at some of the European watering-places.



Cyanaa.

**Cy'ane** [Gr. *Κυανή*], the name of a water-nymph of classic mythology, who tried to rescue her playmate Proserpine, and was changed by Pluto into a fountain in Sicily. She is also called the wife of Æolus, god of the winds. The fountain Cyane, near Syracuse, still flows, and gives rise to a considerable river. Here grows the papyrus plant.

**Cy'anide**, or **Cy'anuret**, a compound of cyanogen with a positive radical. Prussian blue is a cyanide (or rather a ferrocyanide) of iron. The cyanide of potassium is very useful in chemistry and the arts, and is also employed in medicine as a sedative. It is a very active poison.

**Cyan'iline** ( $C_{14}H_{14}N_2$ ), a direct compound of cyanogen and aniline. It is very unstable, but crystallizes and forms salts with acids.

**Cy'anite**, or **Kyanite** [from the Gr. *κύανος*, "blue," and *λίθος*, a "stone"], a beautiful mineral, sometimes called **Disthene**, is a silicate of alumina. It often occurs crystallized, and generally in broad prisms. It is transparent or translucent, sometimes opalescent, and exhibits various shades of blue. Its formula is  $Al_2O_3SiO_2$ .

**Cyanogen** [from the Gr. *κύανος*, "blue," and *γεννάω*, to "produce," referring to "prussian blue," one of its compounds], a compound negative radical composed of one atom of carbon with two of nitrogen, represented by the symbol  $CN_2$ , or, in its capacity of a quasi-element, by Cy. It is a colorless, inflammable, permanent gas, with a specific gravity of 1.806. At the temperature of 45° F., if submitted to the pressure of 3.6 atmospheres, it becomes a transparent, colorless liquid. It has the odor of peach-kernels. Combined with hydrogen, it produces prussic or HYDROCYANIC ACID (which see), remarkable for its deadly action upon the animal economy. Cyanogen combines with metals and other positive radicals, and produces a class of compounds known as cyanides, which are analogous in character to the chlorides, iodides, etc. Some of these are of great importance in the arts, as in gilding, electro-plating, photographing, and as tests in the chemical laboratory. Some are used in medicine as sedatives, but they are in general extremely poisonous. PRUSSIAN BLUE (which see) is one of the most important of the cyanides.

**Cyanom'eter** [from the Gr. *κύανος*, "blue," and *μέτρον*, a "measure"], an instrument for measuring the blueness of the sky. It consists, essentially, of a disk divided into sectors, the several sectors being colored with tints of blue gradually increasing in intensity. Held between the eye and the sky, some sectors will appear deeper, and some lighter in tint than the heavens. That one where the difference is insensible is the measure of the blueness for the time being. F. A. P. BARNARD.

**Cyano'sis** [from the Gr. *κύανος*, "blue;" Fr. *cyanoïse*], also called **Cyanopathi'a** [from *κύανος*, "blue," and *πάθος*, "affection"], a condition in which the skin of a newly-born infant is of a blue color. It is the result of various congenital malformations and conditions of imperfect development. Frequently the pulmonary circulation is defective. In some cases the foramen ovale remains open as in the fetal state. The venous and arterial blood are mingled, as is normal before birth. Cyanosis may prove fatal in a few days after birth, but normal development may take place and recovery follow, or the patient may live for years with this undeveloped condition of the blood-vessels.

**Cya'thea** [from the Gr. *κύαθος*, a "cup," alluding to the shape of its indusia], a genus of beautiful tree-ferns of

the sub-order Polypodiaceæ, found in the tropical regions of the Old and New World. The species are numerous. *Cyathea arborea*, a native of the West Indies, Mexico, and South America, has bipinnate fronds. *Cyathea medullaris*, a New Zealand species, has edible starchy roots.

**Cyathophyl'ium** [from the Gr. *κύαθος*, a "cup," and *φύλλον*, a "leaf," referring to the shape of the polypidoms], a genus of fossil stony corals having a simple or branched polyparium, internally lamellated, the lamellæ having a quadripartite arrangement. This genus is found in abundance in the Devonian measures, and thirty-six species have been described from them. It disappeared at the close of the carboniferous period.

**Cyax'ares** [Gr. *Κυαξάρης*; Old Persian, *Uvakhshatara*, i. e. "beautiful-eyed"] I., a king of the Medes, began to reign in 633 B. C. He waged war against the Scythians, who invaded his dominions, and against Alyattes, king of Lydia. A total eclipse of the sun which occurred about 610 B. C. induced Cyaxares and Alyattes to make peace. Cyaxares and the king of Babylon took Nineveh in 625. He died in 593 B. C., and was succeeded by his son Astyages, who reigned from 593 to 569 B. C.

**Cyaxares II.**, a son of Astyages, grandson of Cyaxares I., and uncle of Cyrus the Great. Though not mentioned by Herodotus or Ctesias, he is named by Xenophon as the successor of Astyages in the Median kingdom, and is probably the same as "Darius the Median" spoken of by the prophet Daniel (v. 31). He is supposed to have reigned in Babylon for two years after its conquest by Cyrus in 538 B. C. He came to the throne of Media in 569 B. C.

**Cyb'ele** [Gr. *Κυβέλη* or *Κυβήλη*], called also **Cybe'be** [Gr. *Κυβήβη*] and **Rhe'a** [Gr. *Ρεία*, *Ρέα* or *Ρείη*], a goddess of classic mythology, received the appellation of "Mother of the Gods" or "Great Mother." She was supposed to be a daughter of Uranus and Terra, the wife of Saturn (Cronos), and the mother of Jupiter. Her priests were called CORYBANTES (which see). She was sometimes styled the "Berecynthian mother," from the hill Berecynthus, where she had a temple. She is generally represented riding in a chariot drawn by lions, with a diadem of towers upon her head.

**Cycada'ceæ**, or **Cyca'deæ** [from *Cycas* (gen. *cycadis*), one of the genera], a small natural order of exogenous plants, indigenous in the tropical parts of Asia and America. They are gymnosperms, and nearly related to the Conifera, and are distinguished by their simple stems, large pinnate leaves, and antheriferous cones. The stems, outwardly like palms, are internally exogenous in structure. Thus they approach closely to the endogens, and seem to be a link between the latter and the exogens. This curious order comprises about fifty known species, none of which are natives of Europe. Many of them afford starch, which is wholesome and extensively used as food. Sago is obtained in Japan from the interior of the stem of the *Cycas revoluta*, and a similar substance is produced in the Moluccas by the *Cycas circinalis*. The large seeds of *Dion edule*, which grows in Mexico, afford a starchy food. The cafferbread trees belong to this order. The COONTIE (which see) is the only plant of this order in the U. S.

**Cy'chla**, a genus of fishes of the family Chromidæ, many species of which are found in the tropical parts of America. They have small and crowded teeth, and are remarkable for the beauty of their colors. Some of them are greatly esteemed for the table.

**Cyc'lades** [from the Gr. *κύκλος*, a "circle"], a name given to a group of islands in the Ægean, numbering twelve in all, according to Strabo, so called because they surrounded the sacred island of Delos. These islands are Syra, Delos, Andros, Tenos, Mykonos, Naxos, Paros, Antiparos, Siphnos, Seriphos, Kythnos, and Keos. The present nome of the Cyclades (the tenth of fourteen in the kingdom of Greece) includes, in addition to the above, the following eight islands: Melos, Thera, Kimolos, Pholagandros, Sicynnos, Ios, Amorgos, and Anaphe. The surface is mountainous, the soil productive. Pop. of the nome, 132,000. Area, 926 square miles. Syra or Hermopolis is the most important city.

**Cyc'lamen** [Gr. *κυκλάμινος*, from *κύκλος*, "circle," because it was used for garlands], the name of a genus of plants of the natural order Primulacæ, having a wheel-shaped corolla, with a long reflexed limb, and flower-stalks twisted spirally after flowering. The species are herbaceous perennials, mostly natives of the south of Europe. Some of them are cultivated in gardens for the sake of the flowers, which are beautiful and fragrant. The root or subterranean stem is acrid and drastic. These properties depend on a peculiar principle called cyclamin.

**Cy'cle** [Gr. *κύκλος*, a "circle"], a period of time which finishes and recommences perpetually. The term has been

employed for marking the intervals in which two or more periods of unequal length are each completed in a certain number of times, so that both begin again exactly in the same relations as at first. The cycles used in chronology are three: the cycle of the sun, the cycle of the moon (or Metonic cycle), and the cycle of indiction. The cycle of the sun, or solar cycle, is a period of time after which the same days of the week recur on the same days of the year. If the number of days in the year were always the same, this cycle could only contain seven years; but the order is interrupted by the intercalations. In the Julian calendar, the intercalary day returns every fourth year, and the cycle consequently contains twenty-eight years. This cycle is supposed to have been invented about the time of the first Council of Nice (325 A. D.), but the first year of the first cycle is placed nine years before the commencement of the Christian era. Hence the year of the cycle corresponding to any given year in the Julian calendar is found by the following rule: add nine to the date and divide the sum by twenty-eight; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the twenty-eighth, or last of the cycle. In the reformed calendar this rule can only apply from century to century, for the order is interrupted by the omission of the intercalary day every hundredth year. (See DOMINICAL LETTER.) The cycle of the moon is a period of nineteen solar years, after which the new and full moons fall on the same days of the year as they did nineteen years before. This cycle was invented by Meton, an Athenian astronomer, and is known as the "Metonic cycle." It contains 6940 days, which exceeds the true length of the nineteen solar years by nine and a half hours, nearly. On the other hand, it exceeds the length of 235 lunations by seven hours and a half only. The framers of the ecclesiastical calendar, in adopting this period, altered the distribution of the lunar months, in order to accommodate them to the Julian intercalation; and the effect of the alteration was that every three periods of 6940 days was followed by one of 6939. The mean length of the cycle was therefore 6939½ days, which agrees exactly with nineteen Julian years. The number of the year in the cycle is called the GOLDEN NUMBER (which see). The cycle begins with the year in which the new moon falls on the first of January. To find the number of any year in the lunar cycle, or the golden number of that year, we have this rule: add one to the date and divide by nineteen; the quotient is the number of cycles elapsed, and the remainder is the year of the cycle. Should there be no remainder, the proposed year is the last or nineteenth of the cycle.

The cycle of indictions, or Roman indiction, is a period of fifteen years, not astronomical, but entirely arbitrary. Its origin and purpose are alike uncertain, but it is conjectured that it was introduced by Constantine the Great about 312 of the common era, and had reference to certain judicial acts that took place at stated intervals of fifteen years. It is considered as having commenced on the first of Jan., 313. By extending it backward to the beginning of the era, it will be found that the first year of the era corresponded with the fourth of the cycle. In order, therefore, to find the number of any year in the cycle of indiction, we have this rule: add three to the date, divide the sum by fifteen, and the remainder is the year of indiction.

F. A. P. BARNARD.

**Cyc'lic Planes of a Cone**, the two planes through one of the axes which are parallel to the planes of circular section of the cone. The perpendiculars to the cyclic planes through the vertex are the focal lines of the reciprocal cone. A sphere around the vertex of the cone is cut by the latter, its cyclic planes, and its focal lines respectively, in a spherico-conic, its cyclic arcs, and its foci, and thus the reciprocal properties of cyclic planes and focal lines give rise to properties of spherico-conics, which are in many respects precisely similar to those of plane conics.

**Cyc'lic Po'ets** [Gr. οἱ ποιηταὶ κυκλικαί, the "poets of the cycle" or "routine" of mythology], a name originally given to Homer and certain epic poets who followed him, whose works treated of the mythological and heroic ages of Greece. In the second century B. C. these poems were arranged at Alexandria according to the order of the events they narrated. The whole collection was called the "Epic Cycle." The Homeric poems, though originally comprised in this cycle, are always treated as distinct from it, and the name "cyclic poet" became rather one of reproach, signifying a follower of an established "routine." The principal cyclic poets were Arctinus, Lesches, Agias, Eumelus, Stasinus, and Eugamon. Their extant writings are mere fragments.

**Cyclifying Line, Plane, and Surface**. The developable surface which contains a given non-plane curve, and which on being unfolded transforms that curve into a

circular arc of a given radius, is called the cyclifying surface, corresponding to that radius. Its tangent planes are the *cyclifying planes* of the curve, and its generators the *cyclifying lines*. The theory of cyclifying surfaces is a generalization of that of the rectifying surface; which latter, in fact, is a cyclifying surface corresponding to the radius infinity. The developable osculatrix of a common helix, or of any curve with constant radius of curvature, is a cyclifying surface.

**Cycloid** [from the Gr. κύκλος, a "circle," and εἶδος, "form"], a name given to several important plane curves generated by a point in the plane of a circle when the latter is rolled along a straight line. If the generating point is in the circumference of the rolling circle, a "common cycloid" is generated; if the generating point be outside the circle, it marks a "curtate" cycloid; while if it be a point within the circumference, a "prolate" or "inflected" cycloid is the result. That part of the cycloid which is generated in one revolution of the generating circle is called one "branch" of the cycloid. The branches may be infinite in number. That part of the straight line which is traversed in one revolution of the generating circle is the "base" of one branch. A line bisecting the branch of a cycloid and its base is the "axis." The common cycloid is the "line of quickest descent," that is, if one point be placed above another, but not in the same vertical line, a falling body will move from the higher point to the lower more quickly along the arc of an inverted common cycloid than by any other course, even if that course be a straight line. If a pendulum be made to vibrate in the arc of a common cycloid, no matter what the length of the arc may be, the time will always be the same. In practice, however, this result has never been attained. Experiments show that cog-wheels with teeth bounded by this curve have their friction reduced to the minimum. (See EPICYCLOID and HYPOCYCLOID.)

**Cycloid, Companion to the**, a name given by Roberval to a curve intimately connected with the cycloid, by means of whose properties he succeeded in 1634 in solving the problem of the quadrature of the cycloid. The curve in question may be conceived to be generated by a point which always remains vertically over the point of contact of the rolling circle and its base, and in the same horizontal line as the describing point. Its area is equal to twice that of the rolling circle. The area of the space between the cycloid and its companion is precisely equal to that of the rolling circle, so that the area of the cycloid itself is three times that of the circle.

**Cyclone** [from Gr. κύκλος, a "circle," one is an augmentative suffix], a rotatory storm or whirlwind occurring in the tropical seas, but never on the equator. The diameter is generally about 200 or 300 miles, and sometimes exceeds 500. The centre of the vortex (which is always calm) travels at a rate varying from eleven to thirty miles an hour. Cyclones are perhaps the most destructive of all storms. They rotate from right to left in the northern hemisphere, and from left to right in the southern. According to Humboldt, the velocity of the wind is sometimes from 200 to 300 miles an hour. (See WINDS.)

**Cyclopæ'dia** [from the Gr. κύκλος, a "circle," and παιδεία, "instruction," "knowledge"], properly signifies a work which takes in the whole circle of learning. The term is often, though incorrectly, applied to a work treating very fully of some one or two important subjects, as Chambers's "Cyclopædia of English Literature," the "Cyclopædia of Anatomy and Physiology," etc. (See ENCYCLOPÆDIA.)

**Cyclo'pean Walls**, a term applied to certain huge structures or walls of uncemented stones, the remains of which are found in Greece, Italy, and Asia Minor. These structures were so called because they were supposed to have been built by the Cyclopes of mythology. The architecture is very different from that of the historic period. Some persons believe that they were erected by the Pelasgi, more than 1000 years before the Christian era. The Cyclopean walls at Tiryns in the Peloponnesus are formed of unhewn stones from six to nine feet long, and nearly three feet thick. At Mycenæ are found massive walls of stones, which are more accurately fitted and are specimens of an architecture less rude than that of Tiryns. A more advanced style of architecture appears in some remains of Etruria. In the Etruscan masonry called Cyclopean the stones are hewn or squared and laid in horizontal courses, but are not cemented.

**Cyclopism**, that form of monstrosity or malformation of the fetus in which only one eye is present, usually on the median line of the head. (See TERATOLOGY.)

**Cyclops** [Gr. Κύκλωψ (i. e. "round-eyed"), from κύκλος, a "circle," and ὤψ, an "eye"], plu. **Cyclo'pes**, in classic

mythology, a race of giants or monsters having each one eye in the middle of the forehead. According to Hesiod, they were the sons of Uranus, and were named Brontes, Arges, and Steropes. Homer represents them as gigantic and lawless shepherds and cannibals who lived in Sicily. The most famous among them was Polyphemus.

**Cyclops**, a genus of minute entomostracous crustaceans, so named from the supposition that the animal had but one eye. It has since been discovered to have two eyes, forming a single spot in the centre of the forehead. The species of *Cyclops* are numerous, and inhabit both salt and fresh waters. Several species occur in the U. S. Whales devour large numbers of the marine species.



Cyclops.

**Cyclo'sis** [Gr. κύκλωσις, a "going around," from κύκλος, a "circle"], a movement of elaborated sap, latex, or granulated protoplasm within the cells or vessels of plants. It was first observed and described by C. H. Schultz. In the milky or colored latex of some species of the genera *Ficus* and *Euphorbia*, and in the celandine (*Chelidonium majus*), it is easily seen under the microscope, but is nowhere more beautiful than in the elongated cells of *Chara* and some other aquatic plants, especially with a magnifying power of about 1200 diameters. It has been observed in the needle-like hairs of the common nettle. There is usually a regular rotation (whence the name) of the granules in each cell, up one side and down the other, with also smaller partial currents in different directions. Huxley considers the cause of the currents to exist in contractions of the protoplasm, too minute to be discerned except through their effects. (See SCHULTZ, "Die Cyklose, etc. in den Pflanzen," Breslau.)

**Cyclostomoides**. See APPENDIX.

**Cyd'nus** [Gr. Κύδνος], a river of Cilicia, flowing through the city of Tarsus into the Mediterranean. It was celebrated for the clearness and coldness of its water. It was anciently navigable up to Tarsus (12 miles), but its mouth is now obstructed by bars. This river was the scene of Cleopatra's celebrated voyage to meet Antony in 41 B. C.

**Cydo'nia**, an ancient city of Crete, was on the north-western coast of the island. It was noted for the production of the quince (*Cydonia*).

**Cyg'nus** (the "Swan"), a constellation of the northern hemisphere between Lyra and Cassiopeia, comprises several bright stars. The parallax of the binary star 61 Cygni was measured by Bessel, who published in 1839 "Measure of the Distance of the Star 61 in the Constellation of Cygnus." By two distinct methods of observation the distance of this star has been shown to exceed 50,000,000,000 miles.

**Cyl'inder** [Gr. κύλινδρος, from κυλίνδω, to "roll"], the name of a genus of geometrical solid figures of which there may be endless species. The most common kind of cylinder is that which is generated by the revolution of a rectangular parallelogram about one of its sides, which line is called the axis of the cylinder. But in order to embrace all varieties of cylinders we must generalize the mode of generation. A cylinder, then, is a solid generated by a line which moves parallel to itself while one end traces on a plane any curve whatever. When the position of the generating line is at right angles to the plane, the cylinder is *right*; when not, it is *oblique*. If the curve traced is a circle, and the line is perpendicular to the plane, the cylinder is a *right circular cylinder*. In all cases the content of the cylinder is found by multiplying the number of square units in the base by the number of linear units in the altitude. A sphere and a cylinder circumscribed to it have a remarkably simple relation to each other, first discovered by Archimedes, their volumes being as 2 : 3.

**Cylle'ne** [Κυλλήνη], a mountain of Greece, in the north-western part of Arcadia, was supposed to be the birthplace of Mercury (Hermes), who was called *Cyllenius*, and had a temple on its summit. Height above the sea, 7788 feet. It is now called *Zyria*.

**Cy'ma** [Gr. κύμα, a "wave"], in architecture, a term applied to a moulding, so called because its contour resembles that of a wave, being, for example, hollow in its upper part and swelling below. Of this moulding there are two sorts—the *cyma recta*, just described, and the *cyma reversa*, of which the lower part is hollow.

**Cym'bal** [Gr. κύμβαλον, from κύμβος, "hollow"], a brass musical instrument of percussion, circular in form and about eight inches in diameter. Cymbals are played in pairs by striking one against the other, and produce a

loud, harsh sound of no fixed pitch. The best are those made in China and Turkey. Cymbals were employed by the Greeks in the festivals of Bacchus and Cybele.

**Cyme** [Gr. κύμα, "swelling" or "sprout"], a flat-topped or convex centrifugal inflorescence—viz. one in which the central flower of each cluster or division opens first, that flower terminating the axis. Linnæus restricted the name to compound inflorescence of this sort, of which the elder (*Sambucus*) and *Viburnum* offer well-marked examples; but modern botanists, making the distinction between flowers from axillary and from terminal buds, employ it as a general term for all forms of inflorescence of the latter kind.

**Cym'ry**, the name given by the Welsh to their nation. It is frequently extended to the entire branch of the Celtic race to which the Welsh belong. To this branch also belong the people of Bretagne in France and the ancient races of Cornwall, Cumberland, and Strathclyde. Attempts have been made to prove that the Cimmerii and the Cimbric were of this race, but the evidence fails to establish these points. There is reason to believe that a great part of the ancient British race was Cymric, and many Cymric roots appear to have been found in Gaulish and Belgic names. (See CELTS and WALES.)

**Cynan'chum** [from the Gr. κύων, a "dog," and ἄγχω, to "choke" (i. e. "dog-bane")], a genus of plants of the order Asclepiadaceæ. *Cynanchum Monspelicicum*, found on the shores of the Mediterranean, produces the Montpellier scammony. Caoutchouc is obtained to some extent from the *Cynanchum ovalifolium*, a native of Penang. Other species have been used in medicine.

**Cyn'ics** [Gr. κυνικοί, "dog-like," from κύων, a "dog"], a sect of philosophers among the Greeks, so called from their dog-like temper and their disregard of the conventional usages of society. It is difficult to give any satisfactory account of the tenets of this sect, as during all the period of its existence it was in a state of constant fluctuation. Its professed aim was to inculcate the love of rigid virtue and a contempt of pleasure. On this point the testimony of Horace—himself a zealous adherent of the school of Aristippus, the very opposite of the cynical sect—even were there no other, must be held conclusive; and according to his opinion the aim of the cynical philosophy was to induce every man to become "the guardian of real virtue." Diogenes belonged to this sect. It was founded in the fifth century B. C. by Antisthenes, a disciple of Socrates, who sought to imitate his master in disregard of outward splendor and contempt of riches, but his indifference to these things soon degenerated into an ostentatious display of singularity.

**Cynoceph'alus** [from the Gr. κύων, a "dog," and κεφαλή, "head"], in Egyptian mythology, a dog-faced baboon. The Egyptians held these animals in great veneration, and professed to discover by their aid the periods of the sun and moon. The name is now applied to a genus of African monkeys. (See BABOON.)

**Cynosceph'alæ** [from the Gr. κύων, gen. κυνός, "dog," and κεφαλή, a "head"], a locality in Thessaly, was the scene of two important battles. In the first the Thebans defeated the tyrant of Phæra, in 364 B. C. In the second the Roman general Flamininus defeated Philip of Macedon in 196 B. C.

**Cynosu'ra** [Gr. κυνοσουρά, from κύων, κυνός, "dog," and ουρά, "tail," probably because four stars of Ursa Minor, including the North Star, were fancied to resemble a dog's tail; Fr. and Eng. *cynosure*], a nymph of Ida, said to have been one of the nurses of Jupiter, who translated her into the constellation of Ursa Minor, which includes the North Star. In the language of poetry it signifies a "point of attraction."

"Where perhaps some beauty lies,  
The cynosure of neighboring eyes."—Milton.

**Cynthian'a**, a city, capital of Harrison co., Ky. (see map of Kentucky, ref. 2-H, for location of county), on the South Fork of the Licking River and on the Kentucky Central R. R., 66 miles S. of Cincinnati. It was first settled in 1780, and was named from Cynthia and Anna Harrison, daughters of one of the early settlers. It is noted for the manufacture of "Bourbon" whiskey. There are several churches, a graded free school, a female college, two flouring-mills, and two carriage-factories. It is in a very fertile agricultural district, and is the site of a famous race-course. A Confederate force numbering 2200 men, with artillery, under Gen. J. H. Morgan, attacked the city July 17, 1862, garrisoned by 350 Federal soldiers. It was surrendered, but not till the ammunition was exhausted. On June 11, 1864, Morgan with a large force attacked the place again, and after two days' fighting captured Gen. Hobson with some 1700 men. On the 14th, Gen. Burbridge, with 7000 men, fell upon Morgan (whose

men were out of ammunition and exhausted), and drove him out of Cynthiana with considerable loss. Pop. in 1870, 1771; in 1880, 2101.

**Cypera'ceæ** [from *Cyperus*, one of the genera], popularly called sedges, an order of endogenous plants nearly related to the grasses, and natives of all parts of the world. They are distinguished from the Graminaceæ by having stems which are solid and mostly triangular, not round and fistular, and nearly destitute of joints. They have closed sheaths and spiked, chiefly tri-androus flowers, one in the axil of each of the glume-like imbricated bracts, destitute of any perianth, or with hypogynous bristles or scales in its place. The ovary is 1-celled, and contains a single ovule, and the fruit is an achenium. This order comprises about 2000 species, which mostly grow in marshy or moist places. Among them are the sedges (see *CAREX*) and papyrus.

**Cype'rus** [Gr. *κύριος*, the name of a water-plant], a genus of plants of the order Cyperaceæ, distinguished by hermaphrodite flowers and compound spikes of numerous 2-rowed glumes, without bristles. It contains numerous species, many of which are natives of the tropics, and others of the U. S. Some of them have tubers or corms which are mucilaginous and nutritious. The *Cyperus esculentus* (rush-nut), a native of Southern Europe, is cultivated in Italy, Spain, and France, and bears farinaceous tubers which are as large as a hazel-nut, and are called *amande de terre* ("ground almond") by the French. They are eaten as dessert, and are used in making orgeat. The papyrus plant is often referred to this genus, though separated from it by some botanists.

**Cypher.** See *CIPHER*.

**Cypræ'idæ** [from *Cypræa*—*Κύπρις*, a name of Venus—the typical genus], a family of gasteropod mollusks of the order Pectenibranchiata and sub-order Tænioglossa, distinguished by the beauty of the shells of most of the species. These are much sought after by shell-collectors, and popularly known under the name of cowries. The animal has a broad, flattened foot, more or less truncated in front and pointed behind; the mantle is expanded on each side, and forms lobes which meet over the back of the shell near its median line, and the surface is usually provided with filaments; the siphon is moderate; the head broad; the rostrum rather long and with an invertible tip; the tentacles elongated and subulate; the eyes sessile or in prominences on the head near the external bases of the tentacles; the lingual ribbon is long, and partly contained in the visceral cavity; the teeth are in seven rows, one rhachidian, and three uncinat on each side; the shell in youth is cylindrical or olive-form, and with a conspicuous spire, but toward maturity the outer lip encroaches upon the spire and becomes thickened, while an extensive deposit of callous material is secreted upon the columella, and the shell consequently becomes involute and ovoid in form, and assumes the aspect represented in *Cowry*; the aperture is then narrow and longitudinal, and occupies the whole length of the shell, and each of the lips is plicated by numerous transverse teeth. The species embraced under the name Cypræidæ by almost all conchologists, and agreeing in the characteristics of the animal so far as given above, differ, however, quite widely in other respects, especially in the presence or want of jaws, as well as in the nature of the teeth of the lingual ribbon. Two groups are thus distinguished, and have been differentiated by Troschel as distinct families—(1) the true cowries, retaining the Cypræacea, and (2) the Triviæ, or small ribbed forms, as well as *Eratos*, or marginella-like forms, being contradistinguished under the name Triviacea. (1) The Cypræacea or Cypræidæ are destitute of jaws, and the rhachidian teeth have each a peculiar flat basal appendage; (2) the Triviacea or Triviidæ are provided with two jaws covered with imbricated scales, and the rhachidian teeth are simple and destitute of basal appendages. The classification of the Cypræidæ is far from being perfected. There are, however, two well-marked sections, distinguished by their dentition—one represented by pustuliferous species, forming the genus *Pustularia*, and the other with smooth shells: these latter have been separated by Troschel into two genera and a number of sub-genera—i. e. (1) *Cypræa*, with the sub-genera (a) *Talparia* (*C. talpa*, *C. lurida*, etc.), (b) *Tigris*, (*C. tigris*, *C. exanthema*, etc.), (c) *Lyncina* (*C. Lynx*, etc.), (d) *Mauritia* (*C. mauritiana*, *C. arabica*, etc.); and (2) *Aricia*, with the sub-genera (a) *Erronea* (*C. erronea*, *C. caurica*, etc.), (b) *Erosaria* (*C. erosa*, *C. caput-serpentis*, etc.), (c) *Monetaria* (*C. moneta*, *C. flaveola*, etc.). The Triviidæ are divisible into two very distinct genera or groups of even higher value: these are (1) *Trivia*, including the globose, transversely-ribbed species, with the spire invisible; and (2) *Erato*, embracing the smooth species, with the spire exerted. The last are more like the Marginellæ in superficial aspect than the Triviæ, although they

in other respects agree with the latter, and are evidently members of the same natural group. The species of the two families are numerous, between 150 and 200 having been described. (See further the article *Cowry*.)

THEODORE GILL.

**Cy'pres**, in law, a rule of construction. (See *INTERPRETATION* AND *CONSTRUCTION*, by PROF. T. W. DWIGHT, LL.D.)

**Cy'press** [Gr. *κυπάρισσος*, perhaps the Hebrew *gopher*], (*Cupressus*), a genus of evergreen trees and shrubs of the natural order Coniferae, having globular cones, and very small and scale-like or awl-shaped leaves, which are appressed and imbricated. The wood is valuable and exceedingly durable. The common cypress (*Cupressus sempervirens*), a native of the Levant and Northern Africa, is a tree of a conical form, sometimes growing to the height of a hundred feet or more. On account of its dark green leaves and sombre aspect it has from very early times been adopted as an emblem of mourning. The ancient Greeks and Romans planted it in burial-grounds, and the same custom now prevails in Turkey. The wood has a pleasant smell, is not liable to be injured by insects, and is therefore valuable to cabinet-makers. It is compact and durable. Specimens of this wood preserved in museums are said to be several thousand years old. Some critics believe that the kinds of timber called cedar and gopher-wood in Scripture were the wood of the *Cupressus*. Among the other species of this genus are the *Cupressus thurifera* of Mexico, the resin of which is burned for incense, and the *Cupressus thyoides*, which is a native of the U. S., and is commonly called white cedar. (See *CEDAR*.) The popular name American cypress is given to the *Taxodium distichum*, a large and valuable deciduous tree which grows in swamps in the Southern U. S. It sometimes attains a height of 120 feet, and is about ten feet in diameter at the base. This is valuable for timber, and is planted as an ornamental tree. The cypress of the North Pacific coast is *Thuja gigantea*.

**Cyp'rian**, SAINT [Lat. *Cyprianus*], or, more fully, **Thas'cius Cæcil'ius Cypria'nus**, a bishop of Carthage and Latin Father of the Church, was born in 200 A. D. at Carthage. He was a teacher of rhetoric before his conversion, which occurred about the year 246, and he was chosen bishop of Carthage in 248 A. D. In 250 he retired into the desert to escape from the persecution which was ordered by the emperor Decius. He returned to Carthage in 251, and then assembled a council on the subject of apostates who had lapsed in consequence of persecution. He judged that these should be treated with moderation and lenity. He emphasized the idea of the Church, insisted upon the three orders of the ministry, and stoutly maintained the parity of bishops against the assumptions of the bishop of Rome. He suffered martyrdom under Valerian in 258 A. D. He was eminent for his learning, eloquence, and zeal, wisely tempered with moderation. His works consist of thirteen treatises, the most important of which is his "De Unitate Ecclesiæ," written in 252, besides eighty-one epistles, including a few addressed to him, all of which have reference to ecclesiastical affairs. (See *GERVAISE*, "Vie de Saint-Cyprien," 1717; POOLE, "Life and Times of Saint Cyprian," 1840.)

**Cyprin'idæ** [from *Cyprinus*, one of the genera], the name of a family of malacopteron fishes, having only the pharynx or hinder part of the mouth furnished with teeth, the gill-rays few, and no adipose fin. They are fresh-water fishes, and are found in lakes and rivers. This order includes the carp, roach, dace, tench, bream, minnow, gold-fish, barbel, etc.

**Cyprinodon'tidæ** [from *cyprinus*, a "carp," and *ὄδοντος*, a "tooth"], a family of malacopteron fishes allied to the Cyprinidæ, but having the jaws more protractile and toothed. They are found in Asia and America, and in both fresh and salt water. The *Anableps* belongs to this order. (See *ANABLEPS*.)

**Cypripe'dium**, a genus of plants of the order Orchidaceæ, comprises several species natives of the U. S., and known by the popular names of lady's slipper and moccasin flower. They have beautiful flowers of curious structure, in which the lip is a large inflated sac. They possess sedative properties, and are used to some extent in nervous diseases.

**Cy'pris**, the name of a genus of minute entomostracous crustaceans of the order Branchiopoda, with the body enclosed in a bivalve shell. The antennæ and feet are furnished with fringed bristles, by means of which they swim with ease. Their horny fossil shells are found in the wealden of England, and several species occur in the triassic rocks of the U. S.

**Cy'prus** [Turk. *Kıbrıs*; Gr. *Κύπρος*], an island of Asia, in the N. E. corner of the Mediterranean, is 44 miles S. of Cape Anamoor in Anatolia, and about the same distance W. of

the coast of Syria. It is about 140 miles long, and 50 miles broad at the widest part. Area, 3678 square miles. Pop. 1881, about 185,000. The interior is occupied by a range of mountains, the highest points of which rise nearly 7000 feet above the sea. These mountains are of limestone formation, and are covered with vast forests of walnut, oak, and other good timber. The soil is generally very fertile, but the island is not liberally supplied with water. The staple products are cotton, wheat, tobacco, madder, silk; also grapes and other fruits. Wine of good quality is also made. A large portion of the population are Greeks. Capital, Nicosia. The foreign consuls reside at Larnica. In ancient times Cyprus was devoted to the worship of Aphrodite or Venus, who was fabled to have here risen from the sea. Her temple was at "Old Paphos," now called *Kuklia*. The original occupants of the island were probably the Japhetic Kittim (Gen. x. 4), who left their name in the old capital, Citium. Cyprus, scarcely ever for any great length of time independent, was held by the Phœnicians from about 1100 to 725 B. C.; by the Assyrians from about 700 to 650 B. C.; by the Egyptians from about 550 to 525 B. C.; by the Persians from 525 to 333 B. C.; and then, after 323 B. C., by the Ptolemies till 58 B. C., when it became a Roman province. In 44 A. D. it was visited by Paul in his first missionary tour. The Saracens (from 649 A. D.) took and retook it several times. Wrested from the Saracens by Richard Cœur de Lion in 1191, it was governed by kings of its own from 1192 to 1489, and belonged to Venice from that time till 1573, when it was conquered by the Turks, who ceded it to England in 1878. Perhaps no country on the globe has changed masters so many times, or holds within its bosom the relics of so many civilizations. (See CESNOLA, "Cyprus;" UNGER and KORCH, "Die Insel Cypern," 1865; "Storia dell' Isola di Cipro," narrata da Romualdo Canonero, Imola, 1870.)

For many years Cyprus has been a hunting-ground for archæologists. The Codex Cyprius, containing the un mutilated Gospels, was found here in the ninth century, and was carried to Paris in 1673. Pococke saw ruins and tombs; the abbé Mariti, who visited the island in the latter part of the last century, describes marbles, coins, medals, idols, and lamps, but the Turks would not permit diggings. Later, a number of silver bowls were found, one of which, now in the collection of the duc de Luynes, closely resembles those found by Layard at Nimroud. In 1845 a bas-relief in black basalt was found at Larnica, upon which is sculptured the figure of Sargon, king of Assyria, father of Sennacherib. This bore the inscription in cuneiform letters, "From the great king Sargon to his vassal friend, the king of Citium."

The largest collection of Cypriot antiquities that has been brought together is the one made by L. P. di Cesnola (see CESNOLA) during his residence in the island as consul of the U. S., the greater part of which is now exposed in the Metropolitan Museum of Art in New York. No complete catalogue has as yet been made out, while those that have been published by the trustees are now confessed to be full of errors: so that it is not possible to give more than a general account of the contents of the collection.

In bronze, the articles are very curious and valuable, though they have suffered greatly from decomposition. There are a multitude of implements—bracelets, anklets, rings, amulets, hairpins, mirrors and mirror-cases, brooches and buckles, strigils, tweezers, pincers, lamps, vases, cups, tripods, shields, spears, battle-axes, javelins, arrowheads, and the small toothed sickles such as are in use to-day in the island. There are many articles in gold and silver, and some engraved gems and stones. The jewelry consists of rings, earrings, necklaces, amulets, bracelets, beads, and buttons. Many of these ornamental objects are of gold alone, wrought with the pincers and the hammer, twisted, granulated, and embossed. The objects in marble, alabaster, and stone are very numerous. The most interesting and important are the statues, but, besides these, there are heads of animals, plates, tripods, ointment-boxes, tear-bottles, vases, seals, lamps, small altars, and pedestals.

There are 1700 pieces of glass, the greater part of it probably of late Greek workmanship. The objects consist of plates, cups, bottles, vases, buttons, necklaces, and seals, and one spoon. In general, the surface of these glass objects is little ornamented, but there are notable exceptions, a few being either fluted, ribbed, or decorated with pressed ornaments or wrinkled handles, or with twisted patterns in the glass itself, as in some specimens of Venetian glass.

The objects in terra-cotta are of all periods and races, and the visitor will find his interest divided between the pottery and the Greek statuettes. The examples of pottery are numerous. They are of every grotesque shape into which man can pinch, turn, or twist clay, but beautiful or graceful forms are rare, and the ornamentation is

made up of circles, single or concentric, of lines, zigzags, dots, and animals, principally birds, drawn without other skill than that which knows how to keep a sort of symmetry and proportion. The series of lamps begins with the clay scoops modelled from bivalve shells—perhaps, as the oldest vases and bowls are, from gourds; then come the Græco-Roman, ornamented on the upper surface with figures stamped in relief.

The statuettes in terra-cotta are in great number and variety, and many of them are so odd that it is difficult not to believe them caricatures; but probably we are studying the slow development of the art of sculpture in the island. In one of the cases there are ranged in chronological order statuettes of Venus from the earliest time, some of them most amusing in their deformity; but the series culminates in several little figures of the purest Greek type and of the finest execution. (See "Cyprus. Its Ancient Cities, Tombs, and Temples," by GEN. LOUIS PALMA DI CESNOLA," etc. (New York, 1878); also, by the same author, communications to the "Atte della Reale Accademia delle Scienze di Torino," vols. vi. and xi.; "Die Sammlung Cesnola beschrieben von Johannes Doell," published in the "Memoirs" of the St. Petersburg Academy of Sciences, 1873, with seventeen pages of well-executed lithographic illustrations; "The Antiquities of Cyprus, photographed by Stephen Thompson from a selection made by C. T. Newton, M. A., keeper of Greek and Roman Antiquities at the British Museum, with an introduction by Sidney Colvin, M. A.," London, 1873.) CLARENCE COOK.

**Cyrenaica** [Gr. Κυρηναία], the ancient name of a region of Northern Africa, now known as BARCA (which see). It is also called Pentapolis, from its five cities, Cyrene, Apollonia, Teuchira, Hesperides, Barca; afterwards Cyrene, Apollonia, Ptolemais, Arsinoë, Berenice. The principal city was Cyrene, from which the name was derived. Cyrenaica was bounded on the W. by Africa Propria, on the E. by Marmarica, and extended southward as far as Libya Inferior. The original inhabitants, now represented by the Berbers, were probably descendants of Phut, the third son of Ham (Gen. x. 6). The Greeks began to colonize this part of Africa about 631 B. C. Till 430 B. C., Cyrenaica was governed by a dynasty of eight kings, four of whom bore the name of Battus, and four the name of Arcesilaus. A democratic republic was then established. In 332 B. C. the people submitted to Alexander. Under the Ptolemies many Jews settled there. In 75 B. C., Cyrenaica became a Roman province, and afterwards a part of the Byzantine empire. In A. D. 616 it was conquered by the Persian Chosroes (Khosroo), in 647 was overrun by the Arabs, and now is under the rule of the Turks, whose authority, however, is hardly more than nominal.

**Cyre'ne** [Gr. Κυρήνη], the capital of Cyrenaica, was situated about 10 miles from the Mediterranean, and 1800 feet above the level of the sea. It was founded about 631 B. C. by a colony of Greeks. Cyrene carried on an extensive commerce with Egypt and Greece through its port called Apollonia. The site is now occupied by *Grenne* or *Kooreen*.

**Cyre'nus, or Quiri'nus** (PUBLIUS SULPICIUS), a Roman governor (proconsul) of Syria. Recent investigations have rendered it highly probable that he held that office twice—first, from 4 to 1 B. C., when Christ was born (Luke ii. 2), and again from 6 to 11 A. D. (See ZUMPT, "De Syria Romanorum Provincia," 1854.)

**Cyr'il, or Cyril'lus** [Gr. Κύριλλος], SAINT, bishop of Jerusalem, was born, probably at Jerusalem, in 315 A. D. He was ordained a deacon in 334 or 335, a presbyter in 345, and became bishop of Jerusalem in 350 or 351. Acacius, bishop of Cæsarea, who was an Arian and an enemy of Cyril, caused the latter to be deposed by a council in the year 358. He was restored in 359, again deposed in 360, again restored in 362, deposed the third time in 367, and the third time restored in 368. He is said to have predicted the failure of Julian's attempt to rebuild the Jewish temple in 363. Died Mar. 18, 386. The best editions of his works are by Milles, Oxford, 1703, and by Touttée (Benedictine), Paris, 1720. His writings have no great doctrinal weight, but are of great archæological and liturgical value.

**Cyril, or Cyrillus**, SAINT, an intolerant and arrogant prelate, born at Alexandria in Egypt. He became bishop of Alexandria in 412 A. D., persecuted the Jews, and was notorious for his fanatical zeal and turbulence. The cruel murder of the accomplished female philosopher Hypatia in 415 has been laid to his charge, but without proof. He had a long controversy with Nestorius on the subject of the Incarnation, and presided over the Council of Ephesus in 431. Cyril died June 9 or 27, 444 A. D. The best edition of his works is by Aubert, Paris, 1638, in 7 vols. His commentaries are worthless. His ablest work is the treatise against Julian, in ten books, written in 433.



**Cyril**, whose name originally was **Constantine**, son of Leon of Thessalonica, and elder brother of Methodius, was born between 810 and 830 A. D. About 850, Cyril went as a missionary among the Chazars in the Crimea; in 861 Methodius went to Bulgaria; and in 863 the two brothers went together to Moravia. They were the apostles of the Slavic race. Cyril invented the alphabet, and translated into the Slavic language the Psalter and all of the New Testament, except the Apocalypse. In 868 he obeyed the pope's summons to Rome, where he died Feb. 14, 869.

**Cyril'ia** [named in honor of Domenico Cirillo], a genus of evergreen trees and shrubs of the natural order Cyrtellaceae. Several varieties of *Cyrilla racemiflora*, a small tree or shrub, occur in the Southern U. S. The clusters of small white flowers appear in June. In cultivation this is one of our finest native evergreens.

**Cyrilla'ceæ**, a small natural order of evergreen shrubs and trees, mostly North American, several of which occur in the Southern U. S. This order, which includes the genera *Cyrilla*, *Cliftonia*, *Elliottia*, etc., is kindred to the Ericaceæ, and contains no plants of industrial value.

**Cyrillic Alphabet**, an alphabet invented about 863 A. D. by Saint Cyril, the apostle of the southern Slavi. It was based upon the older Glagolitic alphabet. Some writers, however, make the Glagolitic to be the invention of Cyril, while the so-called Cyrillic they consider to be the invention of Clement, bishop of Velitza, who died in 916 A. D. The Cyrillic, with a number of modifications, is the alphabet used in Russia and some other Slavic countries.

**Cyrus** [Gr. Κύρος (or Κύρος ὁ παλαιός, i. e. "Cyrus the Elder"); Persian, *Kai-Khosroo*; old (unciform) Persian, *Koorsosh*], surnamed **the Great**, the founder of the Persian empire, and the greatest of the Persian heroes, was the son of Cambyses, a Persian nobleman. His mother was Mandane, a daughter of Astyages, king of Media. According to a tradition which Herodotus adopted, Astyages was alarmed by a dream which portended that the offspring of Mandane would become king or conquer Media, and he commanded an officer named Harpagus to kill Cyrus. Harpagus promised to obey the order, but privily committed the infant to the care of a herdsman, who brought him up with his own children. Cyrus, having discovered the secret of his birth, and having inured himself to the hardy habits of the warlike Persians, incited the latter to revolt against the king of Media. He defeated Astyages in battle, and ascended the throne in 558 B. C. He conquered Croesus, king of Lydia, in 554, and extended his dominions by the conquest of other states. Among his exploits was the capture of Babylon, by diverting the river Euphrates from its channel, in the year 538, while Belshazzar was feasting. This event was foretold by the prophet Isaiah, who declared: "Thus saith the Lord to his anointed, to Cyrus, whose right hand I have holden to subdue nations before him." (Chap. xlv. 1.) Cyrus issued an edict that the Jewish captives who had been deported to Babylon should return to Jerusalem and rebuild their temple. Herodotus states that he afterwards invaded the country of the Scythian Massagetæ, who were ruled by Queen Tomyris, and that he gained several victories over her, but was drawn into an ambush and killed in 529 B. C. According to Xenophon, Cyrus died a natural death at Pasargadae. He was succeeded by his son Cambyses. (See **XENOPHON**, "Cyrupædia;" **DIONORUS SICULUS**, books ii., ix., x., xvii., and xxxi.; **SCHUBART**, "Programma de Cyro," 1743; **WETZKE**, "Cyrus der Gründer des Persischen Reiches," 1849; **RAWLINSON**, "Five Great Monarchies," 2d ed. 1871.)

REVISED BY R. D. HITCHCOCK.

**Cyrus the Younger** was the second son of Darius Nothus, king of Persia, by whom he was appointed satrap of Lydia and Phrygia in 407 B. C. Having formed a design to dethrone his brother Artaxerxes Mnemon, he hired a large army of Greek mercenaries, of whom Clearchus, a Spartan, was the leader. In the year 401 B. C. he moved his army from Sardis, but kept his soldiers in ignorance of their destination. Xenophon the historian took part in this expedition. Cyrus met the army of Artaxerxes at Cunaxa, where, rashly exposing himself in the front, he was killed about Sept., 401 B. C. His character is praised by Xenophon. (See **GROTE**, "History of Greece;" **XENOPHON**, "Anabasis" and "Hellenica.")

**Cyst** [from the Gr. κύστις, a "bladder"], a word commonly used to designate hollow tumors or pathological structures in the form of a bladder. The name is also applied to hollow organs with thin walls, as the gall and urinary bladders. Pathological cysts are frequently transparent and of great tenuity. They are mostly lined by an epithelium, and are either simple or compound.

**Cysticercus**. See **HYDATID**.

**Cystic Worms**. See **CESTOID WORMS**.

**Cystitis** [Gr. κύστις, the bladder], inflammation of the bladder. It may be acute or chronic. It is more frequent in men than in women. It may be the result of blows, kicks, bruises, punctured or incised wounds. It also occurs from holding the urine too long, from urine which is irritating—either highly acid or very alkaline—or from the irritation of calculus and gravel in the bladder. In old men it results from enlarged prostate (neck of the bladder), and in women from inflammations and diseases of the uterus and pelvic cellular tissue. The symptoms are chilliness, fever, nausea and vomiting, prostration of strength, pain and sense of heat over the bladder, constant desire to urinate, often with inability to do so, and the voiding of urine thick and creamy like pea-soup. The treatment consists in applying, in some cases, ice-packs over the bladder; in others, hot poultices and fomentations sprinkled with laudanum, opiates and chloral by the mouth to allay pain, the free use of alkaline and demulcent drinks, and in withdrawing the urine by the catheter twice daily, washing out the bladder with tepid or cool water, medicated or carbolated. E. D. HUDSON, JR.

**Cyt'isus** [Gr. κύτις], a genus of plants of the order Leguminosæ, sub-order Papilionaceæ. (See **BROOM**.)

**Cyz'icus**, a peninsula of Asia Minor, in Anatolia, extending into the Sea of Marmora, is about 70 miles S. W. of Constantinople. It is connected by a narrow neck with the mainland, and is noted for its picturesque scenery. The ancient Greek city of Cyzicus was on this peninsula and on the Propontis. The site of this splendid city is marked by the ruins of an amphitheatre.

**Czar** [from the Russian *tsar*, a "king"], the title of the emperors of Russia. As early as the twelfth century this title was given by the Russian annalists to the grand duke Vladimir and his successors, but it was not officially used till the sixteenth century.

**Czartorys'ki** (**ADAM GEORGE**), PRINCE, a Polish patriot, a son of Prince Adam Casimir, president of the Polish Diet, was born at Warsaw Jan. 14, 1770. He fought against Russia in 1792, was taken to St. Petersburg as a hostage, and gained the favor of the grand duke Alexander, who appointed him assistant minister of foreign affairs in 1802, which position he resigned in 1808. In the revolution of 1830 he supported the Poles against Russia, and was elected president of the new government Jan., 1831, but after the defeat of the Poles in August of that year went into exile. Died in Paris July 16, 1861.

**Czas'lau**, a town of Bohemia, 45 miles E. S. E. of Prague. Its church, in which the Hussite leader Ziska was buried, is surmounted by a spire said to be the highest in Bohemia. Here Frederick the Great defeated the Austrians May 17, 1742. Pop. 5998.

**Czeg'led**, a market-town of Hungary, is on the railway from Pesth to Temesvár, about 50 miles S. E. of Pesth. It has some handsome buildings and large breweries; also a trade in red wine. Pop. in 1880, 24,872.

**Czensto'chow**, a town of Poland, on the river Wartha. Here is a convent which has a dark-colored picture of the Virgin, visited by multitudes of pilgrims, and reputed to have miraculous power. Pop. 15,522.

**Czerka'sy**, a town of Russia, in the government of Kiev, on the Dnieper, 156 miles E. S. E. from Berdichef, is the seat of the hetman of the Saporozh Cossacks. Pop. 13,914.

**Czer'mak** (**JOHANN NEPOMUK**), born at Prague June 17, 1828, became in 1865 professor of physiology at Jena. He published, among other works, "The Laryngoscope, and its Practical Value for Physiology and Medicine" (1860), and "Information from a Physiological Study" (1864). Died Sept. 16, 1873, while professor at Leipsic.

**Czer'nowitz**, capital of the Austrian duchy of Bukovina, is on a hill near the river Pruth, about 160 miles S. S. E. of Lemberg. It is the seat of a bishop of the Oriental Greek Church, has a Greek theological seminary, a gymnasium, a Realschule, a school of midwifery, a provincial library, a chamber of commerce, and manufactures of clocks, hardware, silver-ware, etc. Pop. 45,600.

**Czer'ny** (**GEORGE**), or **Kara George** (Black George), a Servian chief, born Dec. 21, 1766, was originally a peasant. He became in 1806 the leader of the Servians, who had revolted against Turkey. He defeated the Turks, captured Belgrade in Dec., 1806, and liberated Servia, secretly aided by Russia. When Russia, invaded by Napoleon, could no longer support him, Czerny was driven out by the Turks in 1813. Having returned to Servia, he was murdered in July, 1817, at the instance of Milosch Obrenovitch.—His second son, **ALEXANDER KARAGEORGEVITCH**, was prince of Servia from 1842 to 1858. D. May, 1885.

## D.

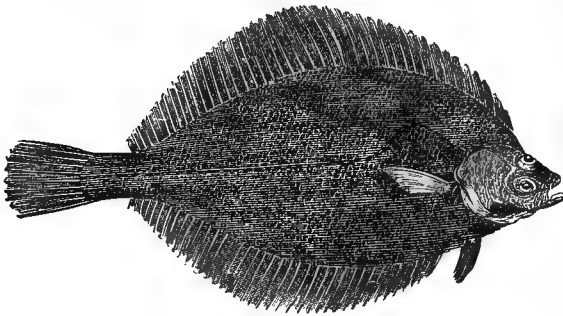
**D**, the fourth letter of the Phœnician and Hebrew, as well as of the Greek and Roman alphabets. The name in Hebrew (*dāleth*) signifies "door," and the picture of a door was probably its original hieroglyphic form. Some have conjectured that the Greek delta ( $\Delta$ ) derived its form from the triangular door of a tent. The sound of the English *d* is formed by placing the tongue against the gums at the roots of the teeth. But in pronouncing the letter in several other languages (as the Spanish, Arabic, and Persian) the tongue is placed against the teeth themselves, and from this circumstance it is termed a *dental*. In the Sanscrit there are two letters which are represented, though not quite accurately, by the English *d*. The one is truly a dental, being similar to the Spanish *d*; the other is formed by turning the tip of the tongue back against the roof of the mouth, whence it is termed a *palatal*, and sometimes a *cerebral*, letter. *D* is often interchanged with other letters (as *t* and *th* ( $\theta$ )) of the same class. Hence *burned* becomes *burnt*, *passed* becomes *past*, and so on; and we have such variations as *burden* and *burthen*, *murder* and *murther*, though the latter is now obsolete.

The sound of dental *d* often approaches, or is actually changed into, that of *th* in *this*. Thus, in Spanish, *d* when between two vowels or at the end of a word, has almost, if not exactly, the sound of *th* in the English word *smother*; the same is substantially true of the Danish; hence the Danish words for "brother" (*broder*) and "mother" (*moder*) have nearly the same sound as their English equivalents. The delta ( $\delta$ ) of the modern Greeks has exactly the same sound as our *th* in *this*.

*D*, in music, is the second note in the scale, and is one tone above *C*. In chemistry *D* stands for didymium.

Among the ancient Romans, *D* (capital) stood for 500, or as an abbreviation it stood for *divus* (a title signifying the "godlike"), and *Decimus*, a name. Among the ancient Greeks *delta* with a mark on it ( $\delta'$ ) stood for the number 4.

**Dab** (*Platessa limanda*), a small, flat fish belonging to the



Dab.

same genus as the flounder. It is common on the more sandy coasts of Great Britain, is found in deeper water than the flounder, and does not enter the mouths of streams. The lemon or smooth dab (*Platessa microcephala*) is a larger species of the same genus, with a smooth body, very small head and mouth, and in color a mixture of brown and yellow shades. The rusty dab (*Platessa ferruginea*) is a rare fish of the New England coast.

**Daboll'** (**NATHAN**), born about 1750, was the author of "Daboll's Arithmetic" (formerly very famous), and also a treatise on navigation. He was a teacher of Connecticut. Died at Groton, Conn., Mar. 9, 1818.—**C. L. DABOLL**, his son, was the inventor of the fog-trumpet. He died Oct. 13, 1866.

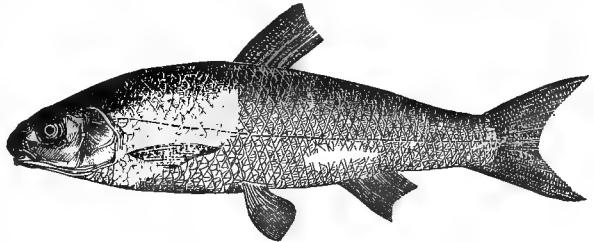
**Da Ca'po** [*It.* *da*, "from," and *capo*, "head," "beginning"], a musical term, abbreviated thus, *D. C.*, is an instruction to the performer in such airs as end with the first strain to return to the beginning and repeat the first part.

**Dac'ca**, one of the divisions into which the province of Bengal in British India is divided. Area, 21,418 square miles. Pop. in 1880, 9,517,498. It is divided into five districts, one of which is called Dacca. The district of Dacca forms part of the delta of the Ganges and Brahmapootra. It extends from lat. 23° 12' to 24° 17' N., and from lon. 90°

11' to 90° 58' E. Area, 2897 square miles. The surface is low and level; the soil is well adapted to the production of rice. Capital, Dacca. Pop. 1,853,416.

**Dacca**, a city, the capital of the above district, is in Bengal, on the Burha Gunga, a navigable stream connected with the Ganges, 127 miles N. E. of Calcutta. It was once a populous city, but its prosperity has declined. It contains several ruined palaces, 180 mosques, 119 pagodas or Hindoo temples, a government college, and several hospitals. Dacca was formerly celebrated for the manufacture of fine muslins, poetically termed "evening dew" and "flowing water." This manufacture is now extinct. Magnificent ruins of palaces, bridges, caravanserais, etc. are visible here. Pop. in 1880, 69,212.

**Dace**, a fish of the family Cyprinidæ, of the same genus (*Leuciscus*) with the roach, and not unlike it in form; the mouth is larger and the scales smaller. The upper parts

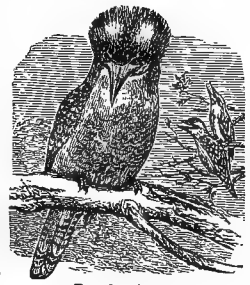


Dace.

are dusky blue, shading into white on the belly; the cheek and gill-covers are silvery white. Its flesh is not greatly esteemed. Dace are gregarious, swimming in shoals, and spawning in June. There are several species which inhabit clear, quiet streams, and are found in various parts of Europe and the U. S. Some of the American species are assigned to other allied genera.

**Dace'lo** [an anagram of *alcedo*, a "kingfisher"],

a genus of Australian kingfishers, of which several species have been observed. Of these, the best known is the *Dacelo gigas*, or "laughing jackass," a rather large and handsome bird of New South Wales. It takes its popular name from its harsh, dissonant cry, which greatly resembles the so-called laugh of the hyæna, and is not altogether unlike the bray of the ass. This cry is uttered

*Dacelo gigas*, or "Laughing jackass."

at early dawn. The bird inhabits hollow trees, and feeds upon fish, reptiles, insects, etc.

**Da'ci**, also called **Ge'tæ**, an ancient barbarous people who inhabited Dacia. They are supposed to have emigrated from Thrace to Dacia before the time of Alexander the Great. Their name, "Getæ," is thought by critics to be identical with "Gothi" or Goths. If this opinion is correct, the Daci were a Germanic people.

**Dac'ia**, a former country of Europe, was occupied by the Daci, a warlike people. It was bounded on the N. by the Carpathian Mountains, and on the S. by the Danube. The Dacians waged against the Romans a long defensive war which began in 10 B. C., when Augustus sent an army to conquer them. In the reign of Domitian they compelled the Romans to pay tribute. Trajan conquered Dacia, and reduced it to a Roman province in 106 A. D. It was formally relinquished by Hadrian (117-138) on his accession to power, and yet remained under Roman masters till the time of Aurelian (270-275), when the Romans finally withdrew within the Danube, leaving the country to the Goths. This province comprised the eastern part of Hungary, Transylvania, Moldavia, and Wallachia.

**Dacier** (**ANNE LEFÈVRE**), a learned French lady, the wife of André Dacier, was born at Saumur in Mar., 1654.

She was instructed in Greek and Latin by her father, the learned Tannegui Lefèvre, became a resident of Paris in 1672, and was employed by the duke of Montausier to edit several Latin authors for the use of the dauphin. She was married to André Dacier (1651-1722), librarian of the king, the translator of Plutarch, and editor of the *Delphin* Horace, etc., in 1683. She produced French translations of Anacreon (1681), of Terence, of Homer's "Iliad" (1699), and of the "Odyssey" (1708). As an enthusiastic admirer of Homer and other ancient poets, she was engaged in a famous controversy with La Mothe, and wrote her "Traité de cause de la corruption du goût." (See BURETTE, "Éloge de Mme. Dacier.") Died Aug. 17, 1720.

**Da Costa** (J. M.), M. D., an eminent American physician, was born in the island of St. Thomas, in the West Indies, Feb. 7, 1833, and received his medical education at Philadelphia and in Europe. He became professor of the practice of medicine at the Jefferson College in Philadelphia in 1872. He wrote "Medical Diagnosis," etc.

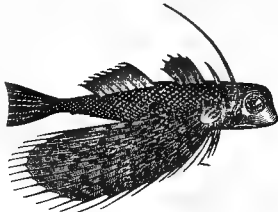
**Dacota.** See DAKOTA, by L. P. BROCKETT, M. D.

**Dacres** (Sir SYDNEY C.). See APPENDIX.

**Dactyl** [from the Gr. δάκτυλος, a "finger," because, like the dactyl, a finger has one longer and two shorter parts], the name of a metrical foot in Greek and Latin poetry, consisting of a long and two short syllables, as *cārminā*. The term is also applied in the English and other languages to a foot or measure consisting of one accented and two unaccented syllables, as *destiny*. In Latin hexameters the next to the last foot is almost always a dactyl.

**Dactylology.** See DEAF AND DUMB.

**Dactylopterus** [from the Gr. δάκτυλος, a "finger," and πτερόν, a "wing"], a genus of acanthopterygian fishes of the family Triglidae, remarkable for the great development of the pectoral fins. The beautifully-colored species *Dactylopterus orientalis* (commonly known as the Indian flying gurnard) is found throughout the Indian Ocean and Archipelago. It is very striking in form, having large pectoral fins and two curved spines (or filaments) between the head and dorsal fin, the foremost of which is much elongated. Shoals of this fish are often seen flying above the surface of the water, and occasionally touching the summits of the highest waves.



Dactylopterus.

**Dactylos** [Gr. δάκτυλος, a "finger"], a finger's breadth, an ancient Greek measure, equal to 0.7586 inches.

**Dadd** (GEORGE H.), M. D., a veterinary surgeon, born in England in 1813, removed to the U. S. in 1839, and became well known as a writer upon veterinary science and kindred topics.

**Dadeville**, on R. R., capital of Tallapoosa co., Ala. (see map of Alabama, ref. 4-E, for location of county), 50 miles N. E. of Montgomery. It has a mineral spring, a female institute, and other schools. Pop. in 1880, 740.

**Da'do**, an Italian word signifying a "die," is applied in architecture to the cubic block which forms the body of a pedestal, and is between the base and the cornice. The term is also applied to the wainscoting of a room.

**Dædalus** [Gr. Δαίδαλος], a personage of Greek mythology, was celebrated as an inventor and mechanical genius. He was the reputed inventor of the auger, saw, and other tools. According to tradition, he built the Labyrinth of Crete and fabricated wings with which he flew from Crete to Sicily. He was the father of Icarus. The inventions ascribed to him are partly artistic, such as the opening of the eyes, which had formerly been closed in statuary, and the extending of the hands, which had formerly been placed down close to the sides; partly mechanical, such as most of the tools employed in carpentry, the mast of the ship, the folding-chair, etc. It seems, however, that when the Greeks ascribed a certain invention to Dædalus they simply meant that it belonged to the period when the arts first sprung up among men.

**Dædalus of Sicily**, son and pupil of Patrocles, himself a distinguished artist, flourished about 400 B. C. He made for the Eleans, after their victory over the Lacedæmonians, the trophy which they erected in the grove Altis. Besides this he fashioned statues of several athletes, a Victory, and others enumerated by Pausanias.

HENRY DRISLER.

**Daet**, a town of Luzon, one of the Philippine Islands, capital of the province of North Camarines, is about 140 miles S. E. of Manila. Pop. about 7500.

**Daf'fodil** [Gr. ἀσφόδελος; Lat. *asphodelus*], the English name of those species of *Narcissus* which have a large bell-shaped corona. The common daffodil (*Narcissus Pseudo-narcissus*) is a native of England, having showy yellow flowers. Another species, called *Narcissus minor*, is cultivated in gardens for the sake of the flowers, which open early in spring.

**Dagg** (JOHN LEADLEY), D. D., LL.D., born in Middleburg, Va., Feb. 13, 1794, pastor of the Fifth Baptist church, Philadelphia (1825-34), principal of Alabama Female Athenæum (1836-44), president of Mercer University (1844-54), and professor of systematic theology to 1856. He is author of "A Manual of Theology," "Church Order," "Moral Science," used as a text-book in several colleges, "Evidences of Christianity," etc.—all valuable and popular works.

**Dag'gett** (DAVID), LL.D., an able American lawyer and jurist, born at Attleborough, Mass., Dec. 31, 1764. He was a Senator of the U. S. from 1813 to 1819, and was appointed in 1826 Kent professor of law at Yale College, of which he was a graduate. He became chief-justice of Connecticut in 1832. Died April 12, 1851.

**Daggett** (OLIVER ELLSWORTH), D. D., an American scholar and divine, son of David, noticed above, born Jan. 14, 1810, at New Haven, Conn., graduated at Yale College (1828), ordained pastor of the South church, Hartford, Conn. (April 12, 1837), pastor of the First Congregational church, Canandaigua, N. Y., nearly twenty-three years, afterwards was professor of divinity in Yale College about three years, and subsequently pastor of the Second Congregational church, New London, Conn.; author of several printed sermons, of many articles in the "New Englander," and also one of the compilers of the "Connecticut Hymn-Book," issued in 1845. Died at Hartford, Conn., Aug. 31 or Sept. 1, 1880; found dead in his library Sept. 1.

**Daghestan'** [from the Persian *dagh*, "mountain," and *stan*, "country"], a province of Russia, extends along the western coast of the Caspian Sea, from lat. 41° to 43° N., and is mostly between lon. 46° and 50° E. It is bounded on the S. W. by the Caucasus Mountains, and the surface is generally mountainous. Area, 11,039 square miles. Chief town, Derbend. The country belonged to Persia until 1812, when it was ceded to Russia, but the Russian rule was not fully established until the submission of Schamyl in 1859. Pop. 481,624.

**Dag'obert** [Lat. *Dagobertus*] I., king of the Franks, born about 602 A. D., succeeded his father, Clotaire II., in 628. He died in 638, leaving two sons, Siebert, king of Austrasia, and Clovis II. of Neustria. He was himself one of the most brilliant scions of the Merovingian family. Elected king of Austrasia in 622, he became king of Neustria in 628, after the death of his father, and to these two kingdoms he added that of Aquitaine after the death of his brother, Charibert, in 631. Thus having become sole ruler of the whole Frankish empire, he went to work to curb or restrict the rising power of the double aristocracy of the feudal lords and the prelates. He banished Bishop Arnulph of Metz, and he called Pepin, his "major-domus," to Paris to have him under his immediate control. He ordered a survey to be made of the possessions of all the monasteries, and one half of the whole mass he confiscated and used for military purposes. One of his greatest feats was the codification of the Frankish laws. Before his death, however, he was compelled to place his son Siebert on the throne of Austrasia.

**Da'göe**, or **Da'go**, an island of Russia, in the Baltic Sea, is a part of Esthonia, and is separated from the island of Oesel by the narrow Sele-Sund. It is nearly 34 miles long and 15 miles wide. Area, 234 square miles. Its soil is not fertile. The inhabitants (partly Swedish and partly Esthonian) number about 10,000. There are forests upon the island. The exports are fish, and cattle of a small and peculiar breed.

**Da'gon** [a diminutive of endearment, and apparently masculine, from the Hebrew *dag*, "a fish"], a Philistine god, human down to the waist, with the tail of a fish; embodying the idea of fertility. The Phœnicians also had a fish-god, Dagon. The identity of the Assyrian Dagan with the Phœnician Dagon, affirmed by some, is denied by others.

**Daguerre** (LOUIS JACQUES MANDÉ), the inventor of the daguerreotype, was born at Cormeilles in 1789. He became a skilful scene-painter, and was one of the inventors of the diorama. Daguerre and Niepce (1765-1833) began to make experiments in photography conjointly in 1826. After the death of Niepce, Daguerre succeeded in forming indelible images on metallic plates by the chemical action of light. He continued to make improvements in photography. Died July 12, 1851.

**Daguerreotype** [named from Daguerre, its inventor], the first successful (now obsolete) form of the photograph. A polished plate of silvered metal was exposed in darkness to the vapor of iodine mixed with bromine, or of iodine alone, until it took a reddish-yellow tint. It was then exposed to the luminous image of the camera, and quickly transferred to a dark room. Here the plate (on which no image was visible) was exposed to vapor of mercury, which brought out the figure by blending with that part of the surface which had been affected by the light in the camera. Next the plate was washed in a solution of hyposulphite of soda, which removed the unaltered iodobromide of silver, and left the picture untouched. The principles involved are discussed under PHOTOGRAPHY, by PROF. H. B. CORNWALL, E. M. (which see).

**D'Aguesseau** (HENRI FRANÇOIS), born at Limoges Nov. 27, 1668, died in Paris Feb. 9, 1751. He studied law, and was appointed advocate-general in 1689, procurator-general in 1700, and chancellor in 1717. Twice he had to give up that position, driven away first by John Law, afterward by Dubois, but both times he was recalled, and in the history of French jurisprudence he has a great name. His reforms refer not simply to the forms of procedure and the limits of jurisdiction, but in many points—as, for instance, regarding donations, testaments, and successions—they denote a material development. His great dislike to the Jansenists, however, allured him into a very wrong line of conduct with respect to the bull "Unigenitus," which he aided Dubois and the Jesuits in forcing the Parliament to register.

**Dahl** (JÖRAN CHRISTIAN), born at Bergen, Norway, Feb. 24, 1778, died in Dresden Oct. 14, 1857. He early showed decided talent for painting, and studied from 1811 to 1818 at the Academy of Copenhagen. In the latter year he settled in Dresden, where he spent the rest of his life, making only short excursions to Tyrol, Switzerland, and Italy. As he was a fully-developed artist when he arrived in Germany, he can only so far be reckoned a member of the German school as he exercised a decisive influence on it. Landscape-painting stood very low in Germany at that time, but the boldness of Dahl's conceptions actually furnished a fresh impulse. Among his most celebrated tablets are "View of Bergen," "The Haven of Copenhagen," "Winter in Munich," "The Outbreak of Vesuvius," etc.

**Dahl'en**, town of Germany in the Prussian Rhine province, in the circle of Geldern, has extensive manufactures. Pop. 6162.

**Dahlgren** (JOHN A.), U. S. N., born Nov. 13, 1809, in Philadelphia, entered the navy as a midshipman Feb. 1, 1826, became a passed midshipman in 1832, a lieutenant in 1837, a commander in 1855, a captain in 1862, and a rear-admiral in 1863. On the 22d of April, 1861, through the abandonment of his trust by Capt. Franklin Buchanan, Dahlgren, then on ordnance duty, became commandant of the U. S. navy-yard, Washington, and to his firmness and sound judgment at that crisis the government was indebted for the preservation of the yard from falling into the hands of the Confederates. In the fall of 1862 Dahlgren was detached from the navy-yard, and appointed chief of the bureau of ordnance, and in June, 1863, became commander-in-chief of the South Atlantic blockading squadron, relieving Rear-Admiral S. F. Dupont of that command in the harbor of Port Royal, S. C., July 6, 1863. He at once commenced active operations in conjunction with Gen. Gillmore, U. S. A., which speedily resulted in the possession of the greater part of Morris Island and the silencing of Fort Sumter, and secured a safe anchorage for the monitors inside the bar of Charleston, thus effectually putting a stop to the blockade-running which had been before so successfully practised, and reducing Charleston to a place of no importance for the rest of the war. After the fall of Charleston in 1865, Dahlgren resigned his command, and in 1866 was appointed commander-in-chief of the South Pacific squadron, in the discharge of which duty he remained for two years. In 1868 he was a second time appointed chief of the bureau of ordnance, from which station he was relieved at his own request in 1870, and ordered to the command of the navy-yard at Washington, where he died July 12, 1870.

Rear-Admiral Dahlgren was a man of most exemplary character, of great personal bravery, and of rare ability. He is the author of the following works, viz.: "Exercise and Manœuvre for the Boat Howitzer U. S. N." (1852), "System of Boat Armament U. S. N." (1852), "Ordnance Memoranda" (1853), "Shells and Shell-guns" (1856); and it is mainly to his labors that the navy is indebted for the great improvement in its ordnance which has taken place since 1840. The 9-inch and 11-inch Dahlgren "smooth-bores" are still the favorites of American seamen, and for

lightness, range, and accuracy combined the Dahlgren howitzer is unsurpassed by any boat-gun in the world. (See ARTILLERY.)

FOXHALL A. PARKER.

**Dahlgren** (ULRIC), an American officer, born in 1842, was a son of Rear-Admiral Dahlgren. He was aide-de-camp to Gens. Burnside and Hooker, distinguished himself by several acts of gallantry, and lost a leg at Hagers-town in July, 1863. He commanded a body of cavalry in a raid against Richmond, the outer works of which he assaulted. During the retreat from that city he was killed Mar. 4, 1864.

**Dahlgren Gun** [named from Admiral Dahlgren, its inventor], an improved form of ordnance used for howitzers, heavy artillery, and especially in naval gunnery. It having been demonstrated that in ordinary cast guns the weight of the metal forward is greater than is needed, and that by far the greatest strain in firing is at the breech, Dahlgren greatly increased the relative size and weight of the breech, with the best results. These guns are chiefly used by the U. S. forces. (See ARTILLERY.)

**Dahlia** [named in honor of Andrew Dahl, a Swedish botanist], a genus of plants of the order Compositæ and sub-order Tubulifloræ. They are natives of Mexico, and the numerous varieties cultivated are chiefly derived from two species—*Dahlia coccinea* and *Dahlia variabilis*. New varieties are easily obtained by the artificial foundation of one with the pollen of another. Dahlias have recently become very popular, being conspicuous for their varied and exquisite colors and regularity of form. The tuberous roots of these plants, although not agreeable in taste, are used as food in Mexico. A light and moderately rich soil, with plentiful moisture, appears to be best adapted to the cultivation of dahlias.

**Dahlmann** (FRIEDRICH CHRISTOPH), a German historian, born at Wismar May 13, 1785. He became in 1822 professor of history at Kiel, in 1829 professor of political economy in Göttingen, and was in 1837, on account of his protest against the abolition of the fundamental law by King Ernest Augustus, deprived of his chair. In 1842 he was appointed professor of history at Bonn. In 1848 he was one of the leaders of the constitutional party. His chief works are a "History of Denmark" (3 vols., 1840-43), a "History of the English Revolution" (6th ed. 1864), and a "History of the French Revolution" (3d ed. 1864). A biography of Dahlmann has been published by Springer (1870). Died Dec. 5, 1860.

**Dahlonega**, capital of Lumpkin co., Ga. (see map of Georgia, ref. 2-G, for location of county), is on a hill about 66 miles N. N. E. of Atlanta. Gold-mines have been opened in the vicinity. Here was before the war a branch mint of the U. S.; the building has recently been converted into the North Georgia Agricultural College. The name of Dahlonega is a compound of Indian and English. When gold was first discovered here, the Indians flocked in from the surrounding country. The Cherokees then inhabited this part of Georgia. *Nega* was the Indian word for yellow, and they called gold *dalla-nega*, yellow dollar. The village that soon grew up here in the midst of the gold-region took the Indian name of *Dalla-nega*; the spelling, however, was afterward changed by the introduction of the *h* and *o*, as it now stands. Pop. in 1870, 471; in 1880, 602.

**Dahomey**, a kingdom of Western Africa, in Guinea, is bounded on the S. by the Gulf of Guinea, and partly on the W. by the river Volta, which separates it from Ashantee. Its limits are not exactly defined. Area, estimated at about 4000 square miles. The surface is generally level, but the northern part is diversified by hills, which are covered with luxuriant forests. The soil is fertile. Maize, cotton, sugar, yams, tobacco, beans, pease, and manioc are cultivated here. The cocoa-nut tree and other species of palm flourish. Among the wild animals are lions, tigers, and elephants. The people are pagans. The tiger is the principal fetish. The Dahomans are bloodthirsty and abject, but hospitable and courageous. They can only approach their despot by crawling with their faces in the dust. The monarch once a year sprinkles his ancestors' graves with human blood. No one can take a wife except by gift or purchase from the sovereign. At the death of a king the multitude of wives in his seraglio set to butchering one another till checked by the successor. The king has a standing army of about 6000 female warriors. Capital, Abomey. Pop. about 180,000. (See FORBES, "Missions to Dahomey," 1851; BURTON, "A Mission to Dahomey," 1864.)

**Daimiel**, a town of Spain, in the province of Ciudad Real, 20 miles E. N. E. of the city of Ciudad Real. It has a Gothic church, a town-hall, and a hospital; also manufactures of linen and woollen fabrics and blond lace. Pop. 12,500.

**Daimio**, di-me-o, the title of the feudal lords of Japan. They are 264 in number, and have exercised in their own districts the powers of petty sovereigns. Eighteen of these daimios were virtually independent within their own dominions, and hence arose many impediments to the intercourse of the Japanese with Europeans. The recent revolution in Japan brings this old feudalism to an end. (See JAPAN.)

**Daingerfield**, on R. R., capital of Morris co., Tex. (see map of Texas, ref. 2-J, for location of county), 17 miles S. E. of Mount Pleasant. Pop. in 1870, 272; in 1880, 395.

**Dairy** [supposed to be derived from an old English word, *dey* or *day*, "milk"], the department of farming which includes the production of milk; also the house or apartment where milk is kept, and where butter, cheese, etc. are manufactured. (See BUTTER, by PROF. C. F. CHANDLER, PH. D., LL.D., and CHEESE.)

**Da'is** [Fr. *daïs*, a "canopy." It. *desco*; probably akin to the Ger. *Tisch*, a "table"], in architecture, the platform at the upper end of a dining-hall where stood the table for distinguished guests; also the canopied seat for those who sat there. Mediæval writers used this word with considerable latitude, one of its significations being a canopy over a shrine or statue.

**Dai'sy** [from the Anglo-Saxon *dæges-age*, i. e. "day's eye"], a genus (*Bellis*) of small perennial plants of the order Compositæ. The daisy is a native of Europe, and very common in Great Britain, where its delicate crimson-tipped flower has been immortalized by Burns and other poets. The variety called "hen and chickens" has the main flower-heads surrounded by smaller ones, with short stems growing from the summit of the scape. New and very beautiful varieties have lately been introduced by the florists. In Scotland this flower is called gowan. A few species of *Bellis* have been discovered in the S. W. portion of the U. S.

**Dako'ta**, a Territory of the U. S. between 42° 30' and 49° N. lat., and 96° 20' and 104° W. lon.; bounded N. by Manitoba and the North-west provinces of British America; E. by Minnesota, S. by Nebraska, W. by Wyoming and Montana; area (census of 1880), 149,100 square miles. It is 450 miles from N. to S. and 350 from E. to W., about three times as large as New York.

**Topography, Rivers, etc.**—The Black Hills region has a few summits between 5000 and 6000 feet high, possibly one or two within the limits of Dakota rising to 7000 feet. Aside from these, there are occasional isolated *buttes* from 3500 to 4000 feet, but no chain of mountains or even high hills. Most of the Territory belongs to the Great Plains E. of the Rocky Mountains, but less elevated than the same plains farther S. The watershed is about the 46th parallel, and is 1500 or 1600 feet above the sea, sloping downward both N. and S. Dakota is well watered; the Missouri River traverses it diagonally from N. W. to S. E., with twelve or fifteen large affluents on the west bank, the principal of which are Niobrara, Keyapaha, White, Bad, Cheyenne, Moreau, Grand, Cannon Ball, Big Heart, and Little Missouri, and about thirty on the E. bank, of which only the Big Sioux, Vermilion, and James or Dakota are very large. The Red River of the North forms its E. boundary for 250 miles, and its affluents, the Sheyenne, Wild Rice, Goose, Park, Turtle, and Pembina, drain the N. E. part of Dakota. The Souris or Mouse, called also Riviere des Lacs, a tributary of the Assiniboine, traverses the N. counties. There are hundreds of beautiful lakes, Minnewakan, Big Stone, Traverse, Albert, Poinsett, McIntosh, Wood, Long, and Thompson being the largest.

**Soil and Vegetation.**—Dakota has a large area of good and arable land, and the river-valleys are very fertile and fine wheat lands. The prairie or plateau lands, though not quite as rich, yield large crops. In Southern Dakota all grains and root-crops are abundant, even with imperfect cultivation. The Black Hills region was thought to be sterile, but its hillside are found to be productive. The Bad Lands, of which there are two or three small tracts, are not cultivable, but are wonderful for their fossils and their statues, cathedrals, and fortresses carved by the waters out of the soft rocks and plastic clays of that region. The hilly portions are excellent grazing lands. There is not any great extent of forest in Dakota, though the banks of the larger streams are well wooded, and the mountainsides in the Black Hills and the buttes of the N. W. are crowned with forest trees.

**Minerals.**—There is gold in large quantities in the Black Hills, as well as silver, lead, and probably copper; iron, in various ores, in all parts; lignite and excellent bituminous coal on the Little Missouri and in the Turtle Mountains; hydraulic lime, limestone, salt, in the Red River region, etc.

**Zoology.**—Bears, panthers, wildcats, lynxes, wolves,

badgers, wolverines, the pine and stone marten, minks, skunks, coyotes, and several varieties of foxes; buffaloes, moose, elk, two species of deer, and rarely the musk-ox; gophers, several species of rabbits and squirrels, and a great variety of the smaller rodents; all the birds of the Mississippi and Missouri valleys, and the rivers and lakes swarm with fish.

**Climate.**—The range of temperature is about the same in all parts of the Territory, from a maximum of summer heat ranging from 90° to 100° F. to a winter minimum from 25° to 44°, but the mean temperature of the year varies largely; 35° at Pembina, lat. 49°; 41.3° at Bismarck, lat. 46° 50'; at Deadwood, lat. 44° 30', it is 43.19°, and at Yankton, lat. 42° 50', it is 47.1°. The rainfall is least at Bismarck—19.66 inches; 20.02 inches at Yankton, 23.58 at Deadwood, and 25.36 at Pembina. The winters are very cold, but generally dry and without very high winds; the summers are hot, but with cool nights; the climate is healthy and bracing. Only the N. grapes can live there, and corn does not always ripen, except in Southern Dakota.

**Agricultural Products.**—Wheat and the other cereals, except corn, yield immense crops; in Northern Dakota root-crops also do well. There are wheat farms of from 50,000 to 75,000 acres in Northern Dakota, yielding an average of 22 bushels to the acre, and smaller farmers report, with more careful cultivation, a much larger yield. Southern Dakota is an excellent grain region, with a rich, fertile soil; Central Dakota is better adapted to grazing, but has much good grain land. By census of 1880 the wheat crop was 2,830,289 bushels; value of live stock, \$6,463,374; by assessment of 1885, \$14,817,225.

**Manufactures.**—The principal are flour, lumber, wagons, leather, beer, linseed-oil, cigars, bricks, wool, and woollen goods. In 1880 the value of flouring and grist mill products was \$1,040,958; lumber products, \$435,792; all manufactures, \$2,373,970. It had 251 manufactories in 1880.

**Mining.**—Aside from the coal-mines of the N. W., near the mouth of the Little Missouri, mining in Dakota is confined to the Black Hills. Mining commenced there in 1875, but there was not much done before 1877; the early mines on the Deadwood belt are of gold, low grade ores, but of free-milling gold, and easily reduced, so that gold-mining on a large scale there is profitable. Some silver-mines have been opened, but gold is much the larger product. The gold and silver product for year ending May 31, 1880, was \$3,325,547.

**Railways.**—To Dec., 1881, there were more than 1800 miles of railways in operation in Dakota. These included three parallel lines crossing the Territory—viz. Northern Pacific, Chicago and North-Western, and Chicago Milwaukee and St. Paul, and several local roads. The counties on the E. border have each access to Chicago and Milwaukee by branches of the Chicago and North-western and Chicago Milwaukee and St. Paul, while the whole Red River Valley is within easy reach of the St. Paul Minnesota and Manitoba R. R.

**Banks.**—Dakota had in Nov., 1881, twelve national banks, with \$750,000 capital, \$545,000 U. S. bonds on deposit, and \$326,750 circulation. It had also in 1881, 37 private banking-houses, with \$216,263 capital and \$484,335 deposits. It has several insurance companies.

**Finances, etc.**—The Territorial debt, Nov., 1884, was \$262,000, principally for public buildings. Valuation of property, 1885, real and personal, \$106,007,307. The Territory has no sea, river, or lake ports, and has only internal commerce.

**Education, Libraries, etc.**—The common-school statistics are meagre and imperfect. In 1884, Dakota had 1609 public schools, with 50,031 pupils; the total expenditure for the year was \$1,748,562.99. The pop. of school-age (five to twenty-one years) in 1884 was over 77,000. Dakota has a good school system, and will have a sufficient revenue from school lands and taxation to support it; the city schools have been promptly organized and are of high character; higher education as well as normal training is in progress. There are several colleges. Only eight public libraries are reported, two of them in Yankton; aggregate number of volumes, 5000.

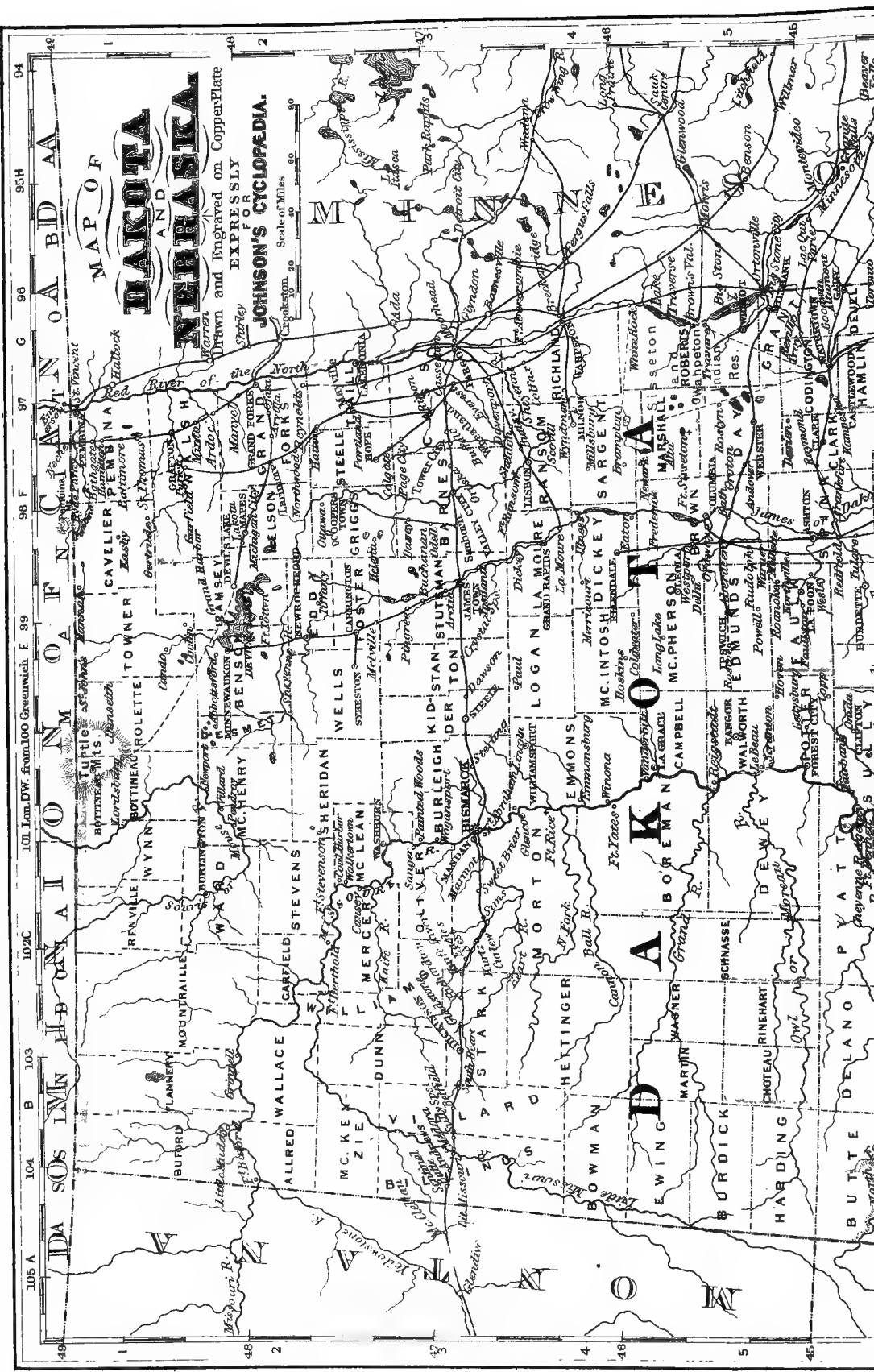
**Churches.**—There were in 1880 nearly 200 of all denominations in the Territory; the Congregationalists have the largest membership, followed by Methodists, Presbyterians, Baptists, Mennonites, Episcopalians, Lutherans, Disciples, Roman Catholics, etc.

**Population**, 1870, 14,181; 1880, 135,177 (white 133,147, colored 2030, including 238 Chinese and 1391 civilized Indians), besides 27,168 tribal Indians; pop. in 1885, 416,000.

**Principal Towns, pop. in 1880.**—Yankton, 3431; Deadwood, 3777; Fargo, 8201 (in 1885); Sioux Falls, 2164; Bismarck (cap.), 3067 (in 1885); Grand Forks, 4692 (in 1885); Lead City, 1437; Central City, 1008.







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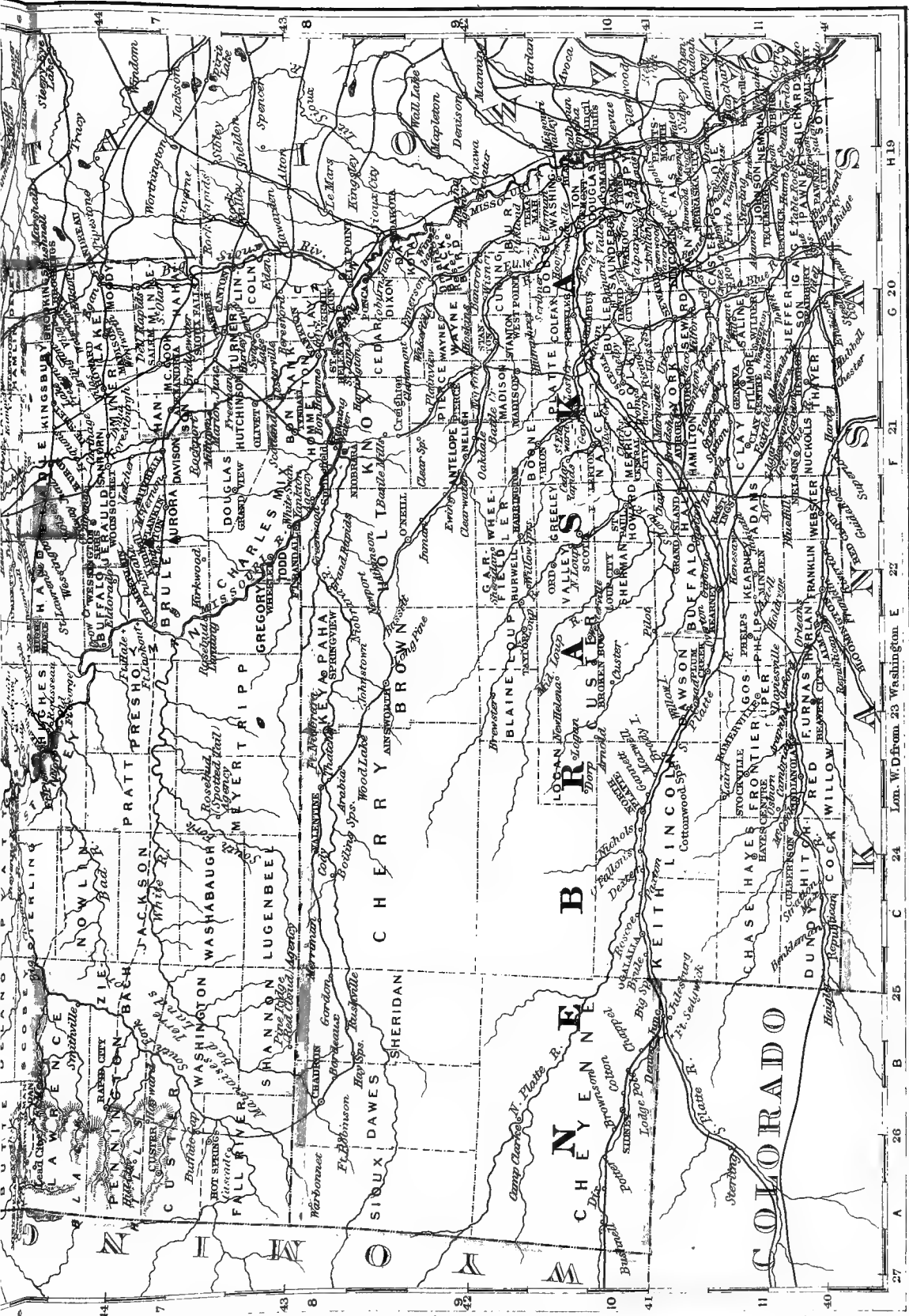
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COUNTIES.	* Ref.	Pop. 1880.	Pop. 1885.	COUNTY TOWNS.	Pop. 1880.
Allred.....	2-B	.....	13		
Aurora.....	7-E	69		Plankinton.	
Barnes.....	3-F	1,585	6,096	Valley City.....	302
Beadle.....	6-F	1,290		Huron.....	164
Benson.....	2-E		1,255	Minnewaukon.	
Billings.....	3-B	1,323	737		
Bon Homme.....	8-F	5,468		Bon Homme.	
Boreman.....	4-C	634			
Bottineau.....	1-D		818	Bottineau.	
Bowman.....	4-B		162		
Brookings.....	6-G	4,965		Brookings.	
Brown.....	5-F	353		Columbia.....	133
Brulé.....	7-E	238		Chamberlain.	
Buffalo.....	7-E	63			
Buford.....	1-B		524		
Burdick.....	5-B				
Burleigh.....	3-D	3,246	5,354	Bismarck.....	1,758
Butte.....	6-B			Minnesela.	
Campbell.....	5-D	50		La Grace.	
Cass.....	3-F	8,998	21,085	Fargo.....	2,693
Cavalier.....	1-E		5,029		
Charles Mix.....	8-E	407		Wheeler.	
Choteau.....	5-B				
Clark.....	6-F	114		Clark.	
Clay.....	8-G	5,001		Vermilion.....	714
Codington.....	6-F	2,156		Watertown.....	746
Custer.....	7-B	995		Custer.....	271
Davison.....	7-F	1,256		Mitchell.....	320
Day.....	5-F	97		Webster.	
De la Platte.....	6-B				
De Smet.....	2-D		76		
Deuel.....	2-G	2,302		Gary.	
Dewey.....	5-C				
Dickey.....	4-E		3,450	Ellendale.	
Douglas.....	7-F	6		Grand View.	
Dunn.....	3-B		32		
Eddy.....	5-E		825		
Edmunds.....	5-E			Ipswich.	
Emmons.....	4-D	38	866	Williamsport.	
Ewing.....	4-B				
Fall River.....	8-B			Hot Springs.	
Faulk.....	5-E	4		La Foon.	
Flannery.....	1-B		103		
Foster.....	2-E	37	992	Carrington.	
Grand Forks.....	2-F	6,248	20,453	Grand Forks.....	1,705
Grant.....	5-G	3,010		Millbank.	
Gregory.....	8-E				
Griggs.....	2-F		2,093	Cooperstown.	
Hamlin.....	6-F	693		Estelline.	
Hand.....	6-E	153		Miller.	
Hanson.....	7-F	1,301		Alexandria.....	99
Harding.....	5-A				
Hettinger.....	4-B		63		
Hughes.....	6-D	268		Pierre.	
Hutchinson.....	7-F	5,573		Olivet.	
Hyde.....	6-D			Highmore.	
Jackson.....	7-C				
Jerauld.....	7-F			Wessington Sps.	
Kidder.....	3-E	819	1,572	Steele.	
Kingsbury.....	6-F	1,102		De Smet.....	116
Lake.....	7-G	2,657		Madison.....	96
La Moure.....	4-E	20	2,072	Grand Rapids.	
Lawrence.....	6-B	13,248		Deadwood.....	3,777
Lincoln.....	8-G	5,896		Canton.....	675
Logan.....	4-E		336		
Lugenbeel.....	8-C				
Lyman.....	7-E	124		Salem.	
McCook.....	7-F	1,263			
McHenry.....	2-D		800		
McIntosh.....	4-E		282		
McKenzie.....	2-B		24		
McLean.....	2-D		942	Washburn.	
McPherson.....	4-E			Leola.	
Mandan.....	6-B				
Martin.....	5-B				
Mercer.....	3-C		254		
Meyer.....	8-D	115			
Miner.....	7-F	363		Howard.	
Minnehaha.....	7-G	8,251		Sioux Falls.....	2,164
Moody.....	7-G	3,915		Flandreau.....	471
Morton.....	4-C	200	5,873	Mandan.....	239
Mountrail.....	1-C	13	340		
Nelson.....	2-F		3,032	Mapes.	
Nowlin.....	7-C				
Oliver.....			327		
Pembina.....	1-F	4,862	11,509	Pembina.....	287
Pennington.....	7-B	2,244		Rapid City.....	292
Potter.....	5-D			Forest City.	
Pratt.....	7-D				
Presho.....	7-D				
Pyatt.....	6-C				
Ramsey.....	2-E	281	3,271	Devil's Lake.	
Ransom.....	4-F	537	4,286	Lisbon.	
Renville.....	1-C		30		
Richland.....	4-F	3,597	9,055	Wahpeton.....	400
Rinehart.....	5-B				
Roberts.....	5-G			Travare.	
Rolette.....	1-E		2,232		
Sanborn.....	7-F			Letcher.	
Sargent.....	4-F		3,018	Milnor.	
Schnasse.....	5-C				
Scobey.....	6-B				
Shannon.....	8-B	113			
Sheridan.....	2-D		40		
Spink.....	6-F	477		Redfield.	

\* Reference for location of counties. See map of Dakota.

COUNTIES.	Ref.	Pop. 1880.	Pop. 1885.	COUNTY TOWNS.	Pop. 1880.
Stanley.....	6-D	793			
Stanton.....	.....		322		
Stark.....	3-C		1,507	Dickinson.	
Steele.....	2-F		3,080	Hope.	
Sterling.....	6-C				
Stevens.....	2-C	247	55	Jamestown.....	393
Stutsman.....	3-E	1,007	5,750	Clifton.	
Sully.....	6-D	296			
Towner.....	1-E		366		
Traill.....	2-F	4,123	8,119	Caledonia.	
Tripp.....	8-D				
Turner.....	8-G	5,320		Swan Lake.....	49
Union.....	8-G	6,813		Elk Point.....	719
Villard.....	4-B		200		
Wagner.....	5-C				
Wallace.....	2-B		46		
Walsh.....	1-F		12,777	Grafton.	
Walworth.....	5-D	46		Le Beau.	
Ward.....	.....		257		
Washabaugh.....	7-C				
Washington.....	7-B				
Wells.....	2-E		285	Sykeston.	
Williams.....	3-C	14	80		
Wynn.....	1-D		10		
Yankton.....	8-F	8,390		Yankton.....	3,431
Ziebach.....	7-B				
Unorganized territory between Cavalier, Walsh, and Ramsey counties.	.....	.....	68		
Total.....	.....	135,177	416,000		

The counties left blank in 1880 column had either no population, were not separately returned, or were formed since 1880. The total of 1880 population contains that of former counties now abolished, also whites on military and Indian reservations. Population for 1885 for all counties is included in total.

**History.**—Portion of the old Louisiana Territory ceded to U. S. in 1803; was organized as a Territory in 1861, extending from 42° 28' to 49° N. lat., and from Minnesota to Rocky Mountains; Idaho (including Montana) set off in 1863, and Wyoming in 1868; a tract W. of Wyoming, 5740 square miles in extent, remained to Dakota, but is now recorded by the census office as unorganized territory; an Indian war with Little Crow's band in 1862; Indians defeated in Dakota and 38 hung; in 1863 another Indian war, in which the Indians were completely overthrown by Gens. Sibley and Sully. The capital of the Territory was removed from Yankton to Bismarck in 1883. A bill for the admission of Dakota as a State provides for a division of the Territory on the 46th parallel of N. lat., the part N. of that line to remain a Territory under the name of Lincoln; it was passed by the U. S. Senate Dec., 1884, but has not yet (1884) been passed by the House of Representatives.

#### Territorial Governors.

William Jayne.....1861-63 William A. Howard.....1878-80  
Newton Edmonds.....1863-66 Nehemiah G. Ordway.....1880-84  
Andrew J. Faulk.....1866-69 Gilbert A. Pierce.....1884-88  
John A. Burbank.....1869-73  
John L. Pennington.....1873-78

L. P. BROCKETT.

**Dakota City,** R. R. junction, capital of Humboldt co., Ia. (see map of Iowa, ref. 3-F, for location of county), 18 miles N. of Fort Dodge. It has a court-house, and flour and carriage manufactures. Humboldt College is 1 mile N. of the town. Pop. in 1870, 162; in 1880, 248.

**Dakota City,** capital of Dakota co., Neb. (see map of Nebraska, ref. 6-K, for location of county), is on R. R. and the W. bank of the Missouri, 5 miles S. of Sioux City, Ia. Pop. in 1870, 300; in 1880, 364; in 1885, 420.

**Dakota Indians,** a race or collection of tribes or "bands" of American savages, often called **Sioux**, who inhabit Nebraska, Wyoming, Dakota, etc. Their language shows them to be of a different stock from most of the Indian tribes. The languages of the Assiniboines, the Pawnees, the Osages, the Comanches, the Crows, and others belong to the same class with the Dakota tongue. The name "Dakota" signifies the "allied." The name of Sioux they received from being called "Nadowessiooux" by the Algonquins. They were first found by the French in 1640 occupying the vast regions extending between the Arkansas River in the S. and Lake Winnipeg in the N., and between the Mississippi in the E. and the Rocky Mountains in the W. In 1685 the French took formal possession of the country. In the Revolutionary war the Sioux played no conspicuous part, but in the war of 1812 they sided with the British. In 1837 they ceded to the U. S. all their lands E. of the Mississippi, and in 1851 they sold 35,000,000 acres of their land W. of the Mississippi. As the government, however, failed to fulfil its part of the bargain, hostilities broke out, which had to be put down by armed force



in 1855. A new treaty of peace was concluded; but, as the government this time too neglected to keep its promises, a general rising took place among the Dakotas, and more than a thousand settlers were killed in 1862. When military force approached, a great number of the disturbers fled into the British dominions, and order was soon restored. But in 1875 new complications arose. Gold was found in the Black Hills, which formed part of the Sioux reservation. The government wished to buy the land, but the Sioux demanded an enormous price. As the government sent surveyors into the country, the Sioux immediately prepared for war, and the defeat of Gen. Custer in 1876 ensued. Shortly after, many of the Sioux again fled into the British dominions, and the strength of the tribe is now much reduced. (See RIGGS, "Dakota Grammar" and "Dictionary," and the article AMERICAN INDIANS.)

**Dakota River, Rivière à Jacques, or James River,** rises in the N. E. part of Dakota. It flows nearly southward, and enters the Missouri River about 8 miles below Yankton. Its whole length is estimated at 600 miles.

**Dal'arnow,** a city of India, in Oude, on the Ganges, 68 miles above Allahâbâd. It has two antique temples of Siva, and is reputed a holy place. Pop. about 10,000.

**Dalaradia.** See DALRIADA.

**Dal'berg, von (KARL THEODOR ANTON MARIA), LL.D.,** born at Hershheim Feb. 8, 1744, died at Regensburg Feb. 10, 1817. He studied law at Göttingen and Heidelberg, entered the Church, and was in 1772 appointed counsellor and governor of Erfurt by the prince-bishop of Mayence. In this position he revealed an administrative talent of the highest order and supported by nobleness of character and manners. As the friend of Goethe, the Mæcenas of Schiller, the intimate of Joseph II., and author of some spirited pamphlets and essays ("Betrachtungen über das Universum," 1777; "Verhältniss zwiochen Moral und Staatskunst," 1786, etc.), he naturally became one of the centres of literary and political life in Germany. In 1802 he was made archbishop and elector of Mayence. But Napoleon he could not withstand; alternately threatened and cajoled by him, he became a mere tool in his hands. In 1804 he was present in Paris at the coronation, but even the admonitions of Pius VII. could not prevent him from completely submitting to the dicta of the great conqueror. In 1806 he signed the Confederacy of the Rhine, and was made prince-primate; in 1810 he gave his consent to all the territorial rearrangements which Napoleon demanded, and was made grand duke of Frankfurt. After the fall of Napoleon his position became untenable; even the many excellent administrative reforms which he had introduced were forgotten or abolished. He made an attempt at explaining his relation to Napoleon, but nobody would listen. He was compelled to resign his sovereignty and retire into private life, and he died in obscurity. His "Life" was written by B. A. KRÄMER (Leipzig, 1821), and I. MÜLLER (Würzburg, 1874).

**Dalbergia** [named in honor of Nicholas Dalberg, a Swedish botanist], a genus of trees and shrubs of the order Leguminosæ, having pinnate leaves. The fruit is a flat membranous pod containing one to three seeds. All the species are natives of tropical climates, and several of them afford valuable timber. The wood of the sissoo of Bengal, the *Dalbergia sissoo*, is extensively used and highly prized in India. The East Indian rosewood is the timber of *Dalbergia latifolia*.

**Dale (RICHARD),** an American commodore, born near Norfolk, Va., Nov. 6, 1756, entered the merchant service when only twelve years of age, serving until the commencement of the Revolution, when he was made a lieutenant in the marine service of Virginia. He was shortly after captured by an English vessel, and while confined on prison-ship his old companions, who surrounded him, influenced him to take sides with England, and he actually engaged on board a cruiser against his native State; he was wounded at an early day, and during his convalescence realized the error he had committed, and firmly resolved to stand by his own country in the future. He entered the U. S. navy in 1776 as midshipman, was captured in 1777, and confined in prison in London nearly two years, when he made his escape in disguise. He hastened to France, and embarked with Paul Jones, who soon made him a lieutenant of his own ship, and became much attached to him. In the action with the *Serapis* he greatly distinguished himself, and was wounded. Returning to this country in 1781, he was appointed a lieutenant in the U. S. navy, and while serving on the *Trumbull* he received his third wound, and was captured for the fourth time. In 1794 he was made a captain, and a commodore in 1801. He served in command of a squadron during the Tripolitan war, and on his return to the U. S. resigned in 1802. Died Feb. 24, 1826.

**Dale (SAMUEL).** See APPENDIX.

**Dalecar'lia** (i. e. "the land of the men of the dales"), or **Dalarne**, a former province of Sweden, now forming the län or county of Kopparberg. It is famous for its beautiful mountain-scenery, its forests of pine, and its mines of iron and copper. The Dalecarlians are a brave and patriotic people, and as a reward for their fidelity they all have the privilege of taking the hand of the king of Sweden when they meet him. Area, 12,127 square miles. Pop. in 1869, 175,927.

**Dale City,** called also **Meyer's Mills** (see MEYERS-DALE), Somerset co., Pa.

**Daleites**, a body of Scotch Independents who were Calvinists and followers of David Dale (1739-1806), a benevolent manufacturer, the father-in-law of Robert Owen. The Daleites became affiliated with the Sandemanians for a time, but later were Independents. They never had more than one or two congregations.

**Dalf'sen**, a town in Holland, on the Vecht, 4 miles E. of Zwolle. Pop. 5549.

**Dalhous'ie**, a seaport, capital of Restigouche co., New Brunswick, at the mouth of the Restigouche River. It ships large quantities of salmon, lumber, and lobsters. Pop. in 1881, 2353.

**Dalhousie, EARLS OF (1633),** Barons Ramsay of Dalhousie (1619) and of Kerington (Scotland, 1633), Barons Panmure (United Kingdom, 1831).—Fox MAULE, eleventh earl, was born April 22, 1801. He became a Whig member of Parliament in 1835, and was secretary at war from July, 1846, to Feb., 1852. In April, 1852, he succeeded his father as Lord Panmure. He was minister of war in the cabinet of Lord Palmerston from 1855 to Feb., 1858. In 1860 he became earl of Dalhousie. Died July 1, 1874.

**Dalhousie (JAMES ANDREW RAMSAY), EARL AND MARQUIS OF,** a British statesman, born near Edinburgh April 22, 1812, was a son of the ninth earl of Dalhousie. He was returned to Parliament for Haddington by the Conservatives in 1837, and succeeded to the earldom on the death of his father in 1838. In 1845 he was appointed president of the board of trade by Sir Robert Peel. He was retained in that office by the Whig prime minister who came into power in 1846, and he became governor-general of India in 1847. His administration was successful, though his somewhat aggressive policy contributed to produce the mutiny of 1857. He annexed Pegu, Oude, the Punjab, and Berar to the British dominions, and developed the resources of India by canals and other public works. In 1849 he was created marquis of Dalhousie. He returned to England in 1856, and died, without male issue, Dec. 19, 1860. (See ARNOLD, "History of the Marquis of Dalhousie's Administration of British India," 1863-64.)

**Da'lias**, a town of Spain, province of Almería, is about 4 miles from the sea and 20 miles W. S. W. of the city of Almería. It has mines of lead and antimony. Pop. 9414.

**Dall (CAROLINE HEALY).** See APPENDIX.

**Dall (WILLIAM HEALY).** See APPENDIX.

**Dallas**, capital of Polk co., Ark. (see map of Arkansas, ref. 4-A, for location of county), is about 170 miles W. S. W. of Little Rock. Pop. in 1880, 176.

**Dallas**, on R. R., capital of Paulding co., Ga. (see map of Georgia, ref. 2-F, for location of county), is 33 miles W. N. W. of Atlanta. Here occurred a battle between Gen. Sherman and Gen. Johnston in May, 1864. Pop. in 1880, 169.

**Dallas**, on R. R., capital of Gaston co., N. C. (see map of North Carolina, ref. 3-D, for location of county), about 170 miles W. by S. from Raleigh. Pop. in 1870, 299; in 1880, 417.

**Dallas**, capital of Polk co., Or. (see map of Oregon, ref. 6-A, for location of county), on R. R. and the Rickreall River, 15 miles W. of Salem. Pop. in 1880, 670.

**Dallas**, a city and important R. R. centre, capital of Dallas co., Tex. (see map of Texas, ref. 2-I, for location of county), on Trinity River, 315 miles N. of Galveston, Tex., and 186 miles W. of Shreveport, La. Dallas was settled in 1841. It has three lines of street railroads, electric light in stores and streets, an elegant merchants' exchange, opera house, public parks, etc. A fine U. S. court-house and post-office is in progress. It has two daily newspapers and a large number of periodicals, and is situated in one of the richest sections of land in the country. Pop. in 1880, 10,358; in 1883 about 22,500. ED. OF "HERALD."

**Dallas (ALEXANDER JAMES),** an American statesman, born in the island of Jamaica June 21, 1759. He emigrated in 1783 to Philadelphia, where he practised law, and published in 1790 "Reports of Cases in the Courts of the United States and Pennsylvania" (4 vols.). In 1801 he was appointed a district attorney of the U. S. He became

secretary of the treasury in the cabinet of Madison in Oct., 1814, when the national revenue was insufficient and the public credit was impaired. He wrote an able report to Congress recommending the establishment of a national bank, raised money by a loan, and restored the public credit. He resigned office in Nov., 1816. Died Jan. 16, 1817.

**Dallas** (GEORGE MIFFLIN), LL.D., an American statesman, a son of the preceding, was born in Philadelphia July 10, 1792. He studied law, and was admitted to the bar in 1813. In 1824 he supported Gen. Jackson as a candidate for the office of President. He was elected in 1831 to the Senate of the U. S. for a short term, which expired in Mar., 1833. He was sent as minister to St. Petersburg in 1837, returned in 1839, and was elected Vice-President of the U. S. in 1844, when Mr. Polk was chosen President. In 1846 he gave his casting vote in the Senate for a revenue tariff bill, which was opposed by the protectionist party. In Feb., 1856, he was appointed minister to England, where he remained until 1861. Died Dec. 31, 1864.

**Dalles City, or The Dalles**, capital of Wasco co., Or. (see map of Oregon, ref. 6-C, for location of county), is on R. R. and the S. bank of the Columbia River, 87 miles by R. R. E. of Portland. It has a large woollen factory. The navigation of the river is here obstructed by rapids. Pop. in 1870, 942; in 1880, 2232.

**Dalles of the Columbia**, a narrow portion of the Columbia River, 45 miles above the Cascades. The river here rushes violently through a chasm only fifty-eight yards wide, enclosed between steep walls of basaltic rock. *Dalle* is a French word signifying "flag-stone," and also a "spout" for water.

**Dalles of the St. Louis, The**, a beautiful series of rapids in the St. Louis River, near Duluth, Minn. The river falls 400 feet in four miles over a bed of slate.

**Dalling, Lord**. See BULWER (HENRY LYTTON).

**Dall' O'ngaro** (FRANCESCO), an Italian revolutionist and author, born at Odezzo (near Venice) in 1808, became a priest, but was suspended for his independent preaching. He then renounced the Church, and became a revolutionary journalist in Trieste, whence he was expelled in 1847. In 1848 he established a journal at Venice called "Fatti, e non Parole." He took an active part in the revolutionary movements of that year, and was compelled to leave Italy. He became a contributor to several journals in Paris. In 1859 he returned to Italy, and became professor of literature at Florence. He has published tales, dramas, and lyric poems.

**Dalma'nia**, a genus of trilobites which has many species in the Silurian and Devonian rocks of the U. S. Of those the best known is *Dalmanites limulus* of the Niagara limestone.

**Dalma'tia**, a portion of the ancient Illyricum, now the southernmost province of Cisleithan Austria, is a long, narrow tract bounded on the N. by Croatia, on the N. E. by Herzegovina, and on the S. W. by the Adriatic Sea. It includes a number of islands. Area, 4940 square miles. Pop. in 1880, 476,101. With the exception of about 80,000 Greeks and a few Protestants and Jews, the population belongs to the Roman Catholic Church. About 89 per cent. of the population are Slavic and 10½ per cent. Italian; 28 per cent. of the children attend school. The coast is bold and indented with bays which form good harbors. The surface is diversified with mountains (the Dinaric Alps) of limestone formation, the highest of which, Mount Orjen, rises 6332 feet above the level of the sea. The soil in some parts is fertile, and produces wheat, oats, potatoes, maize, wine, and olives. Good timber for shipbuilding is procured on the islands. But only eighteen per cent. are under the plough, five and a half per cent. in vineyards, and twenty-two per cent. in forests. The climate is warm and healthy, but the country is not well supplied with water. The only streams of importance are the Kerku, the ancient Titius, and the Cetina, the ancient Telurus, both of which rise in the Dinaric Alps. The former of these two streams, which forms the boundary between Croatia and Dalmatia, is famous for the picturesque wildness of its scenery. The chief towns are Zara, Spalato, Ragusa, and Cattaro. Dalmatia was conquered by the Romans in the time of Augustus. In the seventh century it was taken by the Slavonians, who founded in it a kingdom which lasted until 1050. In the Middle Ages it belonged to Hungary. In the fifteenth century it fell under the power of the Venetians, who ceded it to Austria in 1797. In 1805, Napoleon annexed it to the kingdom of Italy, and in 1810 to the kingdom of Illyria. It reverted to Austria in 1814. The district of Cattaro in 1869-70 revolted against Austria, in consequence of changes in their old system of military service. After some concessions to the national pride of the

Dalmatians, the revolt was suppressed in the latter year. The political constitution of the country dates from Feb. 26, 1861. The diet consists of 43 members, representatives of the various classes. To the imperial diet the country sends five delegates. (See NOË, "Dalmatien," 1870.)

**Dalmat'ica, or Dalmat'ic**, a mantle with long sleeves formerly used in Dalmatia. It was worn by the nations who were called barbarians by the Greeks and Romans. It was afterwards adopted by deacons when assisting the priest at the altar. It is still worn by deacons in the Greek and Roman Catholic churches, though in a different form.

**Dalri'ada** [a word which appears to have signified the "country of the race of Riada," an Irish chieftain], the ancient name of a region in Ireland now known as the "Route," the northern half of the county of Antrim. Some of the race of Riada are said to have settled in Argyshire, Scotland, where they founded a petty kingdom called also Dalriada. More than twenty kings of this line in Scotland are mentioned before the Dalriads (or Scots) and the Picts became united under Kenneth MacAlpine, who became the first king of Albany. The region S. of the Irish Dalriada was called DALARADIA, probably from another chieftain who governed it.

**Dalrymple**. See HAILES, LORD, and STAIR, EARLS OF.

**Dalrym'ple** (ALEXANDER), a Scotch traveller, a younger brother of Lord Hailes, born July 24, 1737, entered East India Company's service and explored many islands in Eastern Archipelago. He became hydrographer to East India Company in 1779, and to the Admiralty in 1795. He wrote several geographical works. Died June 19, 1808. His library was very rich in works on geography and natural science. It was bought by the Admiralty.

**Dal'ton**, R. R. junction, capital of Whitfield co., Ga. (see map of Georgia, ref. 1-F, for location of county), 99 miles N. N. W. of Atlanta. It was an important strategic position during the last year of the civil war, being the headquarters of the Confederate army under Gen. J. E. Johnston in the spring of 1864. Abandoned May 7, at the beginning of Sherman's Atlanta campaign. It has a heavy trade in grain. Pop. in 1870, 1809; in 1880, 2516.

**Dalton, Mass**. See APPENDIX.

**Dalton** (JOHN), F. R. S., an English chemist, the author of the atomic theory, was born at Eaglesfield, in Cumberland, Sept. 5, 1766. He taught and gave lectures on physical science, and resided in Manchester. In 1802 he announced his important theory of the constitution of mixed gases. The development of the laws of combining proportions and the atomic theory he explained in the first volume of his "New System of Chemical Philosophy" (3 vols., 1808-27). (See CHEMISTRY.) He wrote a number of scientific treatises, which were inserted in the "Philosophical Transactions," etc. Died July 27, 1844.

**Dalton** (JOHN C.), M. D., an eminent physiologist, born at Chelmsford, Mass., Feb. 2, 1825, graduated at Harvard in 1844. He took the degree of M. D. there in 1847. In 1859 he published an excellent "Treatise on Human Physiology," of which the fourth edition, enlarged, appeared in 1867. Among his other works is a "Treatise on Physiology and Hygiene for Schools, Families, and Colleges" (1868). He is professor of physiology and hygiene in the New York College of Physicians and Surgeons. His original observations in embryology and other departments of physiology have given him a wide reputation. He is the author of the article on EMBRYOLOGY in this work.

**Dalton-in-Fur'ness**, a town of England, in Furness, Lancashire, 18 miles W. N. W. of Lancaster, and 3 miles from the sea. Here are iron-works and iron-mines. Near Dalton are the ruins of the splendid Furness Abbey, founded in 1127 by Stephen, who was afterward king. Pop. in 1881, 13,350.

**Dal'tonism**, an inability to distinguish colors, was so called because the celebrated John Dalton and his brothers had a defect in vision in consequence of which red, blue, and green appeared alike. (See COLOR-BLINDNESS.)

**Da'ly** (CHARLES P.), LL.D., was born of Irish parentage in New York City, Oct. 31, 1816, was admitted to the bar in 1839, became judge of common pleas in that city in 1845, and chief judge in 1857. He was author of articles in the "New American Cyclopædia," lecturer at the Columbia College Law School, published a history of the courts of New York (1855), a memoir of Chancellor Kent, and many papers on banking, law, science, etc. He has been, since its foundation, president of the American Geographical and Statistical Society, and is a prominent member of the Ethnological Society.

**Damages**. See MEASURE OF DAMAGES, by PROF. T. W. DWIGHT, LL.D.

**Damân'**, or **Damaun**, a seaport-town of Hindostan, in Guzerat, is on the Indian Ocean, about 100 miles N. of Bombay. It belongs to the Portuguese. The harbor affords a good shelter from the S. W. monsoon. Shipbuilding is carried on here. Damân is at the mouth of the Damân Gunga or Damân River. Pop. about 7000.

**Daman** (an animal). See **HYRAX**.

**Damanhoor'** (anc. *Hermopolis Parva*), a town of Lower Egypt, capital of the province of Bahreh, is about 40 miles E. S. E. of Alexandria. It has manufactures of cotton and wool. Pop. 10,000.

**Damar'**, or **Demar**, a town of Arabia, in Yemen, 60 miles S. S. E. of Sana. It has a citadel, a college, and about 5000 houses.

**Dâmar**. See **DAMMAR**.

**Damasce'nus** (**JOANNES**), a learned theologian, born in Damascus about 700 A. D. About the age of thirty he retired to the monastery of St. Saba, near Jerusalem, where he devoted his time to the study of philosophy and theology and to the composition of religious works. The principal is "An Accurate Exposition of the Orthodox Faith," which is not so much a well-wrought system of divinity as a digest of the teachings of his predecessors, such as Athanasius, Basil, the Gregories, Chrysostom, and others. He was, indeed, the last of the Greek Fathers, and he is the most authoritative theologian of the Greek Church. As he was the first to employ philosophy in the service of theology, comparing the latter to a princess waited upon by her maids, and as, at the same time, he is completely dependent on tradition, he may, indeed, be considered as a forerunner of scholasticism. Died between 754 and 787 A. D. He was canonized by the Latin and the Greek churches. (See his "Life" by LUPTON, London, 1882.)

**Damasceus** (**NICOLAUS**), a Greek historian and philosopher, born in Damascus in 74 B. C., was a friend of Herod, king of Judæa, at whose court he lived. He wrote, besides other works, a "Universal History," of which fragments are extant.

**Damas'cius** [Gr. *Δαμάρκιος*], a pagan philosopher, born in Damascus about 480 A. D. He taught the Neo-Platonic philosophy at Athens, and when Justinian in 529 prohibited the pagans from teaching, he retired to the court of Chosroes, king of Persia. He wrote a work entitled "Doubts and Solutions of the First Principles," which is still extant.

**Damas'cus** [Arab. *Sham el Kebeer* or *es Shereef* ("the great" or "the holy")], a celebrated city of Asiatic Turkey, in Syria, is situated on a triangular plain at the eastern base of the Anti-Libanus, 58 miles E. S. E. of Beyroot; lat. 33° 27' N., lon. 36° 25' E. The plain of Damascus, regarded by the Arabs as the fairest of the four earthly paradises, is about 70 miles in circumference, and extremely fertile, irrigated by the river Barada and other streams, and adorned with gardens and orchards. The magnificent appearance of this city from afar has been celebrated by ancient and modern travellers. Numberless cupolas and minarets are seen clustered about the towering mass of the great mosque. Within, the streets are narrow, and many of them have a gloomy and decayed appearance. The houses are mean in external aspect, and present a dead wall to the street, but the interiors are often elegant and richly furnished. Fine marble-paved courts ornamented with fountains and shrubs, rooms with arabesqued roofs and walls, are the common features of the houses of the rich Damascenes. Damascus continues to be Oriental in all its features and characteristics. The city is oval in form, surrounded by a picturesque wall with stately towers and gates, and intersected by the broad street which the Romans called *Via Recta*. The great mosque, 650 feet in length and 150 in breadth, was built by the Christians in the form of a cross, but has been occupied by the Mussulmans since 705 A. D. Damascus has 248 mosques, many of them with splendid minarets. The huge quadrangular citadel, with massive towers, forms part of the city wall. No wheeled carriages or vehicles are used in the streets. There are important manufactures of cotton, silk, and woollen fabrics, jewelry, saddlery, glass, and arms. The Damascus blades, for which this city was once famous, have lost their high reputation. The bazaars, said to be finer than those of Cairo or Constantinople, are well supplied with European manufactures, in which Damascus has an extensive trade, carried on by means of camels and caravans, with Bagdad, Bassorah, Persia, etc. Here is assembled annually a large caravan of pilgrims, merchants, and other travellers, sometimes as many as 50,000, destined for Mecca. The date of the foundation of Damascus is not known, but it was a city in the time of the patriarch Abraham. (See Gen. xiv.) During the Hebrew monarchy it was the capital of Syria. It passed afterwards successively

under the dominion of the Assyrians (740 B. C.), Babylonians (604 B. C.), Persians (540 B. C.), Macedonians (333 B. C.), Romans (65 B. C.), Saracens (634 A. D.), and was finally captured by the Turks in 1516. Here the apostle Paul was converted and preached the gospel. Damascus is one of the sacred cities of the Mohammedans, and has long been known for the fanaticism of its inhabitants. In 1860 the Druses entered the city and massacred a large number of the Christians. The present population is estimated at 150,000, among whom there are about 15,000 Christians and 6000 Jews. (See PORTER, "Five Years in Damascus.")

**Damascus Blades**, a name given to sword-blades of the highest excellence, formerly made at Damascus in Syria. Since the time of the Crusades they have been famous for their beautifully watered and lined appearance, as well as for their exquisite temper, which enabled them, when skilfully handled, to cut, not only bars of iron, but to divide films of gauze floating in the air. It is said that good blades of this kind can be bent into a hoop, and will fly back to their original shape without injury. The secret of their manufacture is unknown, but it is said that the Russians have recently produced swords which equal the best Damascus blades in beauty and temper.

**Dam'ask**, the name given to certain rich stuffs of silk and linen because they were first manufactured at Damascus, whence the trade was carried to Venice, Lyons, and Genoa. The cloth is woven with flowers and regular figures, and in modern times is often made of worsted or worsted and cotton mixed. The fashion of wearing it was adopted in England by Henry V. and Edward IV. Damask tablecloths are said to have been first imported from France into England in 1575.

**Damaskeen'ing** [from *Damascus*, where the art was practised with great success], the ornamenting of steel or iron by inlaying with other metals, such as gold or silver. There are several methods of performing it.

**Damas'tes**, son of Dioxippus, a Greek historian, was a native of Sigeum. He is called by Suidas a pupil of Hellanicus, and flourished about 440 B. C. Several works are ascribed to him, as "An Account of Events in Greece," "On the Ancestors of those who Warred against Troy" in two books, "A Catalogue of Nations and Cities," and a treatise "Of Poets and Sophists." Besides these, he composed a "Periplus," which is referred to by later geographical writers. Very few fragments remain, collected in MÜLLER's "Fragm. Histor. Græc.," vol. ii., pp. 64-67.

HENRY DRISLER.

**Dam'asus I.** [Fr. *Damasc*], SAINT, born, some say in Rome, others in Spain, in 306 A. D., was elected bishop of Rome in 366. A rival named Ursinus was at the same time elected by a party, but Damasus was recognized by the emperor Valentinian. Although elected by the Arian faction, he strenuously opposed Arianism. He employed violent methods, but was a man of learning and taste. We are indebted to him for Jerome's new version of the Latin Bible. He improved the church service by introducing the Psalter. He also wrote hymns, two of which are given by Daniel in his "Thesaurus Hymnologicus." He is said to have been the first to employ rhyme. Died Dec. 10, 384 A. D.—**DAMASUS II.**, a German, and probably a Bavarian, was consecrated pope July 17, 1048, and died Aug. 9 of the same year. (See JAFFÉ, "Regesta Pontificum Romanorum.")

**Dam'bool'**, a village of Ceylon, 45 miles N. W. of Kandy. Here is a mass of rock about 550 feet high, in which are cave-temples devoted to the worship of Booddha, and profusely adorned with sculpture and images. Among these is a colossal image of Booddha, hewn out of the rock. These temples, which are partly artificial, were constructed about 100 B. C.

**Damia'ni** (**PIETRO**), known as SAINT PETER DAMIAN, an influential Italian prelate, born at Ravenna in 1007 A. D. He was appointed cardinal-bishop of Ostia in 1057. He opposed simony and other corrupt practices of the clergy, and was a friend of Pope Gregory VII. He was a voluminous writer, and morally and intellectually one of the first men of his time. He invented a new system of flogging-penance, which became very fashionable. The flogging was performed on the bare back and accompanied the recitation of the Psalms as a time-beating machine. To each Psalm belonged one hundred strokes; to the whole psalter, fifteen thousand; but three thousand strokes were equal to one year of damnation. He is honored as one of the doctors of the Church. A collected edition of his works appeared in Rome (1606, 4 vols.). Died Feb. 23, 1072.

**Da'mianists**, a sect originating in the sixth century, were the followers of Damianus, a Monophysite patriarch

of Alexandria, who taught a novel theory with regard to the Divine essence and the three Persons of the Godhead. They nearly agreed with the Sabellians. They are sometimes called *Angelists*.

**Damia'nus**, a distinguished Sophist and rhetorician of Ephesus, of whom an account is given by his friend Philostratus in his lives of the Sophists. In his youth Damianus had attended the lectures of Adrianus and Ælius Aristides, and he formed himself after the model of these. He taught rhetoric in his native place with great success. He was a man of wealth and of great liberality, and erected for his fellow-citizens a beautiful portico. He appears to have left no writings. HENRY DRISLER.

**Damiet'ta**, a town and river-port of Lower Egypt, is on the right bank of the E. mouth of the Nile, about 8 miles from the Mediterranean and 110 miles N. by E. from Cairo; lat. 31° 25' N., lon. 31° 47' E. It is meanly built, but has some good mosques and marble baths. The harbor is not good, and a bar at the mouth of the river prevents the entrance of large vessels. The modern town was founded in 1251 a few miles S. of the ancient *Tamiathis*, which in the time of the Crusades was a strong fortress of the Saracens. The cloth known as *dimity* was first manufactured in this town, and received from it its name. Pop. 32,730.

**Damiron** (JEAN PHILIBERT), a French philosopher, born at Belleville (Rhône) May 10, 1794, was a pupil of Cousin. Among his works is an "Essay on the History of Philosophy in France in the Seventeenth Century" (2 vols., 1846). Died in 1862.

**Damm** (CHRISTIAN TOBIAS), a learned Greek scholar and theologian, was born in 1699 at Geithain, near Leipzig. He was appointed pro-rector in 1742, and afterwards rector of the Königl. Real-Gymnasium in Berlin, but was displaced in 1764 on a charge of Socinianism, founded on his translation of the New Testament. He died in 1778. Besides the New Testament, he translated the works of several Greek authors, and published editions of both Greek and Latin writers. His principal work, and that by which he is now known among scholars, was his *Homerie and Pindaric Lexicon*, Berlin, 1765, 4to, edited by J. M. Duncan, Glasgow, 1824, 4to, and still further improved by Rost, Leipzig, 1836, 4to. HENRY DRISLER.

**Dam'mar**, or **Dâmar** [from the Hindostanee and Malay *dâmar*, "resin"], the name of a valuable varnish produced by the dammar pine (*Dammara orientalis*), of the natural order Coniferae. This tree is a native of the Molucca Islands, and is distinguishable from most of the other trees of its order by the broad, lanceolate, leathery leaves. It grows to an immense height, and on its trunk, which is often nine feet in diameter, are many huge knots. The tree is not valuable as timber. The resin is used in varnishes, but not being permanent, it cannot take the place of copal and amber. It is sometimes used in photography. The kauri pine (*Dammara australis*) produces kauri resin or kauri gum. It is a native of New Zealand. Black dammar is obtained from the Molucca Islands; it has a strong resinous odor, and is black when dried; it is used as pitch, and by distillation a kind of turpentine is obtained from it. It is the product of a tree of the natural order Amyridaceæ. *Canarium microcarpum* is of the same order, and is also a native of the East. It yields a substance called dammar, which is used as oakum in shipbuilding. When mixed with chalk and the bark of reeds it becomes hard as stone. Various other trees yield resins called dammar.

**Dam'o**, daughter of Pythagoras, to whom he left his memoirs (*ὑπομνήματα*), with strict injunctions not to allow them to pass out of his family. This injunction she obeyed, though in great poverty and tempted with offers of considerable sums of money. She transmitted them to the care of her daughter Bitale. HENRY DRISLER.

**Dam'ocles** [Gr. *Δαμοκλῆς*], a Syracusan parasite and courtier who lived at the court of Dionysius the Elder, and was the subject of an experiment recorded by Cicero. As an antidote to his fond admiration of regal luxury and happiness, the tyrant invited him to a sumptuous banquet over which a sword was suspended by a single hair.

**Dam'on**, a distinguished musician of Athens, celebrated also as a Sophist. Plutarch ascribes to him the invention of one form of the Lydian melody. He taught Pericles music, and was his adviser also in many of his political measures. Plato has spoken highly of the abilities of Damon. Late in life he was banished from Athens, no doubt from the objectionable character of his political opinions. HENRY DRISLER.

**Dam'on and Pyth'ias** (or *Phin'tias*), two Syracusans and disciples of Pythagoras, celebrated for the fidelity of their friendship. Pythias was condemned to

death by Dionysius, who kept Damon as a hostage while the former went home to settle his affairs. Pythias returned punctually, to the surprise of the tyrant, who pardoned him, and desired to be a partner in their friendship.

**Damoph'ilus of Bithynia**, called by Suidas a philosopher and Sophist, was reared by Salvius Julianus, who was consul under Marcus Antoninus. He wrote a number of works, of which Suidas says he found the following in the libraries: "Philobibulus, concerning Books worth Possessing," and "Concerning the Life of the Ancients." (The notices of Damophilus are collected by MÜLLER, "Fragm. Hist. Græc.," vol. iii., p. 656.) HENRY DRISLER.

**Dam'ophon**, or **Demophon**, a statue of Messene, flourished about 370 B. C. He adorned Ægium, Messene, and Megalopolis with his works, which were chiefly statues of Parian marble and of wood. Pausanias mentions among the most important of his works a statue of Lucina, one of Æsculapius, of the Mother of the Gods, of Mercury, and of Venus. He was also employed to repair the Olympian Jupiter of Phidias, the ivory of which had become loosened in many places. HENRY DRISLER.

**Damoph'yle**, one of the large group of Greek lyric female poets who were pupils, companions, and followers of Sappho. She flourished about 610 B. C., and was a Pamphylian by birth, but Pamphylia was largely Greek. Like her mistress Sappho, she instructed other young women. She wrote love-poems, and composed those hymns to Artemis which were sung at Perga. None of her works are now extant, and very few facts with regard to her are known.

**Damox'enus**, a comic poet of the new Attic comedy, probably reaching back also into the middle. He is referred to by Athenæus, who with Suidas has preserved the titles of two of his comedies, and has given considerable extracts from one of them. All that remains of his writings has been collected by MEINEKE, "Fragm. Comic. Græc.," vol. iv., pp. 529-36. HENRY DRISLER.

**Damp'er** [from *damp*, to "check," originally to "smother," akin to the Ger. *Dampf*, "vapor," and *dämpfen*, to "suffocate," "smother," or "quench"], a valve used to lessen the aperture of a chimney or air-flue for the purpose of checking combustion by diminishing the quantity of air. In the construction of the pianoforte a damper is used. This consists of a drop cushioned with flannel, which, falling on the string, checks the vibration, and gives distinctness to the passages and clearness to the sound.

**Dam'pier** (WILLIAM), an English navigator, born in Somersetshire in 1652. He joined in 1679 a party of buccaneers who crossed the Isthmus of Darien, captured several Spanish vessels, and molested the settlements. In 1684 he made a voyage to the East Indies, from which he returned to England in 1691, and published an interesting narrative, entitled "A Voyage Round the World." In the service of the government he conducted in 1699 an expedition to the South Sea, and explored W. coast of Australia, coast of Papua and other islands. He returned home in 1701, and published a narrative of this voyage.

**Dam'pier Archipel'ago** is near the N. W. coast of Australia, about lat. 21° S. and lon. 117° E. It comprises Enderby, Depuch, Lewis, and other islands. Dampier Strait, between Papua and Waigeo, is 35 miles wide.

**Dampremy**, a town of Belgium, near Chatelet. It has coal-mines and glass-factories. Pop. 5235.

**Damrosch** (LEOPOLD). See APPENDIX.

**Damps** [Ger. *Dampf*, "vapor;" see etymology of DAMPER], the noxious exhalations of mines and excavations. The carburetted hydrogen of coal-mines is called *fire-damp*, and carbonic acid gas mixed with carbonic oxide is termed *choke-damp*.

**Dam'son** [a contraction of *Damascene*, from Damascus], a variety of the common plum. It is a small, oval fruit, made use of in preserving. In England it is much used as a confection called *damson cheese*. It is cultivated in the U. S.

**Dam, Tinker's**, is the wall of dough or chewed bread which a tinker puts around the hole which he is stopping, so as to confine the melted solder to that point. After it is once used it of course loses its value, so that its name is often employed in popular slang as a symbol of utter worthlessness.

**Dan** [Heb. דָּן], a son of the Hebrew patriarch Jacob. Also a part of Palestine occupied by the tribe of Dan, and bounded on the W. by the Mediterranean. Joppa was its principal town. Dan (or Laish) was an ancient city in the extreme northern part of the Promised Land.

**Dan**, a river of Virginia and North Carolina, rises in the southern part of Virginia, flows in a generally eastward direction, and crosses the boundary between those States five or six times. After a course of about 200 miles, it

unites with Staunton River at Clarksville, Va. Below this junction the stream is called the Roanoke.

**Dana** (ANDERSON GREEN), M.D., LL.D., born at Newton, Mass., Sept. 14, 1791, graduated at Philadelphia Medical College 1813. In April, 1814, he performed the first public dissection in Vermont, at Rutland, in the presence of a large number of physicians; elected to the State Senate of Vermont in 1840 and 1841. Died at Brandon, Vt., Aug. 20, 1861. F. B. WHEELER.

**Dana** (CHARLES ANDERSON), a journalist, born at Hinsdale, N. H., Aug. 8, 1819, studied two years at Harvard University, did not graduate owing to a disease of the eyes, but received the degree of A. M. He edited the "Harbinger," was a contributor to the Boston "Chronotype," was connected with the New York "Tribune" from 1847-58, and is now editor of the "Sun." He edited "The Household Book of Poetry" (8vo, 1858), and in connection with George Ripley edited "The New American Cyclopedia." He was assistant secretary of war (1863-64).

**Dana** (EDMUND TROWBRIDGE), J. U. D., political economist and publicist, a brother of R. H. Dana, Jr., born at Cambridge, Mass., Aug. 29, 1818, was educated at the University of Vermont, the Cambridge Law School, and the German universities, and published translations of works on public law, etc. Died May 18, 1869.

**Dana** (FRANCIS), LL.D., an American statesman and jurist, born at Charlestown, Mass., June 13, 1743, was a son of Judge Richard Dana. He was admitted to the bar in 1767, and joined the "Sons of Liberty." In 1776 he was chosen a member of council of Massachusetts, at that time the supreme executive power in the State. He was a delegate to the Congress of 1777, which formed the Confederation, and to the Congress of 1778. In Nov., 1779, he sailed to Europe as secretary to John Adams, who was sent to negotiate a treaty of peace and commerce with Great Britain. In Dec., 1780, Mr. Dana was appointed minister to Russia, in the capital of which he remained nearly two years. Having returned to Boston in 1783, he was appointed a judge of the supreme court of Massachusetts in 1785. He was chosen in 1787 a delegate to the convention which formed the Constitution of the U. S., but his judicial duties and ill-health prevented his attendance. He voted for that Constitution as a member of the State convention convened to ratify it in 1788. He was chief-justice of Massachusetts from 1791 to 1806. In politics he was a Federalist. Died April 25, 1811. He was the father of the poet Richard H. Dana.

**Dana** (JAMES), D. D., a Congregational theologian, born at Cambridge, Mass., May 11, 1735, graduated at Harvard in 1753, and was pastor of the First church at New Haven, Conn. (1789-1805). He published (1770-73) an "Examination of Edwards on the Will," in which he strongly opposed the doctrine of utilitarian morality, and ably defended the freedom of the will. Died Aug. 18, 1812.

**Dana** (JAMES DWIGHT), LL.D., an eminent American naturalist and geologist, born at Utica, N. Y., Feb. 12, 1813, graduated at Yale in 1833. He published a "System of Mineralogy" (1837), of which a new edition, greatly improved, appeared in 1868. He sailed with Capt. Wilkes as geologist of the exploring expedition sent out by the government in 1838. Some results of this exploration appeared in his "Report on Zoophytes" (1846), a "Report on the Geology of the Pacific" (1849), a "Report on the Crustacea" (1852-54), etc. He married a daughter of Prof. Benjamin Silliman, settled at New Haven in 1846, and became one of the editors of the "American Journal of Science." In 1855 he was elected professor of natural history and geology at Yale College. Among his works are an excellent "Manual of Geology" (1862) and "Corals and Coral Islands" (1872). Prof. Dana combines with the habit of close and accurate observation powers of mind which place him in the very foremost rank of philosophic naturalists.

**Dana** (JAMES FREEMAN), M. D., a brother of Dr. S. L. Dana, was born at Amherst, N. H., Sept. 23, 1793, graduated at Harvard in 1813, studied medicine in Boston, and chemistry in London. He subsequently took the degree of M. D. (1817), became professor and lecturer on chemistry, etc. at Harvard, Dartmouth, and the New York College of Physicians and Surgeons. He was the author of "Chemical Philosophy" (1825), and of many scientific papers and other works. Died April 14, 1827.

**Dana** (NAPOLEON JACKSON TECUMSEH), an American officer, born April 15, 1822, in Maine, graduated at West Point in 1842, and May 29, 1862, major-general U. S. volunteers. He served as an infantry officer till 1848, and then as an assistant quartermaster till he resigned, Mar. 1, 1855. He served chiefly at frontier posts 1842-45; in the military occupation of Texas 1845, in the war with Mexico

1846-47, engaged at Fort Brown, Monterey, Vera Cruz, and Cerro Gordo (severely wounded and brevet captain), and on quartermaster duty 1848-55. He was a banker at St. Paul, Minn., till the beginning of the civil war, when he became colonel First Minnesota volunteers, and served in guarding the upper ferries of the Potomac 1861, in Shenandoah Valley 1861-62, in Virginia Peninsula 1862, engaged at Yorktown, West Point, Fair Oaks, Peach Orchard, Savage Station, White Oak Swamp, Glendale, and Malvern Hill; in Maryland campaign 1862, engaged at South Mountain and Antietam (severely wounded); in command of the defenses of Philadelphia 1863; in operations in the department of the Gulf 1863-64, engaged at Fort de Bayou, expedition to the Rio Grande, and the occupation of Matagorda Bay; and in command of the district of Vicksburg and of West Tennessee 1864, and of the department of Mississippi 1864-65. Resigned May 25, 1865, and engaged in mining-operations in California.

GEORGE W. CULLUM.

**Dana** (RICHARD), an able American lawyer, born at Cambridge, Mass., July 7, 1699, was the father of Francis Dana, noticed above. He graduated at Harvard in 1718, practised law at Boston with success, and was an active promoter of the popular cause in the period which preceded the war of Independence. Died May 17, 1772.

**Dana** (RICHARD HENRY), a poet, born at Cambridge, Mass., Nov. 15, 1787, a son of Chief-Justice Francis Dana, was educated at Harvard College, studied law, and was admitted to the bar of Boston in 1811. He was one of the editors of the "North American Review" in 1818 and 1819. In 1821 he published "The Dying Raven," a poem. His poem entitled "The Buccaneer" (1827) was praised by Prof. Wilson of "Blackwood's Magazine" in these terms: "We pronounce it by far the most powerful and original of American poetical compositions." He published in 1833 a collection of his poems and prose works, including some essays which originally appeared under the title of "The Idle Man," in 1821-22. D. Feb. 2, 1879.

**Dana** (RICHARD HENRY, JR.), LL.D., an eminent American lawyer and author, a son of the preceding, was born at Cambridge Aug. 1, 1815; entered Harvard College in 1832, but suspended his studies on account of the weakness of his eyes in 1834. He then performed as a common sailor a voyage to California, of which he wrote an interesting and popular narrative entitled "Two Years Before the Mast" (1840). Having graduated at Harvard in 1839, he studied law under Judge Story, and was admitted to the bar in 1840. He published in 1841 "The Seaman's Friend, containing a Treatise on Practical Seamanship," and also an ed. of Wheaton's "International Law" in 1865; was one of the founders of the Free-Soil party in 1848, and an orator of the Republican party in 1856. D. Jan. 7, 1882.

**Dana** (SAMUEL LUTHER), M. D., LL.D., an American chemist and writer on agriculture, was born at Groton, Mass., July 11, 1795. He was employed as chemist of the Merrimack Print-Works at Lowell, and invented a method of bleaching cotton goods which was extensively adopted. Among his works are the "Muck Manual" (1842) and an essay on manures (1843). Died Mar. 11, 1868.

**Dana** (SAMUEL WHITTLESLEY), son of Dr. James Dana, noticed above, was born at New Haven, Conn., July, 1757, graduated at Yale in 1775, was a member of Congress (1796-1810), and U. S. Senator (1810-21). He was a leading Federalist. Died July 21, 1830.

**Dana** (WILLIAM H.), U. S. N., born May 27, 1833, in Athens, O., entered the navy as a midshipman May 1, 1850, became a passed midshipman in 1856, a lieutenant in 1858, a lieutenant-commander in 1862, and a commander in 1869. He served in the North Atlantic blockading squadron and the Western Gulf blockading squadron in 1863 and 1864, participating in the attack on Port Hudson, Mar. 6, 1863, and commanded the gunboat Winona, South Atlantic blockading squadron, from the latter part of 1864 to the close of the civil war. Died at the naval hospital, Chelsea, Mass., Mar. 5, 1872. FOXHALL A. PARKER.

**Dan'æ** [Gr. Δανάη], in classical mythology, was a daughter of Acrisius, king of Argos, who confined her in a brazen tower because an oracle had predicted that her son would kill her father. She became the mother of Perseus, whose father, Jupiter, is said to have obtained access to her in the form of a golden shower.

**Danæus** (LAMBERT), born at Beaugency in 1530, died at Castres, in Navarre, 1595. He studied first law at Orléans, afterward theology at Geneva, and was appointed pastor of Chien, but by the increasing persecution was compelled to leave his charge in 1563. After the massacre of the night of St. Bartholomew (1572) he fled from France. For several years he was pastor in Geneva, and



afterward pastor and professor at Castres. He was a very prolific writer on various subjects, exegetical, doctrinal, ethical, etc. His "Commentary on the Minor Prophets" was translated into English by Stockwood (London, 1594). A complete list of his works is found in "La France Protestante," iv. 194. In the history of ethics he has a prominent place, as he was one of the first who treated Christian ethics separately from dogmatics. Down to his time and, indeed, for a long period thereafter, ethics were not treated as a distinct part of the theological system, but simply as the practical side of dogmatics, the practical application of the dogma.

**Dan'aid** [for etymology see below], an ingenious hydraulic machine, consisting essentially of two hollow cylinders, placed one within the other, with a (comparatively) narrow space between; the inner cylinder closed at bottom, the outer having an aperture at the bottom in the centre. Between the two bottoms are partitions radiating from the centre to the circumference, but the annular cylindrical space is without partitions. The whole is sustained by a vertical axis, about which it turns easily. A jet or stream of water being now admitted into the annular space, as nearly tangential horizontally to the cylindrical surface as possible, sets the machine in motion, at first by mere friction, but presently the living force imparted to the water by revolution, acting on the radial partitions of the base, accelerates the velocity and increases the force. Experiments show that this machine utilizes from 70 to 75 per cent. of the power due to the hydraulic head. The name seems to have been suggested by the fable of the Danaïdes pouring water for ever into a vessel, from which it continually escapes. F. A. P. BARNARD.

**Danaïdes** [Gr. *Δαναΐδες*], the fifty daughters of Danaus, a mythical king of Egypt, were married to fifty sons of Ægyptus, their uncle. By order of their father, each of the Danaïdes, except one, killed her bridegroom on the wedding-night. They were doomed in Tartarus to pour water for ever into a vessel perforated with holes.

**Dan'bury**, R. R. centre, semi-capital of Fairfield co., Conn. (see map of Connecticut, ref. 6-C, for location of county), is 69 miles N. N. E. of New York. It has several hat-factories and manufactures of sewing-machines, boots, shoes, and shirts. It has also a foundry, extensive water-works, a town farm for the indigent, and a cemetery of remarkable beauty. It was settled in 1684, and burned by the British in April, 1777. The losses of private property amounted to about \$80,000. Pop. in 1870, 6542; of township, 8753; of township in 1880, 11,666.

**Danbury**, capital of Stokes co., N. C. (see map of North Carolina, ref. 2-F, for location of county), about 112 miles W. N. W. of Raleigh. Pop. in 1880, 144.

**Danby** (FRANCIS), A. R. A., a landscape-painter, born near Wexford, Ireland, Nov. 16, 1793. His works are marked by fine light-effects. Among his works are a "Sunset at Sea after a Storm" (1824), "Christ Walking on the Sea" (1827), "The Embarkation of Cleopatra on the Cydnus" (1827), and "Caius Marius among the Ruins of Carthage" (1848). Died Feb. 17, 1861.

**Danby** (THOMAS OSBORNE), EARL OF, marquis of Caermarthen and duke of Leeds, an English Tory statesman, born in 1631. He gained the favor of Charles II., and became in 1673 lord treasurer, and the most powerful of the king's ministers. In 1674 he was created earl of Danby. He was committed to the Tower by the Commons on a charge of treason in 1678, and was confined five years. In 1689 he was appointed president of the council by William III., and in 1694 was created duke of Leeds. Died July 26, 1712.

**Dance of Death** [Mediæval Lat. *chorea Machabæorum*; Fr. *la danse Macabre* or *la danse des morts*; Ger. *Todtentanz*], an allegorical representation of the power of Death over all classes and conditions of men. The name "Dance of Death" is derived from the mocking activity usually displayed by the skeleton figure of Death as he leads away his victims. As for the name "Macabre" sometimes given to this subject, it has much puzzled scholars, and has produced many absurd etymologies. The only one of these that needs to be noticed is that which connects the word with the Maccabees of the apocryphal Old Testament. These seven martyrs for the Law were never popular nor much known in the Western Church, and their legend has nothing in it that connects them with this subject. The most reasonable explanation of the origin of the word is that it is derived from the Egyptian anchorite Macarius, one of the most famous of the hermit-saints. His legend connects him directly with warnings of death to the living. Though, as he was a Greek saint, his pictures are rare in the West, yet he is twice represented in the cemetery of Pisa—the Campo Santo—once by Pietro Laurati, and again

in the fresco attributed to Orcagna and mentioned below. Vasari expressly tells us that the aged saint who is showing the three dead bodies to the hunting-party was meant for Saint Macarius; and it is possible that his name may in time have come to be applied to the subject of which this fresco is a famous illustration.

Traces of the idea which was the foundation of the mediæval acted dramas and pictured or sculptured representations of this subject are to be found in Italo-Greek and Roman antiquity. Douce says that on a sarcophagus found near Cumæ are sculptured three dancing skeletons, and that the same subject is on a Roman lamp and in a Pompeian fresco. On an antique gem in the Royal Gallery at Florence there is engraved an old man piping to a dancing skeleton; and though the introduction of the skeleton is rare, yet it is common enough to find on the Roman sarcophagi such representations of life interrupted by death as will abundantly connect the moralizing of those times with that of the Middle Ages. Probably the earliest of the modern treatments of this subject were in the form of dramatic representations—moralities—acted in churches. As early as 1453 a Dance of Death is recorded to have been acted in the cathedral of Besançon after mass, and we may suppose that this was not the only instance. Originally, it would seem that the "Dance of Death," which, in the fifteenth and sixteenth centuries, was made to include a considerable number of people, was restricted to a few. As early as the thirteenth century there appeared a French poem called "*Li Trois Mors et li Trois Vis*;" that is, "*Les Trois Morts et les Trois Vifs*." "This poem relates that three noble youths when hunting in a forest were intercepted by the like number of hideous spectres or images of Death, from whom they received a terrific lecture on the vanity of human grandeur." (Douce.) In 1335, Orcagna painted in the Campo Santo at Pisa his Triumph of Death, one of the earliest pictures of this subject, where three kings, with their ladies, companions, and servants, returning from hunting, come suddenly upon three open coffins containing the bodies of three persons, one of them a king, in various stages of decay. In his "Pardoner's Tale" Chaucer has also introduced a most powerfully imagined variation of the same theme. Death (for so we understand it), under the disguise of an old man, appears to three riotous young men who in their bravado are in search of Death, to destroy him in punishment of his many murders, and directs them to a certain tree in the forest where he says he had left him sitting. They find him there in an unlooked-for fashion.

The "Dance of Death," whether as a series of pictures showing the skeleton conqueror carrying away popes, kings, cardinals, bishops, priests, abbots and abbesses, nuns, queens, ladies, and lords, the bride and the bridegroom, judges and scholars, merchants, warriors, ploughmen, market-women, and little children, or only a selection of a few of these, was painted "not only on the walls, but in the windows of many churches, in the cloisters of monasteries, and even on bridges, especially in Germany and Switzerland. It was sometimes painted on church-screens, and occasionally sculptured on them, as well as on the fronts of domestic dwellings. It occurs in many of the manuscripts and illuminated service-books of the Middle Ages." (Douce.) It is also found carved in wood, and made the subject of tapestries; and in one of Holbein's finest drawings in the museum at Bale it is used to decorate a dagger-sheath. The subject had a wide popularity, and examples abound in England, Germany, and France, but fewer in Italy, and, so far as we know, none in Spain, though mention is made by some writers of an example in the palace of St. Ildefonso. (Qu. *bishop's* palace at Alcala?) Mr. George Street, however, a most careful and accurate observer, in his "Gothic Architecture in Spain" does not mention a single picture or sculpture of this subject. Douce gives a list of places where Dances of Death were painted, and among them we find Paris, Dijon, Bale, Lübeck, Anneburg, Erfurth, Lucerne, Amiens, Rouen, Fécamp, Strasbourg, London, and Salisbury, with others less important. Most of these have disappeared; the one still to be seen on the old bridge at Lucerne has been very much repainted. Douce considers the oldest mentioned example to be that executed for the church of the Innocents at Paris in 1434. Among the most famous ones was that at Bale (long erroneously attributed to Holbein, who was not born till near a half century after it was painted) in the cloister of the Dominican monastery. Tradition says that this was made between 1431 and 1443, at the instance of the prelates who assisted at the great Council of Bale, and in allusion to a plague that raged at one time during its sitting. The monastery, having fallen into decay, was destroyed in 1806 to make room for certain municipal improvements, and the frescoes went with it. But, perhaps, what keeps the name of the Dance of Death most securely

in men's minds is the series of wood-cuts indissolubly connected, whether rightly or wrongly, with the name of Holbein. These cuts originally appeared in a book of which the following is the title: "Les simulachres et | historiées faces | de la mort autant ele | gammët pourtraictes que artifi | ciellement imaginées. A Lyon Soubz lescu de Coloigne | M.D.XXXVIII. 4to;" and at the end, "Excudebant Lugdu | ni Melchior et | Gaspar Trechsel | fratres 1538." In the first edition above cited there were only forty-one cuts; in later editions, which followed one another with great rapidity, they were increased, until in that of 1547, also published at Lyons, there were forty-nine. Holbein's relation to these cuts is still, after much laborious and learned investigation, very obscure: it may be that we owe nothing to him but a more artistic draughtsmanship, by which new life was given to the old compositions, and it is at least possible that he had no hand in them whatever. (See PEIGNOT, "Recherches sur les Danses des Morts," Dijon and Paris, 1826; "The Dance of Death," with a Dissertation, etc. etc., by FRANCIS DOUCE, London, 1833; LANGLOIS, "Essai historique, philosophique, et pittoresque sur les Danses des Morts," 2 vols., 50 plates, Ronen, 1852; MASSMANN, "Literatur der Todtentänze," Leipzig, 1841. "La Danse Macabre: Histoire fantastique du XV. Siècle," by PAUL LACROIX, 1832-38, sometimes cited as an authority, is only a romance after the manner of Hugo's "Notre Dame.") CLARENCE COOK.

**Dancing**, a succession of rhythmical movements of the body, often accompanied by music. Dancing is of very early origin. The ancients constituted it a part of their religious observances, and danced before their altars and the images of their gods. The ancient Egyptians ascribed its invention to their god Thoth. All the different passions were expressed in dancing by the Greeks, and the dance of the Eumenides or Furies was so expressive of vengeance that it inspired the beholders with terror. The attitudes of the public dancers were studied by the Greek sculptors in order to delineate the passions. Aristotle ranks dancing with poetry. The Spartans were required to train their children in this art from the age of five. This was publicly done, to train them for the armed dance, and was accompanied by songs or hymns. In ancient times, dancing in private entertainments was performed by professionals. The Romans counted it disgraceful for a free citizen to dance except as a religious rite.

In Egypt there are dancing and singing-girls, who improvise verses and are called *almeh*. In India there are nautch- (natch-) girls, who dance on public occasions. Among savages dancing is still used as a religious rite or as a sort of state ceremony on important occasions. Among civilized nations it is a frequent mode of recreation. By many it is believed to have immoral tendencies, and is doubtless liable to serious abuse.

**Dancing Ma'nia**, an epidemic disorder of the fourteenth, fifteenth, and sixteenth centuries, similar to chorea. It is supposed that much imposture prevailed in many forms of this epidemic, but there were also many cases in which the subject entirely lost control of the will. This disorder is even now known in Abyssinia. Something similar to it in Italy was ascribed to the bite of a spider called the tarantula, but its greatest prevalence was in the cities of Germany during the Middle Ages. At Aix-la-Chapelle, in 1374, there appeared on the streets crowds of dancing men and women, apparently excited thereto by the frantic demonstrations at the festival of St. John. The dancers were said to be unobservant of outward things, but sensible of visions. They appeared to lose all self-control, and would dance till they fell as if dead, and would sometimes beat out their brains upon the ground. The mania extended to the Low Countries, as well as Cologne, Metz, and Strasburg, and caused much demoralization. Exorcism was at first found remedial, and cold water, as applied by Paracelsus in the sixteenth century, was very efficacious. At the beginning of the seventeenth century the St. Vitus's Dance, as the disorder was then called, was abating, and is now almost unknown. The "St. Vitus's Dance" of our day is CHOREA (which see). The excesses of the French "prophets" of the last century and the convulsive disorders sometimes seen in the camp-meetings of our own country are probably of similar character with the dancing mania. (See J. F. C. HECKER, "Tanzwuth," 1833, translated into English by B. G. Babington, M. D.)

**Dan'delion** [from the Fr. *dent de lion*, "lion's tooth," probably from the shape of its leaves; Ger. *Loewenzahn*], the *Taraxacum dens-leonis*, an herbaceous plant of the natural order Composite, with a perennial fusiform root. The leaves spring immediately from the root, are long, feather-shaped, with the divisions toothed, smooth, and of a fine green color. The plant grows spontaneously in most parts of the globe. The leaves when very young are tender,

and are often used as a potherb, and it is cultivated and brought to market in considerable quantities for this use. It is a popular remedy with many medical practitioners in this country and Europe, having gentle tonic powers. The root is sometimes prepared and ground with coffee, the taste of which covers that of the dandelion.

**Dandolo** (ENRICO), doge of Venice 1192-1205, belonged to one of the most illustrious patrician families of the republic. He was seventy-two years old when he was elected doge, and he was blind—some say, from a cruel punishment he once had been subjected to by the emperor Manuel of Constantinople. Nevertheless, he rapidly and successfully ended the war with Pisa, and his participation in the fourth crusade was a brilliant stroke of policy. The crusaders were negotiating with Venice to be carried to Asia by the Venetian fleet, and a bargain was finally struck. As they had not money enough to pay for the passage, they agreed to stop on the way and subdue Zara, which had rebelled against Venice. Zara was speedily reduced, but Dandolo then persuaded the crusaders to proceed directly to Constantinople. The city was conquered and pillaged. The emperor Alexis was murdered, and the so-called Latin empire was established under Baldwin of Flanders. The imperial crown was offered to Dandolo, but he declined it. On the other hand, he took care that Venice got her due part of the spoils, provinces and privileges and movable treasures. The four horses which now adorn the western front of the church of St. Mark were among the booty which was carried to Venice. But of much greater importance were the commercial privileges acquired, and of still greater the provinces. (See VENICE.)

**Dan'dridge**, capital of Jefferson co., Tenn. (see map of Tennessee, ref. 6-J, for location of county), on the French Broad River, 30 miles E. of Knoxville. Pop. in 1880, 431.

**Dane** (NATHAN), LL.D., an American jurist, born in Ipswich, Mass., Dec. 27, 1752, graduated at Harvard in 1778. He was one of the most able lawyers of New England, and a member of the Continental Congress in 1785-88. In 1787 he framed the ordinance for the government and organization of the North-west Territory, in which he inserted a clause prohibiting slavery. He served in the State senate for several years (1794-98). He published "An Abridgment and Digest of American Law" (9 vols., 1823-29). In 1829 he gave \$15,000 to Harvard College, to found the Dane professorship of law. Died Feb. 15, 1835.

**Dan'negelt**, or **Danegold** (i. e. "Dane-money" or "Dane-tax"), a tribute of one shilling levied on every hide of land by the Anglo-Saxon kings for the purpose of defending the country against the Danes. It was subsequently increased to two shillings, and was continued to the reign of Stephen.

**Dan'nelag** [an Anglo-Saxon term signifying "Danish law"]. Under the later Saxon and earlier Norman kings of England this name was applied to fifteen or more counties of the north and east of England, where the Danish language and customs prevailed in consequence of the invasions and conquests of that race.

**Dan'iel** ("God is Judge," or "God will judge"), one of the four greater Hebrew prophets, was a youth when he was carried with many other Jewish captives to Babylon in 605 B. C. Whether he was of royal, or only of noble descent, cannot be determined. He was educated at the court of Nebuchadnezzar, and was eminent for learning and wisdom. His skill in the interpretation of dreams procured for him the favor of the king, who appointed him governor of the province of Babylon and chief of the Magi. He explained the handwriting on the wall at Belshazzar's feast about 538 B. C. After the capture of Babylon by the Medes and Persians, Daniel gained the favor of Darius the Mede, and was the first of three presidents who had authority over the 120 satraps of the empire. He also "prospered in the reign of Cyrus the Persian," and appears to have remained in Babylon when the other Jews returned to Jerusalem. He probably lived to the advanced age of at least ninety years.

**Daniel, Book of**, an important canonical book of the Old Testament, assigned by some to the prophetic books, and by others to the Hagiographa or *Chetubim*. (See BIBLE.) The book has commonly been divided into two parts, of six chapters each—the first six historical, the last six prophetic. Some recent critics maintain that the first seven chapters treat of the world-power in relation to the kingdom of God; the last five chapters treat of the kingdom of God, and its development in relation to the world-power. The book is remarkable both for its miracles and its prophecies. The close general correspondence of these prophecies with the recorded facts of history has led some writers to the belief that the book is not the work of Daniel,

as it purports to be, but that it was written by some unknown person at a much later period. This view, which is as old as the time of Porphyry, has been revived and maintained by Collins, Semler, De Wette, Ewald, and others. On the other side, the evidence for the genuineness of the book is satisfactory to the representatives of orthodox theology. Among the points in its favor are the following: 1. The New Testament decidedly affirms its authority in many places. 2. The Maccabean literature and the Septuagint translation show that the book was in existence before the date assigned to it by rationalists (175 B. C.). 3. The book was written partly in Hebrew and partly in the older Chaldee, as might naturally occur at the period when it purports to have been written. This point appears decisive in favor of the genuineness of the work. 4. So far is the book from being a copy of history, that even now the historical application of some of its parts is a matter of controversy. 5. It is remarkably free from the characteristic beliefs of the later Judaism. The exegetic and controversial literature upon the book of Daniel is very extensive.

**Daniel** (HERMANN ADALBERT), an eminent German divine and geographer, born in 1812, was until 1870 professor in the pedagogium in Halle. His chief theological works are "Thesaurus Hymnologicus" (5 vols., 1841-56) and "Codex Liturgicus Ecclesiae Universæ," etc. (4 vols., 1847-54); his best geographical works are "Leitfaden für den Unterricht in der Geographie" (68th ed. 1872) and "Handbuch der Geographie" (3d ed., 4 vols., 1870-71). Died Sept. 13, 1871. (See "H. A. Daniel, ein Lebensbild," 1872.)

**Daniel** (PETER VYVIAN), a lawyer, born in Stafford co., Va., in 1785, graduated at Princeton in 1805. He became a member of the privy council in 1812, and was several times re-elected. He became an associate justice of the Supreme Court of the U. S. in 1841. Died May 31, 1860.

**Daniel** (SAMUEL), an English poet, born at Taunton in 1562, was educated at Oxford. He lived in London, where he associated with Shakespeare and Marlowe, and was employed as tutor to Anne Clifford, who became countess of Pembroke. In 1603 he was appointed master of the queen's revels. He wrote, besides other poems, "The Tragedy of Cleopatra" (1594), an historical poem "On the Civil Wars of York and Lancaster" (1595), "Musophilus" (1599), and a "History of England" (1613-34). Died Oct. 14, 1619.

**Daniel** (WILLIAM), Hon. See APPENDIX.

**Daniel** (WILLIAM COFFEE), M. D. See APPENDIX.

**Daniell** (JOHN FREDERICK), F. R. S., D. C. L., an English natural philosopher, born in London Mar. 12, 1790. He published "Meteorological Essays" (1823). In 1831 he became professor of chemistry in King's College, London. He was the inventor of the first form of galvanic battery by which it was made possible to maintain a current sensibly constant for a long period of time, and for this most valuable improvement he received the Copley medal in 1837. In 1839 he published an "Introduction to Chemical Philosophy." His is one of the great names of electrical science, and his "Meteorological Essays" was the first attempt to explain the phenomena of the weather by physical science. Died Mar. 13, 1845.

**Danielsonville**, Windham co., Conn. (see map of Connecticut, ref. 4-F, for location of county), on E. R. and the Quinebaug River, 26 miles N. N. E. of Norwich. It has large cotton-mills, several shoe-manufactories, and excellent schools. Pop. in 1880, 3118.

**Danielsville**, capital of Madison co., Ga. (see map of Georgia, ref. 2-H, for location of county), about 85 miles E. N. E. of Atlanta. Pop. in 1880, 128.

**Danish Language and Literature.** The Danish language in its present shape is the result of a long, generally slow, but at certain periods sudden and almost violent, development of the old tongue, which as late as 800 years after Christ was spoken with very slight modifications throughout the whole of Scandinavia, and which still exists as a living language in Iceland. The two most remarkable periods of its development fall in the latter part of the sixteenth and the latter part of the eighteenth century. In the first epoch the Reformation, in the latter the French Revolution, brought the whole mental life of the Danish people in such a commotion that ampler means of expression became necessary. New words burst forth with new ideas; new forms followed the new logic; new phrases blossomed with the new passions. In both cases the German language served as a pattern, but its influence was in both cases legitimate and highly beneficial. The Danish language stands to-day as an original and self-consistent growth, as an independent and well-defined organism. It has a great part of its vocabulary in common with the German language, but the forms of the words are so differently cast that only the scholar can recognize the kindred material. Its grammar and phrases are singularly like those of the

English language; a Danish book translated word by word would give readable English, while the same process would produce only nonsense in the German language. Its style is more precise, but less pathetic, than that of the German language; more truthful, but less brilliant, than that of the French; more fanciful, but less sympathetic, than that of the English. It is not a beautiful language, but it is a highly developed one. Its speech has a monotonous sound, its main vowel being a mixture of *a* and *e*, and its most characteristic consonant a weak *d*; but its rhythm is capable of a most delicate and infinitely varied modulation. A foreigner can never learn to speak it with elegance, and even the native who resides for a long time among foreigners loses the most impressive graces of its accent.

The Danish literature began immediately after the Reformation, and began on such a scale as to make the student expect an Elizabethan era. The Bible was translated; the history of the country was written; the old popular songs, which had been composed two or three centuries earlier, and handed down by tradition from generation to generation, and which at this very day constitute an important element of Danish civilization, were collected and printed in a remarkably clever edition. Great scientists whom the world has heard of appeared; Tycho Brahe made his observations, and the tables he left furnished the material from which his disciple Kepler abstracted the famous laws which bear his name; Niels Hemmingsen was a sharp and subtle theologian of a singularly pure and powerful mind. Comedies and tragedies were written both in Latin and Danish, and performed with great splendor in the streets of the great towns by the students of the colleges, to the instruction and amusement of the population. In every field of literature and art there were activity and energy. But this splendid beginning ended in a sudden and utter failure. Niels Hemmingsen was condemned to silence, Tycho Brahe was exiled, the stage grew dumb, and the songs which were gathered from the lips of the people mouldered on the shelves of the library. For two centuries there was no literature in Denmark, except the king's orders for new taxes and the queen's bill of fare for sumptuous court-dinners; and both were written in German. Now and then a great scientist appeared, as Thomas Bartholinus, the celebrated anatomist, and Ole Rømer, who figured out the velocity of light. Now and then a little song flew out, or an awkward endeavor was made of imitating some classical pattern. But these feeble tokens of life make only the general misery more conspicuous. It was two centuries before literature in Denmark took a new start, but then it did it with success, and Ludvig Holberg (1684-1754) became the founder of a great and noble literature, which has proved a highly beneficial instrument in educating and elevating the Danish people.

Holberg was a Norwegian by birth; his ideas were English and his patterns French, but the materials he used were exclusively Danish, and he handled them with such a penetrating power of understanding, with such a happy talent for interpretation, and with such a superiority of judgment, that it has been said of him, with truth, that if the whole of Denmark were swallowed by the ocean, and nothing left but Holberg's comedies, the world would have a perfectly clear and exhaustive idea of Danish society at that time. It is evident, however, that an author must be possessed of original ideas which take hold of the minds of the people, and original patterns which express the people's taste, if he really shall create a literature, form a literary school, and awaken the slumbering genius of the nation. But with Holberg both ideas and patterns were borrowed, and died out among the Danes with him; and when he, nevertheless, is called the father of the Danish literature, it needs a little explanation. Holberg did not create a literature, but he created a public. He aroused the attention of the people for literary affairs. He taught them how to use a book as a means of education and enjoyment. He wrote exactly what they needed and liked, and whenever the interest slackened a little he whipped them with his satire until their attention was fully awake. There were ten readers in Denmark when he began; there were ten thousand when he finished. Next, he did not call forth new authors, but he made authorship possible. Before his time an author in Denmark was a beggar who tried to win a patron for his book by a high-flown dedication, and who was paid for his work by a miserable alms from the patron. Holberg brought his books to the market through a bookseller, without any patron or dedication, and the immense success with which his courage was rewarded made authorship a profession and book-selling a trade in Denmark. Finally, in his comedies, he gave the Danish literature one of its finest treasures. They are an inexhaustible source of refreshing and invigorating enjoyment. His characters are not deep; they lack psychology; but they are well defined and sharply drawn,

and they carry along with them an historical significance which makes them highly interesting. His expressions are not elegant, but they are exceedingly witty, and they have a fluency and abundance which in the mouth of a well-trained actor make them sound like a merry song. His plots are without interest, considered as pictures of life, but they are eminently well fitted for showing off the character by help of the situation, and peals of laughter always accompany the performance of these plays.

The period following immediately after Holberg's death was very curious—talents which ran wild and passions which fought against their own ideas; great exertions ending with bagatelles, and great energies producing nothing but noise; passionate debates about trifles, and sentimental wailings about nonsense; and all this done in the greatest good earnest, and with the fullest confidence that it was great. But the period is very interesting when viewed as a time of preparation; for so it was. Just with the new century he appeared who in the full sense of the word is the father of the Danish literature—he who truly is the representative of the genius of the Danish people—Adam Oehlenschläger (1779-1850). Every one of Oehlenschläger's earlier works—when he grew older he repeated himself—became a new influence in the Danish civilization; it opened a new mine, and scientists, poets, and artists gathered to work it. In his great epos, "The Gods of the North," and in several tragedies, "Hakon Jarl," "Palnatoke," "Hagbart and Signe," etc., he gave a sublime and, in an artistic respect, perfect representation of the old pagan Scandinavian civilization, and by these works the study of Scandinavian antiquities became a popular interest, and pictures and ideas from the olden times, when Scandinavia was one, became an essential part of every man's education in Denmark, Norway, and Sweden; nay, they became a passion in every man's heart; and the political world has already heard something about this passion. In his comedy, "The Play of St. Hans' Night," he gave a most lovely and charming picture of life as it is led by the Danish middle class, and Heiberg, Hertz, Overskou, and Hostrup followed the track with such a power and variety of talent that the theatre of Copenhagen during a whole generation exercised an influence on Danish culture hardly surpassed by that of the university. Most deeply, however, Oehlenschläger influenced the Danish people by his "Aladdin;" by this work he touched the moral character of the people. "Aladdin" is a kind of drama which in a series of most brilliant pictures shows the contrast between the born genius who enters the world as he would his own house, and the ambitious, restless energy which toils and conquers only to fail at last. It is true that this book extricated Danish character from much narrow pedantry, in which an antiquated education kept it entangled; but it is also true that it allured the youth into a dream of being born geniuses from which it was hard to awaken.

It must be remembered that contemporary with Oehlenschläger lived Thorwaldsen, the greatest modern sculptor; Ørsted, the discoverer of electro-magnetism; Rask, the founder of comparative philology; Martensen, the leader of the speculative school of theology; Gade, one of the finest and mightiest composers of our time; and that each of these men had a number of pupils, and each of these pupils an audience. Furthermore, it must be remembered that these exertions in science, art, and literature were made by a people comprising only two millions of souls, two-thirds of which—namely, the whole peasantry—lived in utter dulness, and the remaining third was not possessed of any extraordinary wealth. It will then easily be understood that the literary glory of this period was also a danger. Life became a refinement, instead of a development; illusion took the place of reality. But, fortunately, there came a warning. In a long series of very elaborate writings, Søren Kierkegaard (1813-54) gave a sublime but austere exposition of the fundamental ideas of Christianity, and from this standpoint he criticised the life around him with the most biting sarcasm and an awe-inspiring severity. The effect was a painful silence. A feeling of guilt visited many a heart. But help there was none. Søren Kierkegaard's criticism was crushing, and his ideals were too strong. He would, no doubt, have left the whole Danish civilization prostrate and lame for a long time if it had not contained an undercurrent which he did not see, and which lay outside of his criticism.

But there was from the very beginning of the period a spirit at work—awakened by Oehlenschläger, yet deeper than he, nursed by all the fruits which science and art presented, but blended with a passionate craving for reality, and supported by an eminently practical talent. Bishop Grundtvig (1784-1871), a great poet, a great scholar, a great preacher, but greatest as a character, was the representative of this spirit. For nearly half a century he and his disciples kept aloof from the general current of events, and

lived as an obscure party. But when the day of collapse came, he stood in the gap with the means of reconstruction. He found two powerful allies, kindred natures, though not disciples, in Carl Ploug, Denmark's greatest lyrical poet, and a most eloquent newspaper writer, and Rasmus Nielsen, a thinker of rare acuteness and a most brilliant lecturer. Both these men, like Grundtvig himself, were men not only of literary talents, but of great literary merits; but literature was to them not an aim, but an instrument. The idea was to throw away all finery, all that had not vigor and breadth enough to become public property; to make religion and patriotism the basis of civilization, and living influence and practical consequence the test of all its elements; and then by an extensive scheme of education to lift the whole mass of the people up into this reconstructed civilization. The idea was strongly supported by the political movement which was started in 1848, and which gradually brought the peasantry to the foreground, and also by the democratic and realistic influence of the young Norwegian literature.

CLEMENS PETERSEN.

**Dan'ites**, among the Mormons of Utah, a secret organization of men who are believed to have taken an oath to support the authority and execute the commands of the leaders of their sect at all hazards. Many massacres, robberies, and murders, committed during the earlier history of Utah, are ascribed to the Danites.

**Danka'li**, an independent state of Abyssinia, is bounded on the N. E. by the Red Sea, and on the S. W. by a range of mountains. It is about 250 miles long. The climate is very hot; the soil is arid and poor. The inhabitants are ferocious, treacherous, and fanatical Mohammedans. They number about 70,000.

**Dan'negrog** [etymology uncertain], the ancient battle-standard of Denmark, bearing the figures of a cross and crown. It was fabled to have fallen from heaven at the battle of Volmar in Esthonia (1219) during a crusade against the heathens. It was twice taken in battle and twice recaptured. In 1500 a mere fragment remained.—The ORDER OF THE DANNEBROG is the second of the Danish orders of knighthood. It is said to have been founded in 1219, but fell into decay, and was restored in 1671.

**Dan'necker, von** (JOHANN HEINRICH), a German sculptor, pupil of Pajou in Paris and of Canova (1785-90) in Italy, born near Stuttgart Oct. 15, 1758. Having returned to Stuttgart in 1790, he was appointed professor of sculpture. He produced admirable busts of Schiller, Lavater, and other men of his time. He excelled in the expression of individual character. Among the best productions of the Canova classicism are his Ariadne and Sappho, and a colossal statue of Christ. Died Dec. 8, 1841.

**Dannelly** (JAMES), a minister of the Methodist Episcopal Church South, born in Georgia Feb. 4, 1786. He joined the South Carolina Conference in 1818. He was of the Boanerges type, and labored extensively and successfully in North and South Carolina and Georgia. He died in South Carolina April 28, 1855. T. O. SUMMERS.

**Dan'nevirk'e** (the "Danish Work"), a boundary-wall in Sleswick, built by the Danes against the Franks about 808, from the Baltic to the North Sea. The original line can be traced from the town of Sleswick to Hollingetted. The line of the Dannevirke was restored in 1848 by a system of strong fortifications known as the "Great" and the "Little Dannevirke." They were evacuated by the Danes Feb. 5, 1864, and destroyed by the allies.

**Dannhauer** (KONRAD), born at Breisgau 1603, died at Strassburg 1666. He studied theology at Marburg and Jena, and was appointed professor at Strassburg in 1628. He acquired a kind of reputation as one of the most ardent champions of Lutheran orthodoxy. Against the Romanists he wrote "Hodomoria Spiritus Papæ" and "Hyæna Friburgica;" against the Calvinists, "Hodomoria Spiritus Calviniani" and "Reformirte Salve;" and against the Syncretists, "Mysterium Syncretismi detecti." He was the teacher of Spener, but had no influence on him; was a very learned man, however. His "Katechismussmilch" consists of ten volumes in quarto.

**Dansville**, R. R. centre and the largest village of Livingston co., N. Y. (see map of New York, ref. 5-D, for location of county), situated at the head of the Genesee Valley. It contains a hygienic institute, one seminary, paper-mills, mower and reaper works, a woollen-mill, a foundry, a pail-factory, and tanneries. Pop. in 1870, 3387; in 1880, 3625.

**Dan'te Alighie'ri**, one of the greatest of poets, was the son of a lawyer in Florence, in which city he was born May 14, 1265. Boccaccio, whose life of Dante, first published in 1477, is the best authority we have on the subject, says that Dante was of Roman origin, of the stock of the Frangi-

pani, one of whom, by the name of Eliseo, came to Florence and settled there, founding the family of the Elisei. A descendant of this founder, named Cacciaguida, married a lady of the Aldighieri family of Ferrara, and giving the name of his wife's family to one of his children, it came about that they substituted it for their own family name. After a time the *d* was dropped, and the name became Alighieri; and Boccaccio says it was spelled so down to his own day. But it has been variously spelled in later times; among the changes that have been rung on the original, that of *Alighieri* is the most common. The arms of the family—a golden wing (*ala*) on an azure field—would seem to be, as is so often the case, a pun upon the name, and to fortify the old spelling. The name of Dante, by which the poet was baptized, is commonly said to be an abbreviation of *Durante*, but Boccaccio says nothing of this, and at the end of an eloquent enumeration of the gifts Italy had received from Dante, he somewhat obscurely plays upon the name, intimating that no other than that of the "giver" (*dante*) would become him.

Little is known of either the father or mother of Dante. His mother's name is said to have been Bella, and she was his father's second wife. His father died while Dante was yet a child, but he seems to have been carefully instructed, and he had such a leaning to books, and such an aptitude for study, that in the end he became master of all the learning of his time. Among his teachers was Brunetto Latini, a distinguished grammarian and the author of two poems, "*Il Tesoro*" and "*Il Tesoretto*," and he is believed to have studied at the universities of Padua and Bologna. He delighted in music and in painting; among his friends were the musician Casella and the painter Giotto, both of whom he celebrates in his great poem; and in the "*Vita Nuova*" he speaks of himself as on one occasion drawing an angel on a tablet while thinking of Beatrice.

When he was nine years old he first saw Beatrice, the daughter of a wealthy Florentine, Folco Portinari, a child of eight years. Dante has described his mystic love for Beatrice in that most exquisite poem the "*Vita Nuova*," and she appears again in his "*Divine Comedy*" as his guide through Paradise. This love never found its earthly close; and there have not been wanting those who declare that it was a purely imaginary worship of an imaginary being, the Beatrice of the "*Vita Nuova*" and of the "*Paradiso*" not having been Beatrice Portinari at all. However this may be, Beatrice Portinari married Simone de' Bardi, and died in her twenty-fourth year. Dante himself married, in his twenty-sixth year, Gemma, a lady of the powerful family of the Donati.

Our knowledge of his life is at best but fragmentary. He fought in the battle of Campaldino, in which the Florentines defeated the men of Arezzo, and he was with his countrymen again when they took Caprona from the Pisans. There are traditions that he studied medicine and that he entered the Franciscan order, but there is no certain foundation for these stories, any more than for the many others that have been devised to fill up the gaps in the obscure story of his life. In the great contest between the Guelphs and the Ghibellines, Dante at first sided with the former: he was a Guelph by birth and education, and he had fought on the two occasions we have mentioned with the Guelphic party in Florence against the Ghibellines of other cities.

In 1300, when he was in his thirty-fifth year, he became chief of the Priori—public officers who held office only for two months. While he was in office a local dispute split the Guelph into two subdivisions, calling themselves the Bianchi (*whites*) and the Neri (*blacks*). In the rage of party the Neri proposed to appeal to Charles of Valois, then fighting for the pope against the emperor, but the Bianchi, to which faction Dante belonged, opposed the measure, and he induced the Priors to settle the question by banishing the heads of both parties. Of course this made both factions his enemies; the Bianchi charged him with favoring the Ghibellines, and the Neri with favoring the Bianchi, and it had an ill look for Dante that the Bianchi were allowed to return to Florence before their time of exile had expired. The excuse was, that the place they had been banished to was unwholesome, and, indeed, Dante's friend, Guido Cavalcante, died there; besides, Dante declared that he was no longer in office at the time of the recall.

The demand for the mediation of Charles still being loud, Dante was sent as ambassador to Pope Boniface VIII. to urge him to discontinue the project. But the pope deluded Dante with vague promises, and secretly gave his voice for Charles, so that the Bianchi lost ground. The Neri, gaining power and influence, became masters of the city, and at once proceeded with all the cruelty of party against the absent Dante, denouncing him as a speculator, fining him in a large amount, and banishing him for two

years. Later he was condemned to perpetual banishment, and threatened with burning at the stake if he should dare to return to Florence.

After wandering far and wide, destined never again to see his wife, living upon the hard charity of some and the cold hospitality of others, he sought the roof of one who seems to have been a true friend, Guido Novello da Polenta of Ravenna, and, after fifteen years of exile, died there in 1321, on the 14th of September, in his fifty-seventh year. Of his children by Gemma Donati, three sons died young, a daughter entered a convent, and two sons, Jacopo and Piero, followed their father into exile, and gained some reputation as scholars in Ravenna, where the race, according to Leigh Hunt ("*Stories from the Italian Poets*"), though extinct in the male line, was still surviving in 1846, through a daughter, in the noble house of Serego Alighieri.

In his long and weary exile Dante's steps have been reverently traced through many cities of Italy, and even beyond her boundaries as far as Paris, and even to Oxford. That he ever saw England there is no good reason to believe, and the visit to Paris rests upon the slenderest evidence, though there seems some likelihood that he visited France. He describes the tombs at Arles as if he had seen them, and the dikes of Flanders; and if he really went so far north, he would hardly have failed of Paris, where were those miniature-painters, speaking of whom he says "they call their art 'illuminating' in Paris." In Italy they point out his haunts at Siena, at Arezzo, in Bologna, and doubtfully in other places, and unhappily too truly in Verona, with Can Grande della Scala, and at last in Ravenna, where his bones still repose, though repentant Florence has asked for them again and again in vain. Once in his lifetime she gave him leave to return, on condition of paying a certain sum of money and asking forgiveness—conditions which he justly refused and nobly resented.

From Boccaccio's life of Dante we give a few particulars of the poet's appearance and habits; if we had space we should like to translate also the remarkable story Boccaccio tells illustrative of his power of mental concentration—a match for Alcibiades' famous story of Socrates (Plato, "*The Banquet*"). Unhappily, no portraits of Dante exist from which we can get an accurate notion of how he looked. The portrait painted by Giotto in the Palazzo dell' Podestà at Florence, in which Dante was represented between Brunetto Latini and Corso Donati, is so defaced that it is virtually lost, nor do any good copies of it exist. In the church of Santa Croce at Florence there is an altar-piece by Giotto, in which is a portrait of Dante, but it is small and so difficult to be seen that its existence is hardly known. The well-known mask of Dante, said to have been taken after death from the poet's face, though it has been the foundation of all the later pictures of Dante, and may well serve as a likeness, since it is every way characteristic, is of doubtful authenticity. Its origin cannot be certainly traced, and it is doubted if the art of casting in plaster was known so early. Perhaps the best portrait of Dante is preserved in the following description by Boccaccio: "Our poet was of middle stature, and after he reached mature age went somewhat stooping. His movements were grave and full of mansuetude. He went always clad in plain garments of such a fashion as became his years. His face was long, with an aquiline nose, and eyes rather large than small; his jaw was large, and the under lip protruded beyond the upper. His complexion was dark, and both his hair and his beard were thick, black, and crisp, and in his aspect he was always melancholy and brooding. By which it came to pass that one day in Verona (the fame of his works, and especially of that part of his Comedy which is called Hell, having gone abroad and become known to many men and women) he was passing before a door where several women were sitting, when one of them in a low voice, yet not so low but that he and those who were with him heard it, said to the other women, 'Look at that man, who goes down to hell, and comes back again when he pleases, and brings news of those who are down there!' To which speech one of the others answered in good faith, 'I believe that what you say is true; don't you see how his hair is crisped and his complexion browned by the heat and the smoke below?' In his eating and drinking he was most temperate, taking food only at the ordinary hours, and then never passing the bounds of necessity, nor showing any excess of liking for one kind more than for another."

Besides the "*Vita Nuova*" and the "*Commedia*," to which the epithet of "*Divine*" was given later by some editor, the title given by Dante being "*The Comedy of Dante Alighieri, a Florentine by birth, but not by manners*," Dante wrote a treatise on the vernacular tongue, "*De Vulgari Eloquentia*," a commentary on some of his own minor poems, "*Il Convito*" ("*The Banquet*"), and a treatise



tise "De Monarchia," in which he eloquently advocates the cause of the empire as against the pope.

Books on Dante and his poem are in such number that the mere mention of their titles would fill pages. At the end of our article on the "Divine Comedy" the reader will find the names of the principal editions and translations. Works more especially relating to Dante himself are Boccaccio's "Vita di Dante," 1544; the notes and appendices to LONGFELLOW's translation of the "Divine Comedy;" AMPÈRE's "Grèce, Rome, et Dante;" LEIGH HUNT's "Stories from the Italian Poets;" the introduction to W. M. Rossetti's translation of the "Inferno;" and the introduction to J. A. CARLYLE's noble translation of the same; T. CARLYLE's "The Hero as Poet" in "Heroes and Hero Worship;" and in French, besides Ampère's interesting essay above mentioned, the sections on Dante in the "Histoire Littéraire de la France au quatorzième siècle, par Victor le Clerc," Paris, 1865, short but full of meat; and, in an entirely different sort, BALZAC's "Les Proscrits," of which Dante at Paris disputing with the Churchmen is the hero. But a complete account of Dante's life, or what is known of it, is much wanted in English, nor does it exist in any language.

As we close this article the great work on which Prof. Ferrazzi has been so long engaged is completed, and in it will be found all that is known of Dante and his works, down to the minutest detail—a work in which an Italian worshipper of Dante has labored with a more than German thoroughness and patience. The title is "Enciclopedia Dantesca, di Gius. Jacopo, Prof. Ferrazzi," 4 vols., Bassano, 1871. (See also "Dante secondo la tradizioni e i novellatori," E. Papanti, Livorno, 1873.)

CLARENCE COOK.

**Danton** (GEORGES JACQUES), a famous French demagogue, born at Arcis-sur-Aube Oct. 28, 1759. He practised law in Paris before the Revolution. Having a tall stature, a muscular frame, an ardent temperament, and the voice of a Stentor, he was well qualified for a revolutionist and agitator. "Nature has given me," said he, "the athletic form and harsh expression of Liberty." Danton and Marat founded the club of Cordeliers, which equalled or surpassed that of the Jacobins in violence and in hostility to the royalists. In 1791, Danton was appointed *procureur-substitut* for the city of Paris. As a favorite orator of the populace he instigated the bloody insurrection of Aug. 10, 1792, which initiated the Reign of Terror. Danton then became minister of justice, and shared the supreme power with Robespierre and Marat. When the French people were alarmed by the approach of the Prussian invaders, their confidence was restored and their martial ardor excited by a powerful speech which Danton made Sept. 2, 1792, which closed with this phrase: "De l'audace, encore de l'audace, et toujours de l'audace!" Having been elected to the Convention, he resigned the office of minister, and became the leader of the Mountain. He voted for the death of the king, and established in Mar., 1793, the revolutionary tribunal. He co-operated with Robespierre in the destruction of the Girondists, and was a member of the Committee of Public Safety. Robespierre regarded him with jealousy, and resolved to sacrifice him. Danton was aware of, but seemed reckless to his danger. In Mar., 1794, he was arrested and taken before the revolutionary tribunal. When asked his name and residence, he answered, "My name is Danton; my dwelling will soon be in annihilation, but my name will live in the Pantheon of history." He exhibited after his condemnation his usual intrepid demeanor, and was guillotined April 5, 1794. "Nothing," says Lamartine, "was wanting to make Danton a great man except virtue." (See LAMARTINE, "History of the Girondists;" THIERRS, "History of the French Revolution;" DES JARDINS, "Vie de Danton," 1851.)

**Dantzic** [Ger. *Danzig*], a fortified city and seaport of West Prussia, is on the left bank of the Vistula,  $3\frac{1}{2}$  miles from its entrance into the Baltic Sea; lat.  $54^{\circ} 21' N.$ , lon.  $18^{\circ} 40' E.$  It is traversed by the rivers Motlau and Radanne, which here enter the Vistula, and is the terminus of a railway from Berlin, 250 miles to the W. S. W. The mouth of the Vistula is obstructed by sand-bars, which prevent the access of vessels drawing more than nine feet of water. Dantzic is surrounded by walls, and defended by a citadel and outworks. It contains a fine cathedral, commenced in 1343 and finished in 1503; numerous Lutheran and Roman Catholic churches; an exchange; a town-hall; a gymnasium; two grammar-schools; schools of navigation, midwifery, and commerce; a school of arts and trade; an observatory, a public library, a museum, and an arsenal. Excellent timber is exported from this place, and great quantities of wheat out of Poland. The granaries on the Speicher Island, on which fire is prohibited, are capable of storing two to three millions of

bushels. Much of this grain comes down the Vistula and Bug on rude floats. The exports amount to \$9,500,000 annually. Dantzic was founded in the tenth century or earlier. It was occupied by the Teutonic Knights from 1310 till 1454, when it became a free state under the protection of Poland. It also was for a long time one of the cities of the Hanseatic League. On the partition of Poland in 1793 it was annexed to Prussia. Dantzic has been twice besieged. The first and most famous siege was made by the French in the winter and spring of 1807, after the conquest of Prussia by Napoleon. The remnants of the Prussian army endeavored to defend the strong places of Pomerania. Dantzic was held by 15,000 Prussians and 6000 Russians, provided with 800 pieces of artillery and immense supplies, and commanded by Gen. Kalkreut. The besieging party, commanded by the veteran Marshal Lefebvre, consisted of the tenth army corps and Saxon and Baden troops. The famous engineer Gen. Chasseloup de Laubat directed the siege operations. The investment was completed Mar. 14, 1807. Gen. Kalkreut, after a vigorous defence, during which the allies vainly made attempts to raise the siege, capitulated on the 21st of May to avoid an impending assault. The utmost skill of the French engineer and the science of the French artillerist were illustrated in this siege (carried on over frozen ground, and with the trenches sometimes filled with snow), which sustained and enhanced the reputation they had already acquired throughout Europe. Marshal Lefebvre was created duke of Dantzic; "the French annals had not before furnished an instance of so brilliant a recompense. Napoleon in this followed the example of the ancients, who bestowed upon their generals the names of the places or the nations of which she had made conquest."

The second siege was more properly a blockade made by the allies (Prussians and Russians) in the winter and spring of 1813 after Napoleon's disastrous Russian campaign. Gen. Rapp, commanding the tenth corps, held the place, and brilliantly maintained himself until the cessation of hostilities (June 10) under the armistice concluded between Napoleon, Alexander, and the Prussian king. Pop. in 1880, 108,549.

REVISED BY J. G. BARNARD.

**Dan'ube** [anc. *Ister* and *Danubius*; Ger. *Donau*; Hun. *Duna*], a river of Europe, inferior in size only to the Volga, is formed from the union of two streams, called the Brigach and Brege, which rise in the eastern part of the Black Forest, in lat.  $48^{\circ} 6' N.$  and lon.  $8^{\circ} 9' E.$ , 2650 feet above the level of the sea. The Danube is from 1750 to 1850 miles long, and drains an area estimated at 300,000 square miles. The average fall of the river is eighteen inches per mile. It is joined in its course by over fifty navigable rivers. Flowing in a north-easterly direction from its source, through Würtemberg and Bavaria, it passes Ulm, where it becomes navigable for vessels of 100 tons. From the S. it receives the Isar and the Lech, flows past Ingolstadt to Ratisbon, then proceeding in a south-easterly direction, enters Austria. In its course eastward to Presburg, the Danube receives from the S. the Inn and the Enns, and from the N. the March. In the neighborhood of Vienna and Linz its waters often divide and form islands, among which are the Great and Little Schütt, sometimes called the Golden Gardens. After leaving Presburg its course changes to the S. E., and passing Pesth it flows directly S., and enters the Hungarian plain, where it is constantly forming new channels. Leaving Orsova, the Danube passes the Iron Gate, a rocky pass 1400 yards wide. This rapid prevented the upward progress of vessels drawing more than two and a half feet of water. The obstruction having been to some extent removed, vessels of eight or nine feet draught can now pass at certain times of the year. The river farther on forms the boundary between Bulgaria and Roumania. Having received the Sereth and Pruth from the N., and after forming several deltoid islands, it flows eastward into the Black Sea. The mouth by which the greater number of ships enter is called the Sulina. Jetties have recently been constructed here for the protection of shipping. Its principal affluents are the Theiss, the Drave, and the Save. The Danube is an important commercial highway, and flows through a grand and picturesque country.

**Danube, Regulation of**, consists essentially in changing the course of the Danube opposite Vienna, by confining its current to a straight, deep channel along a well-constructed quay, thus diverting it from a broad and intricate system of shallow channels, none of which were conveniently available for navigation to the city. A large area of land will be reclaimed for agricultural purposes, and a fine water-front will be secured. The work was commenced in 1869, under a commission appointed by the government, and is expected to cost not less than 30,000,000 florins, equal to about \$15,000,000.

W. P. BLAKE.

**Danvers**, R. R. junction, Essex co., Mass. (see map of Massachusetts, ref. 1-I, for location of county), 18 miles N. by E. from Boston. It has extensive manufactures of shoes, brickyards, lumber and coal wharves on Porter's River at Danvers Port, an iron-foundry, a carpet-factory, a new State insane asylum, etc. Pop. of township in 1870, 5600; in 1880, 6598.

**Danville**, one of the capitals of Yell co., Ark. (see map of Arkansas, ref. 3-B, for location of county), is on the Petit Jean River, about 40 miles from its mouth. It has a school and one flour-mill. Pop. in 1880, 200.

**Danville**, city and R. R. centre, capital of Vermillion co., Ill. (see map of Illinois, ref. 6-G, for location of county), is situated on the Vermillion River. It has car-shops, numerous factories, several coal-mines, a public park, a free library, a high school, and graded schools. Pop. in 1870, 4751; in 1880, 7733.

**Danville**, on R. R., capital of Hendricks co., Ind. (see map of Indiana, ref. 6-D, for location of county), 19 miles W. of Indianapolis. It has good public buildings, a fine location, and good schools. Pop. in 1870, 1040; in 1880, 1598.

**Danville**, R. R. junction, capital of Boyle co., Ky. (see map of Kentucky, ref. 3-H, for location of county), 96 miles S. E. of Louisville. It is the seat of Centre College, the Danville Theological Seminary (Presbyterian), the Southern Collegiate Institute, the Caldwell Female Institute, and a State asylum for the deaf and dumb. Pop. in 1870, 2542; in 1880, 3074.

**Danville**, capital of Montgomery co., Mo. (see map of Missouri, ref. 4-I, for location of county), 80 miles W. of St. Louis. Pop. in 1880, 239.

**Danville**, R. R. centre, capital of Montour co., Pa. (see map of Pennsylvania, ref. 4-G, for location of county), on the North Branch of the Susquehanna, 50 miles S. W. of Wilkesbarre and 67 miles N. by E. from Harrisburg. It contains seven blast-furnaces, six rolling-mills, and numerous other manufactories. Good iron-ore, limestone, and anthracite coal are found in the vicinity. Pop. in 1870, 8436; in 1880, 8346.

**Danville**, R. R. centre, Pittsylvania co., Va. (see map of Virginia, ref. 7-F, for location of county), on the falls of Dan River, 141 miles W. S. W. of Richmond. Leaf tobacco is largely imported. It has an iron-foundry, fifteen tobacco-factories, machine-shops, and mills, and is the seat of Roanoke Female College and another female institute. The principal trade is in leaf tobacco. Pop. in 1870, 3463; in 1880, 7526.

**Daphne**, a genus of trees and shrubs of the order Thymelacæ, having a 4-cleft, funnel-shaped perianth, eight stamens, and a 1-seeded succulent fruit. The leaves are sometimes deciduous and sometimes evergreen, and are more or less acrid. The berries are poisonous, but the flowers of some species are beautiful and of exquisite fragrance. The garou bush (*Daphne Gnidium*) of Southern Europe, and the mezereon, both used in medicine, belong to this genus. The spurge laurel (*Daphne Laureola*) is a native of Great Britain. Paper is made in India from the bark of the *Daphne cannabina*; it is called Nepal paper, and is distinguished for smoothness and durability.

**Daphne**, a celebrated grove and sanctuary of Apollo, 5 miles S. W. of Antioch in Syria, was frequented by heathen pilgrims and voluptuaries. Here was a temple of Apollo, surrounded by beautiful groves of laurel and cypress trees, gardens, and baths. This place was appropriated to the indulgence of licentious pleasures, and was the scene of an almost perpetual festival of vice.

**Daphne** [Gr. Δάφνη], in Greek mythology, a nymph beloved by Apollo. To escape from him she besought the aid of the earth, which opened to receive her, and she was transformed into a laurel tree.

**Daphnis** [Δάφνις], in Greek mythology, a beautiful youth of Sicily, was the son of Mercury and a nymph of the country. He was reared amid beautiful groves of laurel (δάφνη), whence his name, and was taught by Pan to play on the pipe. He became a herdsman, and tended his herds on Mount Ætna, where he won the love of a naiad, who for his supposed unfaithfulness punished him with blindness. Having prayed his father for relief, Mercury transferred him to heaven. The invention of bucolic poetry was ascribed to him. The story of Daphnis forms the subject of the first idyll of Theocritus, and the name frequently occurs as a character in descriptions of pastoral life.

HENRY DRISLER.

**Da Pon'te** (LORENZO), an Italian poet, born at Ceneda Mar. 10, 1749. He became Latin secretary to the emperor Joseph II. in Vienna, where he composed several operas. After he had resided for some years in London, Vol. II.—24

he emigrated to New York in 1805. About 1828 he was appointed professor of Italian in Columbia College. He wrote the libretto for Mozart's "Don Giovanni" and other works. Died Aug. 17, 1838.

**Dar'abgherd'**, a town of Persia, in the province of Farsistan, 155 miles S. E. of Sheeraz. It is in an extensive plain, amidst groves of oranges and lemons. It was formerly a large and important city, and now has a population of 10,000 to 15,000.

**D'Arblay**, MADAME (originally FRANCES BURNEY), an English novelist, born at Lynn-Regis June 13, 1752, was a daughter of Charles Burney, the musician. Burke, Dr. Johnson, Garrick, and other *literati* frequented her father's house and listened to his musical concerts, and in these assemblies she was a silent and diffident spectator. Her first novel, "Evelina," published anonymously in 1778, had a great success. In 1782 she produced "Cecilia." She was second keeper of the robes to Queen Charlotte (1786-91), and wrote an interesting relation of court experience in her "Diary and Letters" (7 vols., 1842-46). In 1793 she was married to Count d'Arblay, a French exile. She died at Bath Jan. 6, 1840.

**Darboy** (GEORGES), a French ecclesiastic, born Jan. 16, 1813, became in 1839 teacher of philosophy and theology at the seminary of Langres, in 1859 bishop of Nancy, and in 1863 archbishop of Paris. At the Vatican Council he was a decided opponent of papal infallibility, but he recognized it when it was promulgated. On April 5, 1871, he was arrested by the Communists, and when the government troops took the city he was with five others shot at the prison of La Roquette May 24. Among his prominent works are "Les saintes femmes" (1850), "Les femmes de la Bible" (2 vols., 5th ed. 1859), "La vie de St. Thomas à Becket" (2 vols., 2d ed. 1860).

**Darby** (WILLIAM), an American geographer and statistician, was born in Pennsylvania in 1775. He was an officer under Jackson, serving in Louisiana, and assisted in the survey of the boundary between the U. S. and Canada. He died at Washington, D. C., Oct. 9, 1854. He was the author of numerous works, among which are a "Geographical Description of Louisiana" (1816), "Geography and History of Florida" (1821), a "Geographical Dictionary," and a number of gazetteers and other works.

**Darbyites**. See PLYMOUTH BRETHREN.

**Darcet** (JEAN PIERRE JOSEPH), a French chemist, born Aug. 31, 1777, was the son of Jean Darcet (1727-1801), director of the porcelain manufactory at Sèvres, who established the combustibility of the diamond. He added several useful discoveries to practical chemistry, important improvements in the manufacture of powder and in the composition of bronze and steel, the production of soda from common salt, etc. Died Aug. 2, 1844.

**Dardanelle**, one of the capitals of Yell co., Ark. (see map of Arkansas, ref. 3-B, for location of county), on the Arkansas River, about 80 miles above Little Rock. It has steam flour-mills, a planing-mill, a steam cotton-gin, and two public schools. Pop. in 1870, 926; in 1880, 748.

**Dardanelles** (anc. *Hellepontus*), called also the **Strait of Gallipoli**, a narrow channel connecting the Sea of Marmora with the Ægean Sea, and forming a part of the boundary between Europe and Asia. It extends from lat. 40° to 40° 30' N.; is bounded on the N. W. by Turkey and on the S. E. by Asia Minor, and is about 40 miles long. The width varies from 1 to 4 miles. A rapid current runs from the Sea of Marmora south-westward. The Dardanelles is strongly fortified on both sides by forts and batteries. Two castles on the opposite shores occupy the sites of the ancient Sestos and Abydos. The Hellespont is historically famous for the floating bridges thrown across it by Xerxes the Great. It is scarcely less renowned as the scene of the loves of Leander and Hero, the subject of a famous epic poem by Musæus.

**Dar'den** (MILES), a person remarkable for his great size, was born in North Carolina in 1798. He was a man of active habits until he was fifty-five years old, when corpulency compelled him to lead a quiet life. He was seven and a half feet high, and weighed at his death over 1000 pounds. Died in Henderson co., Tenn., Jan. 23, 1857.

**Dare** (VIRGINIA), the first child born among the English colonists in America, was born at Roanoke (now in North Carolina) in Aug., 1587. She was a granddaughter of the governor, John White. Her fate, like that of all the colony, is unknown.

**Dar'es**, a Trojan, companion of Æneas, distinguished for his skill in boxing. At the games in honor of Anchises in Sicily, Dares challenged all competitors, but was defeated and nearly slain by the aged Entellus.

**Dares**, a priest of Vulcan in Troy, to whom was as-

cribed an Iliad, written before that of Homer on palm leaves. Ælian states that he knew the work as existing in his own day (150 A. D.), but that work, whatever its character, must have been the production of some post-Homeric writer. There is still extant, under the name of Dares Phrygius, a narrative in prose of the destruction of Troy ("De Excidio Trojæ Historia") in forty-four chapters. A letter prefixed, addressed to the historian Sallust, states that this narrative was translated from the Greek by Cornelius Nepos, who met with the original in Athens. The Latin text shows the production to be of a later age than that of Nepos. It is probably, according to Dederich, a collection of extracts from different sources made in the sixth or seventh century. It was edited, along with "Dictys Cretensis," by Madame Dacier, as one of the volumes of the Delphin classics, Paris, 1680; most recently by Dederich, Bonn, 1835.

HENRY DRISLER.

**Dar'foor'**, a country of Central Africa, in the E. part of Soudan, is mostly included between lat. 10° and 16° N. and lon. 26° and 29° E. Its limits are not accurately defined. Area, about 106,000 square miles. The northern part is level, sandy, and nearly destitute of water. A ridge of mountains called Marrah extends through the central part. The soil produces maize, rice, millet, sesame, tobacco, and beans. The rainy season begins in June and continues till September. The people are Mohammedans, a mixture of Arabs and negroes. Darfoor carries on a trade with Egypt by means of caravans, and exports slaves, ivory, copper, hides, and ostrich feathers. Pop. about 4,000,000. It is ruled by a sultan who has despotic power and resides at Tindelly. The chief commercial town is Kobbe.

**Dar'gan** (EDWARD S.), a distinguished lawyer and jurist in Alabama, a native of North Carolina, first taught school, then studied law, and upon being admitted to the bar settled in Mobile. In 1844 he was elected mayor of the city; from 1845 to 1847 he was representative in Congress. He was the first proposer of the line of adjustment finally adopted on the settlement of the Oregon question with the British government. On his return from Congress he was elected judge of supreme court of Alabama. D. Nov., 1879.

**Dar'ic** [Gr. *δρακμῆς*, said to be derived from Darius], an ancient Persian gold coin, having on the obverse an archer crowned and kneeling, and on the reverse a quadrata incusa or royal palla. Several of these coins are preserved in European collections. The daric is essentially the same coin as the Greek *chryseus* (*χρυσεύς*) and *stater* (*στατήρ*) of gold, and also the Roman *aureus* (which, like *χρυσεύς*, signifies "golden"), though the last-named coin appears to have varied more in weight than the Greek stater, averaging about 121 grains. The daric weighed two Attic drachmæ = 133 grains Troy, or in later times considerably less. It was used in Greece, as well as in Asia. Its value in American gold would be nearly seven dollars, but, owing to the difference of purchasing power in gold at different periods, its true value cannot be accurately stated.

**Darien**, a port of entry and capital of McIntosh co., Ga. (see map of Georgia, ref. 6-K, for location of county), is on the Altamaha River, 12 miles from the sea and 60 miles S. S. W. of Savannah. Pine lumber is exported from it. Pop. in 1870, 547; in 1880, 1543.

**Darien', Gulf of**, a portion of the Caribbean Sea, in the United States of Colombia, is bounded on the W. by the Isthmus of Darien (or Panamá). It receives the river Atrato.

**Darien, Isthmus of.** See PANAMA.

**Darius**, eldest son of Artaxerxes Mnemon, was designated by that monarch as his successor to the Persian throne. When Darius was fifty years old, his father, according to custom, asked the king-elect to choose any gift which it was in the father's power to confer. By an established rule such a choice must be complied with at whatever cost. Darius chose Aspasia (or Milto), the beautiful and favorite Greek mistress of his father and of his late uncle, Cyrus the Younger. Though much enraged at this request, the old king promised to leave the matter to the decision of Aspasia, who preferred Darius. The king, however, broke his promise, and devoted the concubine to the service of the gods and to a celibate life. The anger of Darius at this act prompted him to enter into a conspiracy against his father, but the design was discovered and the prince put to death.

**Dari'us** [Gr. *Δαρείος*; old Egyptian, *Ntreioush*; modern Persian, *Dara* or *Darab*; Heb. *Daryavesh*; old Persian (cuneiform), *Daryahush*] **I.**, or **Darius Hystaspis**, king of Persia, was the son of Hystaspes, a member of the noble family of Achaemenides. He was called Gushtâsp in the legends of Persia. He was one of seven noble Persians who conspired against and killed the usurper Smerdis,

whom he succeeded in 521 B. C. He married two daughters of Cyrus the Great, and organized the extensive empire which Cyrus and Cambyses had enlarged by conquest. Babylon revolted against him, but was after a long siege reduced to subjection in 516. Soon after this date he conducted a large army against the nomadic Scythians of Europe, whom he was not able to conquer or defeat. He sent a great army to conquer and chastise the Greeks, some of whom had offended him by aiding the Ionians in their revolt against Darius. His army was routed at the great battle of Marathon, 490 B. C. He was preparing to renew the invasion of Greece, when he died in 486 B. C., in the sixty-third year of his age, and was succeeded by his son Xerxes, who reigned from 486 or 485 to 465 B. C. (See GROTE, "History of Greece.") There is little doubt that at first the name Darius was a title rather than a proper name.

**Darius II.**, called **Darius Ochus**, or **Nothus**, king of Persia, was a natural son of Artaxerxes Longimanus. He married Parysatis, his aunt, a daughter of Xerxes I. In 424 B. C. he deposed and succeeded the usurper Sogdianus, who had killed Xerxes II., the lawful heir. His reign was ignoble, and disturbed by the rebellions of several satraps. He had sixteen brothers and half-brothers, who were illegitimate sons of Artaxerxes. His character was weak, and he was the slave of the eunuchs of his court. He died in 405 B. C., and was succeeded by his son Artaxerxes Mnemon.

**Darius III.**, surnamed **CODOMANNUS**, the last king of the ancient Persian monarchy, was a descendant of the preceding. He ascended the throne in 336 B. C., on the death of Arsēs. In the year 334 his empire was invaded by Alexander the Great of Macedonia, who gained a victory at the river Granicus. Darius, commanding in person, was defeated at Issus in 333, and again at Gaugamela, near Arbela, in 331 B. C. He retreated towards Bactriana, pursued by the victorious army, which had nearly overtaken him when he was murdered by Bessus, one of his satraps, in the year 330. The wife and daughters of Darius were captured at the battle of Issus. Alexander married his daughter Statira.

**Darjeel'ing**, a sanitary station of British India, in the Sikkim Himalaya, is situated at an elevation of 7400 feet above the level of the sea, on the side of a large basin or hollow in which the river Runjeet flows. It is 308 miles N. of Calcutta, and commands a magnificent view of the snowy ranges of the Himalaya to the N. and W. The climate is salubrious, although the annual rainfall is great—i. e. about 120 inches.

**Dark Ages**, a term somewhat vaguely applied to the period between the fall of the Roman empire and the revival of letters about the thirteenth century. As this revival occurred earlier in Italy than in Northern Europe, the Dark Ages may justly be said to have been of longer duration in the North than in the South. (See MIDDLE AGES.)

**Dark Day.** See APPENDIX.

**Darke** (WILLIAM) was born near Philadelphia, Pa., in 1736; removed with his parents to Virginia in 1740; served under Braddock at his defeat in 1755; and served throughout the Revolutionary war in the American army, in the latter part of which he held a colonel's commission. He became an influential citizen and a major-general of Virginia militia, served in Ohio and at St. Clair's defeat (Nov. 4, 1791), acting as lieutenant-colonel of the levies, and fighting with desperate valor against the Miamis. He was dangerously wounded, and his youngest son was killed. Died in Jefferson co., Va., Nov. 26, 1801.

**Darkhan', Mount**, a lofty granite mountain in Mongolia, in lat. 47° 36' N., lon. 110° 10' E., is 140 miles S. E. of Ourga. Here is a monument erected to the memory of Genghis Khan, to honor whom the Mongolians assemble here annually.

**Dar'ley** (FELIX O. C.), an eminent American designer, born in Philadelphia June 23, 1822. He became a resident of New York City in 1848. He has illustrated the novels of J. Fenimore Cooper, Irving's "Sketch-Book," "Rip Van Winkle," some of the works of Dickens, etc. His outline illustrations of Judd's "Margaret" are among his most remarkable productions.

**Dar'ling**, a river of Australia, in New South Wales, is formed by numerous branches which rise on the western declivity of the Australian Alps. They converge into a central basin of clay, where their channels unite and separate again into branches in a singular manner. Below the union of these branches the Darling flows south-westward through arid plains, and enters the Murray near lat. 34° S. The main stream is about 600 miles long.

**Darling** (GRACE), an heroic Englishwoman, born at Bamfborough Nov. 24, 1815, was a daughter of the keeper

of the Longstone lighthouse, on one of the Farne Islands. She rescued nine persons from the wreck of the steamer Forfarshire, Sept. 7, 1838. A public subscription of about £700 was raised for her. Died Oct. 20, 1842.

**Darlington**, or **Darnton**, a market-town of England, in the county of Durham, on the Skerne, near its junction with the Tees, 18 miles S. of Durham. It has a fine church built in the twelfth century, with a tower 180 feet high. The town is well built, and is connected by railway with Stockton and other places. It has manufactures of Brussels carpets, optical glasses, worsted yarn, and brassware. Pop. in 1881, 35,102.

**Darlington**, on R. R., capital of Darlington co., S. C. (see map of South Carolina, ref. 5-F, for location of county), 75 miles E. N. E. of Columbia, and 30 miles S. of Cheraw. It has a Masonic hall and steam mills. Pop. in 1880, 940.

**Darlington**, city, cap. of La Fayette co., Wis. (see map of Wisconsin, ref. 7-C, for location of county), is on R. R. and the Pecatonica River, about 50 miles S. W. of Madison. It has good water-power, a large flour-mill, and other manufactures, and is an extensive market for grain and live-stock. Pop. in 1880, 1372.

**Darlington** (WILLIAM), M. D., LL.D., an American botanist, born in Chester co., Pa., April 28, 1782, practised medicine at West Chester. He was a Democratic member of Congress in 1815-17 and 1819-23. He published a valuable work on the plants of Chester county, entitled "*Flora Cestrica*" (1837), "*Agricultural Botany*" (1847), "*Memoirs of John Bartram and Humphry Marshall*" (1849), and several other works. He organized societies for the study of natural history and botany in West Chester, where he was a bank president. He imparted his own enthusiasm for science to others, and did much to develop the literary and social culture of the community. The *Darlingtonia Californica*, a curious sarracenaceous plant of the Pacific States, was named in his honor. Died April 23, 1863.

**Darlingtonia** [named by the late Dr. John Torrey in honor of Dr. William Darlington, noticed above], a genus of herbs of the natural order Sarracenaceae, comprising but one known species, the *Darlingtonia Californica*, a perennial plant of California. Its leaves are all radical, and resemble somewhat closely those of the Sarracennias of the Atlantic States, but the size of the leaves of the *Darlingtonia* is much the larger, the length in some instances exceeding two feet. The leaves are hollow and twisted, the upper part being turned over into a hood-like dome or vault, beneath which is the orifice which opens into the cavity or pitcher of the leaf. On either side of the opening two lobes depend, which may be taken to represent the true leaf, in which case the ascidium or pitcher must be considered as representing the petiole or leaf-stalk. Inside the pitcher the remains of insects are often found, their exit being impeded by long slender hairs within the leaf. The flower-stalk is sometimes four feet high, single, and furnished with bracts; the flower regular, nodding, and single, and about two inches across; the calyx straw-colored, of five sepals, all pointed; the five petals are pale purple, the stamens, twelve to fifteen, nearly hidden by the top-shaped ovary, upon which there is a style with a five-parted stigma. The capsule is five-celled, many-seeded, and one inch long. This plant is the representative of the Sarracennias of the Atlantic States, and with them and the *Heliamphora* of South America constitutes the whole natural order as far as it is known at present. The name *Darlingtonia* was given by De Candolle to a proposed genus of herbs of the order Leguminosae, but it having been shown that the plants assigned to that genus belonged rather to the genus *Desmanthus*, the name was dropped. The same result followed the attempts of several other botanists thus to honor Dr. Darlington, until at last, by a happy choice, this remarkable plant was selected to bear his name.

**Darmstadt**, a town of Germany, capital of the grand duchy of Hesse-Darmstadt, is on the river Darm and on the Frankfort and Mannheim Railway, 15 miles S. of Frankfort-on-the-Main. It is at the north-western extremity of the Odenwald. It consists of an old and a new town, both surrounded by walls. The former is ill-built, but the new town has wide and handsome streets. It has five public squares, and two ducal palaces, one of which contains a library of 450,000 volumes and a valuable collection of 700 paintings. One of the Madonnas, supposed to be a copy of a Dresden Holbein, was a few years ago, by competent critics, pronounced a true Holbein, and even a better picture than the Dresden Madonna. Pop. in 1881, 48,863, including the suburb Bessungen.

**Darnel** (*Lolium temulentum*), a grass well known in Europe, and naturalized in the U. S. The glumes are as long as the spikelets, or longer, and the spikelets have five

to seven florets which are awned. The seeds of darnel are reputed poisonous, but recent researches are said to have established their harmlessness. It is often infested by ergot, and this may account for its poisonous qualities.

**Darnetal**, a town of France, department of Seine-Inférieure, on the Aubette, 2½ miles E. of Rouen. It has two Gothic churches, and manufactures of flannels and other woollen goods. Pop. in 1881, 6154.

**Darnley** (HENRY STUART), LORD, born in England in 1541, was a son of the Scottish earl of Lennox. His mother was a niece of Henry VIII. of England. He had a handsome person, but was profligate and deficient in intellect. In 1565 he married Mary queen of Scots, whom he soon offended by his insolence and other faults. He also procured the assassination of Rizzio, which aroused her deepest indignation. The isolated house in which he lodged was blown up with gunpowder at the instance, it was suspected, of his wife, and he was killed Feb. 9, 1567.

**Darter** [so called from their manner of seizing their prey], (*Plotus*), a genus of birds, natives of warm climates, sometimes called snake-birds from the length of the neck. They are nearly allied to the cormorants, but they have a long, slender, straight, and sharp-pointed bill. They devour great numbers of fish. The common darter (*Plotus Anhinga*) is found along the coast of the Southern States.

**Dartford** [Saxon, *Darentford*], a town of England, in Kent, on the river Darent, and on the London and Gravesend Railway, 17 miles by rail E. S. E. of London. It lies in a narrow valley between two steep hills. It has cotton and silk printing-works, large powder-mills, and manufactures of machinery, iron, and paper. Watling Street, an ancient Roman road, crosses the river here. Edward III. held a tournament at Dartford in 1331, and Wat Tyler's insurrection broke out here in 1381. Pop. in 1881, 10,567.

**Dartford**, capital of Green Lake co., Wis. (see map of Wisconsin, ref. 6-E, for location of county), on the outlet of Green Lake, 65 miles N. N. E. of Madison. Pop. in 1880, 241.

**Dartmoor**, an elevated moor or table-land and royal forest in the south-western part of Devonshire, England, noted for its rugged scenery and its cyclopean relics of pre-historic races. The royal forest and its adjuncts extend about 20 miles from E. to W. and 22 from N. to S., being one-fifth of the whole area of Devonshire, and measuring more than 130,000 acres. Elevated considerably above the surrounding country, it culminates in Yes Tor, 2050 feet above the level of the sea. The geological formation of Dartmoor is chiefly granitic, but large masses of trap occur. Copper, tin, and manganese are found. The soil is mostly peat, which in some places is twenty-five feet deep. The moor affords pasturage. Many of the dells are fertile, and the region abounds with mosses and lichens. Among the antiquities of Dartmoor we may mention the Gray Wethers, a ruin of an ancient circular temple, and the remains of a large pre-historic village at Grimspound. The forest of Dartmoor was granted by Henry III. to his brother Richard, earl of Cornwall, and since 1337 a part of Dartmoor has been annexed to the duchy, but not to the county, of Cornwall. Dartmoor is famous as the seat of a prison, near Prince Town, in which, during the war of 1812-15, a large number of American sailors were confined. Their sufferings were at times very great.

**Dartmouth**, a seaport-town of England, in Devonshire, 32 miles S. by W. from Exeter, picturesquely situated on the terraced side of the right bank of the estuary of the Dart, near the ocean. The entrance to the river is defended by a castle and batteries. The chief exports are woollen goods, cider, and barley. Six steamers and about 240 sailing vessels belong to this port, which is a bonded one, its jurisdiction extending about 40 miles along the coast. Here Richard Lion-heart assembled the crusading fleet in the spring of 1190. Dartmouth was incorporated by charter of Edward III. in 1342, was attacked by the French in 1404, was taken by Prince Maurice in 1643, and recaptured in Jan., 1645-46, by Fairfax. Pop. in 1881, 5725.

**Dartmouth College**, the fourth of the New England colleges in chronological order—preceded only by Harvard, Yale, and Brown—was an offshoot of Moore's charity school, an institution for the education of Indian youth, established in Lebanon, Conn., in the year 1754, by the Rev. Eleazar Wheelock, D. D. The school was subsequently removed to Hanover, N. H., a charter for a college, to be connected with it, and yet a distinct institution, having been obtained. This charter was issued Dec. 13, 1769, by John Wentworth, the last of the royal governors of New Hampshire. Dr. Wheelock was its first president, and in view of the interest taken in the school by Lord Dartmouth, an English nobleman, and of his benefactions to it, his

name was given to the college. One of the most signal events in the history of the institution is the controversy out of which arose the famous Dartmouth College case. The legislature of New Hampshire passed an act in 1816, changing the name of the institution to "Dartmouth University," enlarging its board of trustees, and assuming the control of its affairs. To this act the trustees were opposed, and with the design of testing its constitutionality, they brought an action before the supreme court of the State. By this tribunal the legislature was sustained, and appeal was taken to the Supreme Court of the U. S., John Marshall being then chief-justice. The cause of the college was there argued by Daniel Webster and other able counsel, and fully sustained by the court. The university organization was dissolved, and the old college board of trustees sustained. This great battle was fought by them not for themselves only; the principles concerned were vital to many other institutions. Dartmouth, in comparative poverty, was thus instrumental in vindicating and establishing the sacredness of private trusts.

The college has had eight presidents: Eleazar Wheelock, D. D., inaugurated in 1769; John Wheelock, LL.D., in 1779; Francis Brown, D. D., in 1815; Daniel Dana, D. D., in 1820; Bennet Tyler, D. D., in 1822; Nathan Lord, D. D., in 1828; Asa D. Smith, D. D., LL.D., in 1863; Samuel C. Bartlett, D. D., LL.D., in 1877. The whole number of its alumni, as given in the "Triennial" for 1880, is 4275. Of these, more than 900 have entered the ministry. Perhaps the two professions that have drawn most largely upon the institution have been those of teaching and the law. A single class might be named, one-fourth of whose members have been either college presidents or professors; and it has been stated that at one time there were residing in Boston, Mass., no less than seven sons of the college, including Daniel Webster and Rufus Choate, "who were justly regarded as ranking among the brightest luminaries of the law."

While the institution has aimed from the beginning at a high religious tone, it is not sectarian. Most of the trustees and teachers are of the orthodox Congregational connection. As to methods of teaching, while the college has always been conservative, it welcomes all real improvements. It holds to a carefully devised curriculum, but has many electives and options, arranged in consecutive courses of study. It retains and honors the ancient classics, but it favors science and the modern languages also. More or less closely connected with Dartmouth College are several associated institutions founded at a later date, and in whole or in part under the same board of trustees—viz. the New Hampshire Medical College, established in 1793; the Chandler Scientific School, in 1851; the Thayer Engineering School, in 1871; the New Hampshire College of Agriculture and the Mechanic Arts, in 1866. The entire number of students in the college and associated institutions, according to the latest catalogue, was 430, and the entire number of instructors in the same was 35. The library of Dartmouth College contains 60,000 volumes.

REVISED BY SAMUEL C. BARTLETT.

**Daru** (NAPOLÉON), COUNT, a son of the following, was born at Paris June 11, 1807, served in the army in his youth, and in 1832 entered the Chamber of Peers. After the accession of Napoleon III. he became a prominent Orleanist. For a short time in 1870 he was minister of foreign affairs under Ollivier, when by his interference in the affairs of the Vatican Council he became very unpopular.

**Daru** (PIERRE ANTOINE NOËL BRUNO), COUNT, a French statesman and author, born at Montpellier Jan. 12, 1767. In the Reign of Terror he was confined in prison, where he translated the odes and epistles of Horace in verse. He became a member of the Tribunal in 1802, a councillor of state in 1805, and intendant-general of the imperial household. In the campaigns against Prussia and Austria (1806-09) he accompanied Napoleon, whom he served with ability as a diplomatist and financier. He became chief minister of state in 1811, and opposed the Russian expedition; but when it was undertaken, he put forth extraordinary efforts to meet its exigencies. In 1815 he was elected president of the French Academy. Among his works is a "History of Venice" (1819). Died at his residence near Meulan, Sept. 5, 1829. (See LAMARTINE, "Éloge du Comte Daru.")

**D'Arusmont** (Madame FRANCES), a distinguished reformer, better known by her maiden name as FANNY WRIGHT, was born at Dundee, in Scotland, Sept. 6, 1795. Her father was an intimate friend of Adam Smith, Dr. Cullen, and other distinguished men of that age, so full of new theories for the improvement of the conditions of human life. It was through this source that she drew inspiration and courage for her future career, which was characterized by benevolence, unselfishness, perfect

honesty, and complete fearlessness. In her youth she published a defence of the doctrines of Epicurus, entitled "A Few Days in Athens." She was in the U. S. from 1818 to 1821, and then visited France, but returned in 1825, and purchased land where Memphis, Tenn., now stands for her famous experiment for the instruction and enlightenment of the colored race. After a number of years of expensive and unsuccessful effort, her people were freed and sent to Hayti. She lectured in many parts of the Union on social, religious, and political questions with such freedom as to incur much opposition. She was for a time associated with Robert Owen at New Harmony, Ind., and his son, Robert Dale Owen, went with her to Tennessee to assist in that philanthropic if misdirected effort for the benefit of the slaves to which we have referred. She visited France, and in 1838 married M. d'Arusmont, but the union was unfortunate, and with her daughter she returned to the U. S. She died at Cincinnati, O., Dec. 14, 1852. Besides other works, she published "Views on Society and Manners in America," a tragedy called "Altorf" (1819), and "Lectures on Free Inquiry" (1836). (Her life has been published by J. WINDT, 1844, and by A. GILBERT, 1855.)

**Darwin** (CHARLES), son of Erasmus, was born at Lichfield, England, in 1758; educated at Christ Church, Oxford; removed to Edinburgh and studied medicine. Died May 15, 1778.

**Darwin** (CHARLES ROBERT), F. R. S., an eminent naturalist, a son of Dr. R. W. Darwin, F. R. S., and grandson of Dr. Erasmus Darwin, noticed below, was born at Shrewsbury, in England, Feb. 12, 1809. He was educated in the grammar-school of his native town, at the University of Edinburgh, and at Christ's College, Cambridge, where he took his degree of M. A. in 1831. The same year he sailed with Capt. Fitzroy, of H. M. ship Beagle, as volunteer naturalist in the survey of the coast of South America, etc. After his return, in 1836, from this voyage, in which he sailed round the globe, Mr. Darwin published a "Journal of Researches into the Geology and Natural History," etc. (1839; 2d ed. 1845; New York ed. 1846), which has been pronounced the "most entertaining book of genuine travels ever written." In 1839 he married his cousin, Emma Wedgwood, granddaughter of Josiah Wedgwood. Mr. Darwin published (1840-42) the "Zoology of the Voyage of the Beagle," a treatise on "Coral Reefs" (1842), on "Volcanic Islands" (1844), and "Geological Observations" (1846). His monograph on the Cirripedia (1851-53) would have given him a lasting reputation as a philosophic observer had he never written anything else. In 1859 he published his "Origin of Species by Means of Natural Selection," a work which has gone through many editions at home and abroad, has attracted much attention, and given rise to warm controversy in all civilized countries. It is universally conceded that this treatise displays profound knowledge of the facts of natural science and great powers of generalization. His style is clear and even elegant, his temper is moderate and always courteous, and his statements of fact may be said to be always accurate. He published a work on the "Fertilization of the Orchids" (1862), the "Habits and Movements of Climbing Plants" (1865), "Domesticated Animals and Cultivated Plants" (1867), the "Descent of Man" (1871), which has attracted scarcely less attention than the treatise on the "Origin of Species," and which is indeed a continuation of that work. He has also published "The Expression of the Emotions in Man and Animals" (1872). Mr. Darwin was a member of many learned societies, and the recipient of numerous medals and other distinctions. He was perhaps equally eminent in geology, zoology, and botany. D. Apr. 19, 1882. (See DARWINISM, by PROFS. E. L. YOUMANS and J. H. SEELYE; and EVOLUTION, by PROF. H. HARTSHORNE.) CHARLES W. GREENE.

**Darwin** (ERASMUS), M. D., F. R. S., an English poet and philosopher, born at Elton Dec. 12, 1731. He studied at Cambridge and practised at Lichfield, from which he removed in 1781 to Derby. He gained distinction as a physiologist, and also as a poet. His "Botanic Garden" (1791), formerly very popular, is a poetical treatise on botany, full of extravagant imagery. Among his works are "Zoonomia, or the Laws of Organic Life" (1793), "Phytologia" (1800), and the "Temple of Nature" (1803). Many of his ideas on physiology contained the germs of important truths. Died April 18, 1802.

**Darwinism**, a term applied to a particular theory of development originated by Mr. Darwin. Darwinism, while based on the doctrine of evolution, is not identical with it. Darwinism is an attempt to explain the law or manner of evolution. (See EVOLUTION.) It is well known that man can, by pursuing a certain method of breeding or cultivation, improve, and in various ways modify, the character of the different domestic animals and plants. By always selecting the best specimens from which to propa-



gate the race, those features which it is desired to perpetuate become more and more strongly developed, so that what are admitted to be mere varieties sometimes acquire, in the course of successive generations, a character as strikingly distinct, to all appearance, from those of other varieties, as one species is from another species of the same genus. Hence it is inferred that what we call species were originally only varieties. Mr. Darwin maintains that a system of influences, not wholly unlike to those which man brings to bear in the breeding of animals, is found in the circumstances with which they are often surrounded in a state of nature.

Plants and animals in a state of nature are subject to certain external conditions, which influence and limit them in various ways. Among these are climate, station, character of soil, food-supply, and the number and kind of living beings with which a given organism is surrounded. The workings of these conditions of existence are, for the most part, complex and obscure, but enough has been made out to show that where a variety has once appeared, the influence they exert upon it is quite analogous to that exercised by man in selective breeding.

Organized beings, as a rule, are gifted with enormous powers of increase. Wild plants yield their crop of seed annually, and most wild animals bring forth their young yearly, or oftener. Should this process go on unchecked, in a short time the earth would be completely overrun with living beings. It has been calculated that if a plant produces fifty seeds the first year, each of these seeds growing up into a plant which produces fifty seeds, or altogether 2500 seeds, the next year, and so on, it would, under favorable conditions of growth, give rise in nine years to more plants by five hundred trillions than there are square feet of dry land upon the whole surface of the earth. But fifty seeds a year is far below the reproductive capacity of many plants.

The elephant is reckoned the slowest breeder of all known animals, yet Darwin says "that it will be under the mark to assume that it begins breeding when thirty years old, and goes on till ninety, bringing forth three pairs of young in the interval." If this be so, at the end of the fifth century, there would be alive fifteen million elephants, descended from the first pair. Slow-breeding man has been known to double his numbers in twenty-five years, and, according to Euler, this might occur in a little over twelve years. But, assuming the former rate of increase, and taking the population of the United States at thirty millions, in six hundred and eighty-five years their living progeny would have each but a square foot to stand upon were they spread over the entire globe, land and water included. Cases could be given of introduced plants which have become common throughout whole islands in a period of less than ten years; and Dr. Falconer states that there are plants which now range in India from Cape Comorin to the Himalayas that were imported into that country from America since its discovery.

It is thus obvious that the rates of reproduction of living beings are by no means adjusted either to the supply of nutriment, or even to the space to be occupied. The room is fixed and the food is limited, while the ratio of increase is so enormous that each species, if unchecked, would ultimately usurp the whole area and monopolize the earth. But millions of species are doing the same thing, so that the inevitable result is conflict, the war of races, destruction of life everywhere, and, as a result, what Mr. Darwin calls the *struggle for existence*. All over the globe, on the land and in the sea, animals and plants, high and low, are driven into this struggle by their ever-increasing numbers and the limited means of subsistence. The warfare is one of life and death; and its result, the perishing of multitudes and the survival of comparatively few—the numbers remaining being in equilibrium with the supply of the means of subsistence.

Now, the result of this strife cannot be a matter of chance. Which shall be destroyed, and which preserved, must depend upon determinate conditions. Obviously, those individuals or varieties having some advantage over their competitors will stand the best chance to live, while those destitute of such advantage will be liable to destruction. Some by superior vigor may be able to withstand a degree of heat or cold, moisture or dryness, which would be fatal to others. Of those that are pursued, the most fleet will escape, while the slower will be captured. Those which from greater strength or agility are best able to supply themselves with food in time of scarcity, or which have superior adaptation to the nature of the food which the locality affords, will be able to displace those lacking these advantages. Briefly, the animals best adapted to the requirements of the situation in which they are placed are the ones that will live and have descendants, while those less in agreement with these surrounding conditions will as certainly disappear. This process of sorting is continually going on. Nature may metaphorically be said to choose

which shall be preserved and which destroyed; and this is what Mr. Darwin terms "Natural Selection," and what Mr. Herbert Spencer calls the "Survival of the Fittest."

How races continually encroach on each other's areas, the stronger outrunning and extirpating the weaker in the competition of existence, is well shown by the spread of European plants and animals in New Zealand. Doctor Hooker states that the cow-grass has taken possession of the roadsides; dock and water-cress choke the rivers; the sow-thistle is spread all over the country, growing luxuriantly up to 6000 feet; white clover in the mountain-districts displaces the native grasses; and the native (Maori) saying is: "As the white man's rat has driven away the native rat, as the European fly drives away our own, and the clover kills our fern, so will the Maories disappear before the white man himself."

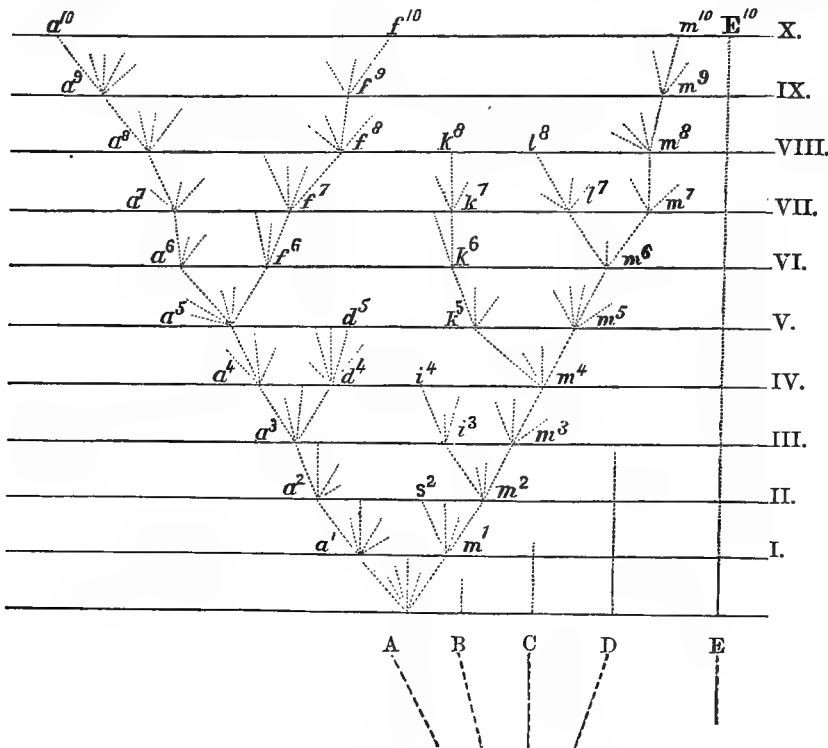
That this kind of struggle among living creatures has always been going on, and must always continue to do so, is obvious; and any one can see that it must be a winnowing and improving process, those least adapted to the situation giving way before those better adapted, while the struggle may be so close and sharp that a very trifling advantage will turn the scale. But Mr. Darwin saw farther into the case than this. It was his merit to discover that natural selection is capable of producing fitness between organisms and their circumstances, and of discerning the importance of the consequences that follow.

We have seen that universal variability, small in amount, but in every direction, and fluctuating about a mean condition in normal circumstances, is characteristic of living organisms; let us now see how this tendency may be made to advance in one direction, by natural selection, so as to produce divergence of characters by indefinite modifications of the forms of life. "A soil possessing some ingredients in unusual quantity may supply to a plant an excess of the matter required for a certain class of its tissues, and may cause all the parts formed of such tissues to be abnormally developed. Suppose that among these are the hairs clothing its surfaces, including those which grow on its seeds. Thus furnished with somewhat longer fibres, its seeds, when shed, are carried a little farther by the wind before they fall to the ground. The young plants growing up from them, being rather more widely dispersed than those produced by other individuals of the same species, will be less liable to smother one another, and a greater number may therefore reach maturity and fructify. Supposing the next generation subject to the same peculiarity of nutrition, some of the seeds borne by its members will not simply inherit this increased development of hairs, but will carry it farther; and these, still more advantaged in the same way as before, will, on the average, have still more numerous chances of continuing the race. Thus by the survival, generation after generation, of those possessing these longer hairs, and the inheritance of successive increments of growth in the hairs, there may result a seed deviating greatly from the original. Other individuals of the same species, subject to the different physical conditions of other localities, may develop somewhat thicker or harder coatings to their seeds, so rendering them less digestible by the birds that devour them. Such thick-coated seeds, by escaping undigested more frequently than thinner-coated ones, will have additional chances of growing up and leaving offspring; and this process, acting in a correlative manner through successive years, will produce a seed diverging in another direction from the ancestral type. Again, elsewhere some modification in the physiologic actions of the plant may lead to an unusual secretion of an essential oil in the seeds, which, rendering them unpalatable to creatures that would otherwise feed on them, may diminish the destruction of the seeds, so giving an advantage to the variety in its rate of multiplication; and this incidental peculiarity proving a preservative," will, as before, be gradually increased by natural selection, until it constitutes another divergence. Now, in these and countless analogous cases we see that plants may become better adapted, or re-adapted, to the aggregate of surrounding agencies, not through any direct action of such agencies upon them, but through their indirect action—through the destruction by them of the individuals which are least congruous with them, and the survival of those that are most congruous with them. All these slight variations of function and structure, arising among the members of a species, serve as so many experiments; the great majority of which fail, but a few of which succeed. Just as we see that each plant bears a multitude of seeds, out of which some two or three happen to fulfil all the conditions required for reaching maturity and continuing the race, so we see that each species is perpetually producing numerous slightly-modified forms deviating in all directions from the average, out of which most fit the surrounding conditions no better than their parents, or not so well, but some few of which fit the

conditions better; and doing so, are enabled the better to preserve themselves, and to produce offspring similarly capable of preserving themselves.

Most naturalists now admit that the principle of adaptive modification or natural selection is potent in the production of *varieties*; yet it seems a tenable position to regard varieties as incipient species. That there is no distinct line of separation between varieties and sub-species,

and between sub-species and species, is shown by the inability of naturalists in many cases to distinguish between them. Hundreds of instances might be given where what one naturalist regards as a species, another of equal authority ranks as a variety. Mr. Darwin, therefore, holds that in the past periods of time this principle has played the leading part in producing the diversities of life, and he has constructed a diagram to show how these divergences have



Scheme Representing the Results of Variation with Descent.

arisen. It attempts to represent "the probable action of natural selection through divergence of character, and extinction, on the descendants of a common ancestor."

The letters A to E are intended to represent the species of a genus widely distributed, and as in large genera the species often resemble each other in unequal degrees, this is shown by the letters standing at unequal distances. The species A is supposed to be extensively diffused, so as to embrace a wider diversity of conditions, and to be highly variable. The branching and diverging dotted lines proceeding from A are intended to represent its varying offspring. The variations may be slight, unequal, diverse, appear at different times, and endure for unlike periods. The short intermediate lines represent varieties which become extinct, while the most divergent lines represent those which survive and give rise to new species. That the intermediates should die out and the extremes stand the best chance of living, results from the theory. The more they resemble each other and the parent form, the more restricted will they be to the same set of conditions, and the fiercer will be that struggle for existence which is a cause of the destruction of closely-competing races. On the other hand, the more divergent the descendants of any particular species in structure and habits, the more diverse will be the conditions that they can make available, the less the competition, and the greater the chance of survival.

The intervals between the horizontal lines are each intended to represent a thousand generations. When a dotted line reaches across one of these intervals to a horizontal line, and is there marked by a small numbered letter, it is supposed that a sufficient amount of variation has been accumulated to form a fairly well-marked variety. Now, after a thousand generations, according to the diagram, the species A has produced two such varieties, marked  $a^1$  and  $m^1$ . These remaining exposed to the same conditions which made their parents variable, and with a tendency to variability which is itself hereditary, tend to vary in nearly the same manner as their parents varied; also, being but slightly modified, and inheriting those general advantages which made the genus and the parent species large, they in turn are favorably situated for the production of new varieties. Their most divergent variations will generally be preserved

during the next thousand generations, and thus is produced variety  $a^2$ , which, on the principle of divergence, will differ more from the species A than did variety  $a^1$ . From  $m^1$  two varieties,  $m^2$  and  $s^2$ , have sprung, which differ from each other, and more considerably from their common parent A. The line of succession is seen to be broken at regular intervals. This is intended to designate when each successive form has become sufficiently distinct to be recorded as a variety; but these breaks are imaginary, and might have been inserted anywhere after intervals long enough to have allowed the accumulation of a considerable amount of divergent variation. At the end of ten thousand generations the species A is supposed to have produced three forms,  $a^{10}$ ,  $f^{10}$ , and  $m^{10}$ , which from wide divergence will have come to differ largely from each other, and from their common parent. If the amount of change has been small in the time represented by the space between each horizontal line, these three forms may be only well-marked varieties; if, however, we suppose that each space represents time enough for considerable change to have taken place, they may have reached the position of sub-species, or even, with a still greater amount of change, to that of well-defined species.

The broken lines at the bottom of the diagram are supposed to lead up from an unknown species which was the common ancestor of the several species represented by the capitals. From this unknown ancestor, through variation and the action of natural selection, there descended five species, constituting a separate genus. One of these species is supposed to have been highly variable, and, standing at the extreme of the genus, to have gone on varying and improving without coming in conflict, until it became the parent of several new species. E represents a species which has gone on without change. (See *EVOLUTION*; also the article on the "Development Hypothesis," by the present writer, in the first volume of JOHNSON'S "Natural History.")

E. L. YOUMANS.

#### A CRITICISM ON DARWINISM.

*Transmutation of Species never yet Observed.*—Professor Huxley, after having elaborately advocated the Darwinian hypothesis, nevertheless declares it as his "clear conviction that, as the evidence now stands, it is not absolutely proven

that a group of animals, having all the characteristics exhibited by species in nature, has ever been originated by selection, whether artificial or natural.<sup>79\*</sup>

It is well to keep this fact in mind. The Darwinian hypothesis, however plausible in its statement or ingenious in its application, is, at the best, only a possible, and wholly wants the evidence which can translate it into the actual, explanation of the facts to which it applies. That species vary, and some of them to a great extent, is admitted by all, but in no recorded observation do they cease to be the same species still. The cable which holds a ship to its moorings may be swayed by the waves and still not snap asunder. The moon varies in the time of her revolution around the earth, in her celestial longitude and latitude, in the motion of her nodes and perigee; and these variations were seriously thought, for a time, to require some new statement for the law of gravitation, until Clairaut demonstrated that these variations furnished a surprising exemplification of the law. Cuvier has shown,† from Egyptian monuments and mummies, that the animals which lived in that country in the earliest records of its civilization are identical in species with those which live there to-day; and Agassiz has shown,‡ from the coral-reefs in Florida, that the animals of the Gulf of Mexico were of the same species 30,000, and probably 200,000, years ago, as in the present time. Though man has been able to secure numerous and often surprising variations within a given species, he has never succeeded in obliterating the original lines of specific distinction, or in bringing out anything more prominent in their place. An Ancon sheep is no less a sheep, however much its legs may be like an otter's. House-pigeons are house-pigeons still, whether carriers, or pouters, or fantails, or tumblers. The racer, the dray-horse, the barb has not changed its one specific characteristic, however different these varieties may be. The dog has been associated in close companionship with man from the earliest history, and, more than any other animal, has been subjected to decisive experiments continued through many generations, in order that every possible variation from the original stock might be secured. The result is apparent. The differences of dogs strike the dullest eye. And yet an authority inferior to none declares that "under the extremest mark of variety so superinduced, the naturalist detects the unmistakable generic and specific characters of the *Canis familiaris*."<sup>80</sup> Moreover, the dog himself sees this likeness, notwithstanding the difference. Two dogs of very different varieties treat each other, on meeting, very differently from what either of them would treat or be treated by a wolf or a jackal.

The same is the case with all the plants upon which man has made such copious and careful experiment. Not a single instance of one species changing into another has yet been found. The differences have been sufficient to induce some careful naturalists to suppose their possible prolongation into difference of species, and some have thus been led to regard this possibility as though it were already translated into an actual fact. But the fact is still wanting, and however plausible as a conjecture, or however accordant with favorite theories of the universe, the Darwinian hypothesis may be, we must not forget that as long as we lack the first fact in its proof, it is a conjecture alone.

Moreover, these variations, which man has secured by "artificial selection," if we look at them closely are not favorable to the conjecture. These deviations from the typical form and state, instead of being improvements out of which superior species may be gained, are monstrosities only kept up by man's care. The species left to itself sloughs them off. As soon as the introduction of merino sheep rendered it no longer an object to raise Ancons, the latter variety disappeared, and for years no remnant of it has been seen.¶ Dogs show a continual tendency to revert to the common type.¶ Prichard has also shown,\*\* in reference to other domestic animals—the hog, the horse, the ass, the sheep, the goat, the cow, the cat, and gallinaceous fowls—originally transported by the Spaniards and others from Europe to this continent, that in instances where they have got out of man's hands and run wild in the woods, they have lost all the most obvious appearances of domestication, and have approximated to the type which may be supposed to have belonged to the species in its original state. Darwin himself declares that in his pigeons, even with breeds of hundreds of years' standing, he was often met by sudden

returns in color and other striking appearances to the original type.†† The same is true with our cultivated plants. The extended varieties which man has brought out in some of these—e. g., the cabbage, the turnip, the beet, the potato—and from which he derives such benefit, are only kept up by constant cultivation. The plant left to itself reverts to its wild and, to man, its comparatively useless, state.

Now, while all these things show that the transmutation of species has not a fact which can prove it, and is at the best but a conjecture, they also render most unlikely the conjecture itself. For in the numberless species which have been minutely observed, over a great space and for a long time, if there were such a tendency to transmutation, how is it possible that no actual case of it has ever been found? Why are not cases occurring all the time and before our eyes? Mr. Darwin admits the force of this inquiry, but we cannot yield to the fitness of his reply. He argues that in the struggle for life the improved offspring would exterminate the inferior progenitor, and that thus the old form disappears by the very process of the formation of the new.†† But if this be true, and if the process of formation be going on before our eyes, why not that of disappearance also? In many animals the duration of the individual life is so short, and the succession of generations so rapid, that if this process of transmutation were actually at work, how could it fail to have furnished, thus far, a single instance of its accomplished fruits? Mr. Darwin often speaks of the frequent uncertainty of specific and even of generic distinctions, and these are sometimes so obscure that even the great Cuvier ranked the barnacle as a mollusk, while it is now classed as an articulate and a crustacean. But this uncertainty and liability to error certainly admits a far other interpretation than what Mr. Darwin adduces. If the species be sometimes separated by such narrow and almost indeterminate bounds, how does it happen that we never see these limits passed over, provided the transition be as easy as is claimed? It is hard to say whether certain living things are representatives of vegetable or animal life. Different naturalists make very different divisions of the innumerable protozoa, some calling animals what others name plants; but if the distinction between the two be of such little account, why has no member of the one class ever been seen passing over into the other? How is it that such a phenomenon—e. g., as the growth of the highest *algæ* into the lowest *zoophyte*—a phenomenon for which sharp eyes have sought, and which is not only natural but inevitable on the Darwinian hypothesis, and whose discovery would make the fame of any observer—has never yet been seen?

*Geological Evidence.*—If one species springs from another by a long-continued process of slow variation and natural selection, the steps through which a parent has become lost in his descendants are very many—indeed, are practically innumerable. "If my theory be true," says Mr. Darwin,§§ "numberless intermediate varieties, linking most closely all the species of the same group together, must assuredly have existed." Therefore, also, if the theory be true, some evidence of these intermediate varieties must assuredly exist in the geological record. But no such evidence appears. Looking through all the vast cycles of time which geological changes are supposed to imply, we find the same clear distinctions of species as we observe in the historic period. Upon this there is no dispute. Mr. Darwin admits it,|| and so do his disciples.¶¶ This fact is sufficient to startle, if not to stagger, the boldest advocate of the theory. Mr. Darwin acknowledges it to have the gravest force, but its weight is not essentially lessened by his very ingenious attempt to remove it. His explanation rests, in the main, upon the extreme imperfection of the geological record. This record gives us only a few disconnected leaves—and these often wellnigh effaced, and written in a changing dialect—of a great history, in which, if we could only decipher the faded lines and recover the missing parts, we should find the connections which, it must be acknowledged, we now lack. Sir Charles Lyell adds the weight of his high authority to the same scale. "It is scarcely possible," says this eminent geologist, "to exaggerate the defectiveness of our archives."<sup>81</sup> "In the solid framework of the globe, a great part of what remains is inaccessible to man, and even of that fraction which is accessible, nine-tenths are to this day unexplored."††† But the facts which the palæontologist offers are neither few nor inconsiderable. There are over 30,000 species of animals already discovered in the different formations. How is it, then, that these 30,000 species have

\* "Lay Sermons," p. 295.

† "Recherches sur les Ossements Fossiles," vol. i., p. 141.

‡ "Contributions to the Natural History of the United States," vol. i., p. 53.

§ Owen, "Classification of Mammalia," p. 100.

¶ Huxley, "Lay Sermons," p. 269; "Philosophical Transactions," 1813, pp. 92, 93.

¶ Prichard, "Natural History of Man," p. 57.

\*\* Ibid., pp. 28-59.

†† "Origin of Species," p. 144; "Variation of Animals and Plants under Domestication," vol. i., pp. 240-249.

†† "Origin of Species," p. 155.

‡‡ Ibid., p. 161.

|| Ibid., p. 246.

¶¶ Lyell, "Principles of Geology," tenth edition, vol. ii., p. 462.

\*\*\* Ibid., p. 463.

††† Ibid., vol. i., p. 306.

been preserved, and are found clearly defined, while not a single individual in a transition state appears? Many of these species are represented in the rocks by thousands of individuals, and if the Darwinian hypothesis be true, and these individuals are only instances of species growing into and out of one another, why are the terminal links of the chain alone preserved? The intermediate links do not differ from these except as would be required by the minutest series of gradations; how, then, if they ever existed, have they now so completely disappeared? The general imperfection of the record is no answer here, for we take the record as it is, and however imperfect, there ought surely to be seen, in the vast number of fossil species actually discovered, some of the missing links, if they ever existed. To Mr. Darwin's explanation of this staggering fact a German professor has applied the calculus of probabilities, with noticeable results.\* If we suppose that of each species a hundred individuals have been found, and that between any two species there were only ten intermediate varieties—a number much smaller than Mr. Darwin claims—then the probability against the exclusive appearance of distinct species would be inconceivable millions to one. In exact terms, the probability that out of the millions of fossils which are found, no one should appear from which the process of transmutation could be positively affirmed, is as 1:10<sup>100</sup>; i. e., the exact probability of the Darwinian hypothesis, when judged by the actual facts of palæontology, is no more than 1:1 with a hundred ciphers annexed!

But this is not the only bar which geology sets in the way of this hypothesis. Some of the lowest and simplest orders of organized beings—*e. g.* the corals—are found among the first forms of life, and also among the latest. But how should this be? In the struggle for existence they should either tend to develop into something higher or they should not. But in the latter case the very ground of the hypothesis slips from under it, while in the former these lower forms ought long since to have disappeared.

But on the same ground it would seem as if we should find everywhere a law either of deterioration or development, but the facts are otherwise. Take the class of fishes. It is impossible to affirm that the present offers any fuller or more varied development of the entire class than has before been manifested, nor on the other hand that it has degenerated in regard to numbers, powers, bulk, or range of modification.† One consideration, however, seems clear—viz., that those species best adapted to afford mankind wholesome food, such as the cod, the herring, the salmon, the turbot, have greatly predominated at the period immediately preceding and accompanying the advent of man. It is certainly difficult to see what advantages, in the struggle for existence, these possessed above the bony garpikes which they have superseded.

"In the vast physical changes to which the earth has been subjected since the neozoic epoch, no revolutions seem more sudden or more pronounced than that connected with the glacial period. Yet the dicyclotherian mammoth lived before it, and passed through the ordeal of all the hard extremes which it involved, bearing its organs of locomotion and digestion all but unchanged.‡ But how was this possible if species are so unstable and susceptible of such transmutation as the Darwinian hypothesis claims?"

Still further: if one species has arisen out of another, all the geological facts indicate that this must have been suddenly and not gradually. For the fact proclaimed by palæontology is that species appear suddenly, and disappear suddenly in successive strata.§ They are as common in the

uppermost bed in which they occur as in the lowest or any intermediate bed. They neither increase successively in numbers, nor do they gradually dwindle down; none of the fossil remains, thus far discovered, show signs of a gradual improvement or of a slow decay.¶ Moreover, the origination of varieties, so far as we can observe it, is sudden, and not slow. The first Ancon sheep appears to have been as perfect as any of his descendants. Persons have been born with six fingers on each hand and six toes on each foot, and have propagated this peculiarity to their children and their children's children, but no cause could be seen in any apparent previous preparation for such a phenomenon. A few years ago there were exhibited two dwarf and idiotic children as specimens of the race of the ancient "Aztecs," but these children were found to have been born at San Salvador, dwarfed and of defective brains, of parents who neither in themselves nor in their other children revealed any such deviation from the normal type.

In the oldest fossiliferous rocks we find suddenly appearing, and at the same time, low and also highly organized structures, representing the four great types into which Cuvier has so successfully classified the animal kingdom. Radiates, mollusks, articulates, and vertebrates spring to life simultaneously and suddenly. Below these, absolutely no traces of life appear. If it be said that the lower rocks have been subjected to igneous agency, by which organic existences have totally disappeared, which might otherwise have been found, Agassiz has shown¶ that in the great continent of North America the palæozoic rocks have undergone so little alteration that the remains of the earliest representatives of the animal and vegetable kingdoms are as well preserved as in later formations. If it be said that any one of these types has been developed out of the other, Von Baer has shown\*\* the impossibility of this from the facts of their embryonic growth and structure.

*Natural Selection cannot Account for the Changes which it is assumed to Produce.*—It is very difficult to see how that gradual development of organs which this hypothesis assumes could have taken place in any such way as Mr. Darwin affirms. If we were presented with a single fact of such development, we should be obliged to assent to it, whether we could explain it or not; but we must remember that not one such fact is furnished, and we must therefore test the doctrine on its intrinsic probabilities. How, then, shall an organ be gradually developed by "natural selection" and in a "struggle for life"? How can the organ give any aid in the struggle for life while it is in a process of formation, and thus how should natural selection have anything to do with its formation? What sort of an agency, *e. g.*, could natural selection have in the formation of mammary glands and their secretions? How do these help the individual in the struggle for life? According to the hypothesis, every new organ must have been in a process of slow growth through many generations, and therefore with numberless individuals which did not need it, and could not use it at all. But the doctrine of natural selection affirms that only those peculiarities which are favorable for the struggle for life would have the advantage to perpetuate themselves; how, then, could organs unformed grow into their perfect form through long-continued generations? The force of this is not weakened by the existence of animals with so-called rudimentary organs. Some insects in deep caves are without eyes; others near the mouth of the cave can see, though indistinctly; while others still, nearly related to these, but living outside the cave, have perfect eyes;†† but instead of inferring that there is a progress here by which no eyes have grown into eyes, it is certainly possible, and it is much more credible, that there is a retrogression, where insects with perfect eyes have lost them because placed where they could not see. The continued disuse of an organ is often followed by its loss, and we can easily see the reason for this; but this does not help us at all in conceiving how an organ which does not exist at all could ever come into existence by any process of natural selection.

Upon this notion of natural selection the facts of reproduction seem absolutely without meaning. It is no advantage to the individual to reproduce its kind. Indeed, with some insects the individual dies in the act of reproduction. The reproductive, which is one of the most pow-

raised, and estuary or shore deposits laid upon it, these deposits would contain remains of a flora or fauna so distinct from anything below them as to appear like a new creation. Thus, along with continuity of life on the earth's surface, there not only may be, but there must be, great gaps in the series of fossils; and hence the gaps are no evidence against the doctrine of evolution."

¶ Agassiz, "Contributions to the Natural History of the United States," vol. iii., p. 91.

¶ Ibid., vol. i., p. 25.

\*\* "Ueber die Entwicklungsgeschichte der Thieren," vol. i., pp. 160 and 224.

†† Pfaff, "Die Neuesten Forschungen u. s. f.," p. 113.

\* Pfaff, "Die Neuesten Forschungen und Theorien auf dem Gebiete der Schöpfungsgeschichte," p. 99.

† Owen, "Palæontology," p. 150.

‡ Falconer, "Palæontological Memoirs," vol. ii., p. 253.

§ Prof. Youmans' explanation of this point (given in Johnson's "Natural History," pp. 33, 34) should be presented here:

"It is alleged that the great geological breaks in the course of past life, and the abrupt appearance of multitudes of new species, disprove their origin by gradual development. But the apparent suddenness of their appearance is, without doubt, illusory. It has been proved that the same effect might be produced by the migration of races from inhabited regions to a continent slowly rising from the sea. The following example will show how such breaks might arise in the regular course of geological change: 'Between England and the United States the ocean-bottom is being covered with a deposit of chalk—a deposit that has been forming, probably, ever since there occurred that great depression of the earth's crust from which the Atlantic resulted in remote geologic times. This chalk consists of minute shells of Foraminifera, sprinkled with remains of small Entomostraca, and probably a few pteropod shells, though the sounding-lines have not yet brought up any of these last. Thus, in so far as all high forms of life are concerned, this new chalk-formation must be a blank. At rare intervals, perhaps, a polar bear, drifted on an iceberg, may have its bones scattered over the bed, or a dead decaying whale may similarly leave traces. But such remains must be so rare that this new chalk-formation, if visible, might be examined for a century before any of them were disclosed. If now, some millions of years hence, the Atlantic bed should be

erful of all impulses, is not for the sake of the individual, but for the species. How, then, can "natural selection" have anything to do with it? "If it profit a plant," says Mr. Darwin, "to have its seeds more and more widely disseminated by the wind, I can see no great difficulty in this being effected through natural selection."\* But pray what profit is it to the individual plant to have its seeds thus disseminated, and how, therefore, should natural selection, which "can act only through and for the good of each being,"† effect this? It is the species only that can thus be profited, and hence, if natural selection have any effect, it is for the profit and permanence, and not for the origination, of species.

"It is conceivable," says Mr. Darwin, "that flying-fish, which now glide far through the air, slightly rising and turning by the aid of their fluttering fins, might have been modified into perfectly winged animals."‡ Such phrases as "it is conceivable," "I see no difficulty in supposing," "I can see no insuperable difficulty in believing," "it seems to me unlikely," etc., are often used by this author to introduce suppositions which he soon employs as though they were actual facts by which his deductions could be proved. But let us look at this supposition of the flying-fish with the sharp eyes of a naturalist not apt to be led away by his fancy. "Some naturalists," says the great Cuvier, "seeing that more or less use of an organ sometimes increases or diminishes its strength and size, have fancied that habits and outward influences, for a long time continued, might gradually change the form of animals to a degree which would ultimately bring out a difference of species. These writers consider the organized body as a plastic material to be moulded as with the fingers. But the moment they carry out their notion into details, they render themselves a laughing-stock. Whoever should venture seriously to suggest that a fish, by means of a dry habitat, might see its scales disparting into feathers and itself becoming a bird, would only prove thereby his most profound ignorance of anatomy. What relation is there between the complicated and admirable organization of the feather, so perfectly adapted to the nature of the bird, and a scale that might be conceived as disparting itself? Moreover, a scale is of such a nature that it would not be disparted by drying; and yet this is but a sample of what these boasted writers propose!"§

*The Law of Hybridity.*—Mr. Darwin gives much attention to this law, and adduces many and curious instances to show that interbreeding tends to deterioration, that strength comes from crossing, and that varieties of new vigor, which might develop into new species, may come from individuals of different species. But that interbreeding tends, in certain instances, to deterioration and sterility, may, for aught we know, be a natural consequence of the inheritance of disease, which close interbreeding may perpetuate, and which crossing might tend to remove. Now, no well-authenticated cases of perfectly hybrid animals are known. Mr. Darwin himself admits this,|| but argues that such cases are intrinsically possible, because we do know of numberless instances where varieties, when crossed, are not only fertile, but their progeny often surpass in fertility their parents. But the true inference from this is not the one he has drawn. These facts teach us rather the real and ineradicable difference between species and varieties. Moreover, the instances which Mr. Darwin adduces furnish themselves the gravest difficulties to his hypothesis. For if close interbreeding tends to sterility, and if somewhat remoter unions diminish this tendency, and if when these unions are of two varieties the cross-breeds are more fertile than either pure stock, and if the difference between varieties and species be only one of degree and not of kind, how does it happen that when the divergence has passed over just that degree which separates the variety from the species, the whole tendency is instantly reversed, and the mongrel, if produced, is sterile? ¶

*Gradation not to be Confounded with Progress.*—In the organic world an individual passes through stages of growth, each of which, compared with the preceding, marks a grade of progress. This is the individual's development, in which case, however, it is not, strictly speaking, true to say that the higher has been developed out of or by the lower, for the lower and the higher spring alike from a deeper source. They are both the unfolding of what lay mysteriously folded up in the germ before any manifestation of the individual life had appeared. So the facts teach us, and so a sound philosophy would declare. But though we might look upon gradation here as equivalent to progress, this by no means proves that it is such elsewhere.

There is a gradation in the colors of the prism, but it would be absurd to call this a progress in any such sense as though one color had grown out of another. In like manner a gradation of species does not involve a progress of species, and we only confuse ourselves if we confound the two. Because a system of nature can be represented, in the contemplation of which we pass, by regular and successive steps, from the lowest and simplest structure to the highest and most complex, it by no means follows that the higher has proceeded from the lower, or that either has been evolved out of the other. Now, we need to remember that in natural history no such gradation can yet be represented. There are broad gaps which require prodigious leaps of the imagination to span. Mr. Darwin urges that these gaps are apparent, but not real. They seem such only to our defective knowledge. If we had the whole field instead of detached portions before us, we should find, he claims, the gaps filled up and the gradation perfect. This we may admit. It seems possible, though as yet far from being proved. The discovery of the intermediate forms between the *Palæotherium* and the hoofed quadrupeds of to-day, which Cuvier desiderated, may no longer be lacking,\*\* but the proof that the *Palæotherium* is the progenitor of our present existing hoofed quadrupeds is not advanced one jot by this discovery. *Palæotherium* and *Equus* remain just exactly as distantly related as before, notwithstanding all the help toward consanguinity which *Paloplotherium*, *Anchitherium*, and *Hipparion* can furnish. Indeed, the case with which gradation becomes translated into progress, and the readiness with which this mistake is made to prove the transmutation of species, is somewhat surprising to one who thinks closely. The imagination, not to say the fancy, would seem to have a more prominent part to play in these processes than a faculty of rigorous logic.

In the assignment of the links which are fancied to connect man, through the anthropoid apes, with the orang-outang and gibbon, it is argued that a perfect gradation is a sufficient warrant for the inference that the man has, in process of time, been evolved from the monkey. Now, we should not forget that the postulate here is only a fancy. The gradation is so far from perfect—indeed, is so grossly imperfect except in certain superficial characteristics—that the most accomplished naturalists declare that "man is the sole species of his genus and the sole representative of his order and sub-class."†† While the studies of Duvernoy upon the gorilla, and of Gratiolet and Alix upon the chimpanzee, have shown that a monkey of the highest grade is none the less a monkey and none the more a man than one of the lowest,‡‡ Pruner-Bey has also shown that in the most salient characteristics of the two there is an inverse order of development, which not only destroys the gradation, but makes it impossible that the higher should ever have descended from the lower.?? And if we pass from anatomical and physiological qualities to the higher psychological distinctions, we find a difference which cannot be bridged by degrees, though extended to infinity.

But even if there are men so sunk in a savage state that the difference between them and the people of the highest civilization seems greater than that which divides some monkeys from others, we have at least just as good reason for saying that the lowest has degenerated from the highest, as that the highest has been developed from the lowest. The history of men is full of instances of deterioration. If we weigh it simply by number, whether of years or of nations or of individuals, degeneration and decay vastly preponderate. Where is the civilization now of Tyre, and Carthage, and Babylon, and Nineveh? and where are the arts which built the Great Pyramid and Baalbec? All over the world we have evidence of a tendency among nations and men to sink away from civilization into barbarism, but history does not show an instance of a nation rising by its own efforts from barbarism to civilization. "To believe," says Mr. Darwin in his latest book, "that man was aboriginally civilized, and then suffered utter degradation in so many regions, is to take a pitifully low view of human nature."||| But, alas! this is exactly the view which the sad facts of history oblige us to take, and we must square our views of human nature to the actual facts of the case, whether or not it would better suit our desires and our theories to have them otherwise. The incontestable fact is, that human nature reveals no inherent impulse to improve or perfect itself. History gives unnumbered cases of a downward tendency, but not a single instance of a self-evolved progress. The lamp which lights one nation in its

\* "Origin of Species," p. 82.

† Ibid., p. 80.

‡ Ibid., p. 163.

§ "Leçons d'Anatomie Comparée," t. i, p. 100.

|| "Origin of Species," p. 224.

¶ "American Journal of Science and Arts," vol. xxxix., p. 178.

\*\* Owen, "Anatomy of Vertebrates" vol. iii., pp. 791, 792.

†† Owen, "Classification of Mammalia," p. 103.

‡‡ Quatrefages, "Rapport sur les Progrès de l'Anthropologie," Paris, 1867, p. 245.

?? Ibid., p. 247.

||| "Descent of Man," vol. i., p. 176.



advancement has been always lighted by a lamp behind it. Civilization is never indigenous; it is an exotic plant wherever found. This is the simple truth of history, which makes all such discussions as Mr. Darwin's respecting the descent of man as false to fact as they are abhorrent to philosophy.

"By the constant working of his brain," says Carl Vogt, "man gradually emerges from his primitive barbarism." \* But, aside from the crude materialism of which this writer is so fond, and which this sentence might illustrate, it is fair, again we say, to ask for some little evidence that this "constant working of the brain" starts from its own accord. We have not a particle of such evidence, and such a supposition is not only unsupported by a single fact, but is contradicted by all the facts of history. (See Prof. SEELYE's argument against Darwinism in Johnson's "Natural History," vol. ii.) J. H. SEELYE.

**Dasent** (GEORGE WEBBE). See APPENDIX.

**Dash'iell** (ROBERT LAWRENSON), D. D., was born in Salisbury, Md., 1826, graduated with honor at Dickinson College 1846, joined the Meth. Baltimore Conference 1848, and occupied prominent pulpits in the Middle States down to 1868, when he was elected pres. of Dickinson College, Pa. He became corresponding sec. of the Missionary Society of the M. E. Church in 1872. Died Mar. 8, 1880.

**Dash'kof** (EKATERINA ROMANOVNA), PRINCESS, a Russian lady eminent for her talents and learning, was born of a noble family Mar. 28, 1743. She became the wife of Prince Dashkof and a friend of the empress Catharine II. She was one of the chiefs of the conspiracy which dethroned Peter II. Soon after this event she lost the favor of Catharine, and passed several years in a tour through France, Germany, and Italy. Having returned home in 1782, she was appointed president of the Academy of Sciences at St. Petersburg. She was the first president of the Russian Academy, founded in 1784, and she superintended the compilation of a great dictionary of the Russian language. Died Jan. 16, 1810. (See "Autobiographical Memoirs of her Life," published in English in 1846.)

**Da'sya** [from the Gr. *δαρύς*, "hairy," a term very applicable to some of the species], a genus of red Algæ, of the order Rhodomelaceæ, nine or ten species of which are found in the U. S., and seven species in the British Islands. They have pear-shaped spores, borne in ovate conceptacles upon the smaller branches. The genus includes some of our finest sea-weeds.

**Da'syure** [from the Gr. *δαρύς*, "hairy," and *οὐρά*, the "tail"], (*Dasyurus*), a genus of carnivorous marsupial quadrupeds, allied to the opossums, but having only eight incisors in the upper and six in the lower jaw, and only twelve molars in each jaw. They also differ from the opossums in the absence of a hinder thumb, a prehensile tail, and in the want of a cæcum. They are all Australasian. The ursine dasyure (*Dasyurus* or *Diabolus ursinus*), or Tasmanian devil, abounded in Van Diemen's Land when it was first colonized. It is as large as the badger. The tail is half as long as the body, and like it is covered with coarse black hair with white bands. It is very wild, and makes its home in the ground. The spotted dasyure (*Dasyurus macrurus*) is the size of a cat, has a tail as long as the body, and is of a deep brown color, spotted with white. This and a smaller species (*Dasyurus Mangir*), called the wild-cat, are natives of Van Diemen's Land, and both are very destructive to poultry. All the dasyures are fierce nocturnal quadrupeds, and cannot be tamed. See TRYLACINIDÆ.

**Da'ta** (plu.), [from the Lat. *do*, *datum*, to "give"]. signifies "things given" or admitted; quantities and facts given, known, or admitted, by which to find things or results unknown; in geometry, the quantities or conditions which are assumed to be known in any problem. Thus, in the problem, *Given the base, altitude, and area, to construct the triangle*, the data are: 1, that the figure is a triangle; 2, that it has a certain straight line for its base; 3, that its vertex is at a known distance from its base; and 4, that its area has a known magnitude.

**Dat'ames**, fourth century B. C., a Persian general and satrap, born of a Carian father and Scythian mother; his principal fields of action were Asia Minor and Syria. He experienced the fate accorded to many distinguished commanders of antiquity, such as Sertorius, master of Spain eight years in the first century B. C., and Viriathus, second century B. C., and in modern times, Wallenstein and Guise, when they sought to maintain their independence against despotism, or when they became dangerous to royalty. Too strong to be crushed out by force of arms, they were taken off by treachery and assassination, as was Datames about 362 B. C. He is known to modern times only by short notices of Diodorus of Sicily, about 50 B. C., and

of Polyen the Macedonian, second century A. D., author of "Strategemata," and through a very interesting account of him by Cornelius Nepos (first century B. C.), who considers him the most valiant and capable of barbarians—that is, foreign—generals, with the exception of the two Carthaginians, Hamilcar and Hannibal; as one who owed his success not to the command of great armies, but to an individual ability almost unequalled. From what is to be gathered from the scanty details furnished, he must, in one respect resembling the greatest of all generals of all times, Hannibal, have been more remarkable for stratagem than strategy, although not deficient either in tactics or strategy. Frontinus, a military writer of consular dignity and Roman commander-in-chief in Britain towards the end of the first century A. D., in his "Strategematica and Strategicon" (Scott's translation, 1811, 185), cites an evidence of his consummate judgment, under fire, so to speak, similar to, but far better than, that which in 1646 distinguished Turenne in respect to the Wennarians when transferring their services to the Swedes. At first very successful in putting down an extensive confederated revolt, and thereupon invested with the command of the army destined to subject insurgent Egypt, Datames fell into disfavor with the Persian monarch Artaxerxes. Finding himself mistrusted and imperilled, he set up for himself, and was victorious over the powerful forces sent against him. Found too great to be conquered, he was betrayed by a friend, and in a conference murdered (exactly like the great Sertorius) about 362 B. C. To few men of whom so little is known has a greater reputation been accorded, demonstrating that Datames made himself felt and obtained a name whose grandeur like a set sun is apparent from the continuing glow beyond the mountains which conceal the orb which irradiates the sky.

J. WATTS DE PEYSER.

**Da'tary** [Lat. *datarius*, from *datum*, "given" (usually the first word in the date of papal documents; for example, "Datum Romæ apud Sanctum Petrum," etc., "Given at Rome January 1st," etc.)], the chancellor of the pope; a high dignitary of the Roman Catholic Church, who has the power in some cases of granting requests, instead of the pope himself. This arrangement was introduced to relieve the pope from the pressure of unimportant business. The datary is assisted by a pro-datary and a sub-datary.

**Date** [Fr. *datte*; from the Gr. *δάκτυλος* (i. e. a "finger," and also a "date," so called from its shape); Lat. *dactylus*; Sp. *datil*], the fruit of the date-palm (*Phoenix dactylifera*), a native of the north of Africa and the south-west of Asia. It also grows in Southern Europe, and to some extent in the Southern U. S. The stem grows to the height of thirty to sixty feet, is straight, and crowned with from forty to eighty smooth pinnate leaves or fronds eight to ten feet long, with lanceolate acuminate leaflets. The tree bears many spadices, each of which on the female tree bears from 180 to 200 dates, weighing in the mass from twenty to twenty-five pounds. This tree is one of the most highly prized of all the palms, furnishing food to millions of the human race. On the N. coast of Africa, in Persia, and in Arabia dates form a chief article of food. They contain 58 per cent. of sugar, combined with gum, pectin, etc. They are used both fresh and dried, and are prepared for market by pounding and pressing them into a solid mass. Both wine and vinegar are made from them by fermentation, and in Persia an ardent spirit is distilled from them. At the top of the stem is a soft pith, which, with the young leaves surrounding it, is called "palm cabbage," and is much esteemed as food. The undeveloped panicles of flowers are also eaten, and "palm wine" is made by fermentation of the sap, of which each tree yields from three to four quarts daily for ten days or a fortnight. The roasted seeds are used in North Africa as coffee. These seeds are also ground and an oil expressed from them, the paste which remains being used as food for cattle. Baskets are made from the leaf-stalks, and mats and bags from the leaves. The fibrous parts at the base of the stalks are made into cordage, and the wood is used in the construction of buildings. The toddy-palm (*Phoenix sylvestris*) of India is perhaps a variety of this species. Like several other palms, it yields "jaggery" or palm-sugar.

**Date** [from the Lat. *datum*, "given," from *do*, *datum*, to "give," occurring in such phrases as the following: "Given under my hand, this seventh day of April," etc.; see DATARY], a word used to denote the exact time when anything was done. The careful observance of dates is of the utmost importance in the proper writing of history. One of the best works on this subject is "L'Art de vérifier les Dates," written by the Benedictines of St. Maur. (See CHRONOLOGY.)

**Date Plum.** See DIOSPYROS.

**Dath'olite** [from the Gr. *δαθός*, "turbid," and *λίθος*, a "stone"], a mineral composed of boracic acid, silica, and lime, with a little water. It occurs massive, and also crys-

\* "Lectures on Man," p. 468.

tallized in rhombic prisms, the edges and angles of which are cut off by planes. It becomes opaque when heated, hence the name.

**Datisca'ceæ** [from *Datisca*, one of the genera], a small natural order of plants related to the Begoniaceæ, consisting of trees and herbs, principally native of the milder regions of Europe and Asia. *Datisca cannabina*, which is very similar to hemp in its general features, is a native of Crete, and is valuable as a tonic. An amylaceous substance called *datiscin* is obtained from it. It also yields a yellow dye.

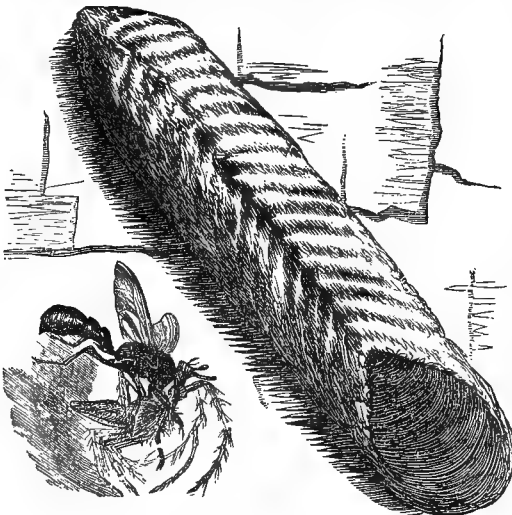
**Dative Case.** See DECLENSION, by J. THOMAS, LL.D.

**Datu'ra** [Arab. *tâtirah*], a genus of exogenous herbs of the order Solanaceæ, natives chiefly of warm climates in both hemispheres. The *Datura Stramonium* (thorn-apple, Jamestown or "Jimson" weed of the U. S.) is naturalized in this country, and furnishes the drug STRAMONIUM (which see). Many other species are cultivated in greenhouses for the beauty of their flowers. They all possess narcotic properties similar to those of belladonna.

**Daubenton** (LOUIS JEAN MARIE), M. D., an eminent French naturalist, born at Montbar May 29, 1716. He studied medicine in Paris, and began in 1742 to assist Buffon in the preparation of his great work on natural history. He was well qualified for this task by his sound judgment, scrupulous accuracy, and patient industry, which enabled him to rectify some of Buffon's errors and hasty theories, and to enrich the work with many new and important facts in the anatomy of animals. In 1745 he was appointed curator and demonstrator of the cabinet of natural history in Paris, of which he had charge for nearly fifty years. He became professor of natural history in the College of France in 1778. He contributed many scientific articles to the first "Encyclopédie," edited by Diderot, and introduced the merino sheep into France. Died Jan. 1, 1800. (See CUVIER, "Notice sur la Vie de Daubenton.")

**Daubeny** (CHARLES GILES BRIDLE), M. D., F. R. S., an English chemist and naturalist, born at Stratton in 1795. He was for many years professor of chemistry, botany, and rural economy in the University of Oxford. He visited the U. S. in 1837. Among his works are a "Description of Active and Extinct Volcanoes, with Remarks on their Origin" (1826), a "Sketch of the Geology of North America," and "Lectures on Agriculture" (1841). Died Dec. 12, 1867.

**Dau'ber**, a name applied to various mud-wasps, hymenopterous insects of the family Sphegidae and the genus



Dauber.

*Pelopæus*, natives of various parts of America, some of the species being quite common in the U. S. This name is given on account of the remarkable nest which the mother-insect constructs, bringing lumps of mud in her mouth, which she arranges into cells, inwardly very smooth and regular, but outwardly looking like masses of clay. In these cells she lays her eggs, one in each cell, and with it she seals up a large number of spiders, alive, but paralyzed by her sting. The eggs hatch, the grub feeds on the spiders, goes into the pupa state, and finally, having burst its cocoon, gnaws through the wall of earth and escapes a perfect insect.

**D'Aubigné** (JEAN HENRI MERLE), D. D., an eminent Swiss divine and historian, born at Geneva Aug. 16, 1794. His father's name was Louis Merle. Having been ordained

as a Protestant minister, he preached about five years at Hamburg, and removed to Brussels in 1823. He became in 1831 professor of church history in a college at Geneva. His principal work is a "History of the Reformation in the Sixteenth Century" (1835), translations of which have obtained extensive circulation in Great Britain and the U. S. In 1863 he began to publish a "History of the Reformation in Europe in the Time of Calvin." He also published the "Protector (Cromwell), a Vindication" (1848). He is most praised for the vivacity of his style, the fervor of his piety, and the pronounced orthodoxy of his opinions. He died at Geneva Oct. 21, 1872.

**D'Aubigné** (THÉODORE AGRIPPA). See AUBIGNÉ, D'.

**Daubigny** (CHARLES FRANÇOIS), a French painter and engraver, born Feb. 15, 1817, studied with his father and Paul de la Roche, and spent three years in Italy. Among his numerous works are "The Harvest," "The Banks of the Eure," etc. His pictures show a careful study of nature. He also made many drawings for books and illustrated newspapers. Died Feb. 21, 1878.

**Daudet** (ALPHONSE), born at Nîmes May 13, 1840, settled in Paris in 1857, made his *début* in literature with some poems ("Les Amoureuses," 1858; "La Double Conversion," 1861, etc.), and became secretary to the duke of Morny. As a dramatist he achieved no small success ("La dernière idole," 1862; "L'Oeillet blanc," 1865; "Le sacrifice," 1869; "Lise Tavernier," 1872, etc.), but it was by his prose-writings he acquired his great fame ("Lettres de mon moulin," 1869; "Lettres à un absent," 1871; "Contes du lundi," 1873, etc.), more especially by his novels ("Jack," 1876; "Le nabab," 1878; "Les rois en exil," 1880, etc.), all translated into English. He is one of the leaders of the naturalistic school in France, and in one respect he approaches real life nearer than anybody else; several characters in "Le nabab," "Les rois en exil," etc. are portraits.

**Daufus'kie Island**, one of the Sea Islands of Beaufort co., S. C., lying S. W. of Hilton Head Island. Its northern point is in lat. 32° 8' 42" N., lon. 80° 49' 58" W.

**Dau'lis**, an ancient city of Greece, in Phocis, at the foot of Mount Parnassus. Its position rendered it an important military station. Its site is occupied by the modern village of *Davlia*, 9 miles N. W. of Livadia.

**Dau'mer** (GEORG FRIEDRICH), a German pantheist, born at Nuremberg Mar. 5, 1800. He published, besides other works, a "System of Speculative Philosophy" (1831) and "Philosophy, Religion, and Antiquity" (1833). Several of his works were noted for his violent attacks upon the Christian religion. In 1858 he joined the Roman Catholic Church, since which time he published a number of works from a Catholic point of view. D. Dec., 1875.

**Daun, von** (LEOPOLD JOSEPH MARIA), COUNT, an Austrian general, born at Vienna Sept. 25, 1705. He served with distinction against the Turks, and became a field-marshal in 1754. He was commander-in-chief of the imperial army in the Seven Years' war. On June 18, 1757, he defeated Frederick the Great at Kolin, where the loss of the Prussians was very severe. On Oct. 14, 1758, he gained a victory over Frederick at Hochkirchen. On Aug. 15, 1760, he was defeated at Liegnitz, and on Nov. 3, 1761, at Torgau. He was appointed president of the Aulic council in 1762. Died Feb. 5, 1766.

**Daunou** (PIERRE CLAUDE FRANÇOIS), a French statesman and author, born at Boulogne Aug. 18, 1761. He was elected in 1793 a member of the National Convention, in which he acted with moderation and opposed the proscription of the Girondists. He was the first president of the Council of Five Hundred, and a member of the committee which formed the constitution of the year VIII. (1800). He was editor of the "Journal des Savants" from 1816 to 1838, and became professor of history in the College of France in 1819. He published an "Essay on the Temporal Power of the Pope" (1810) and a "Course of Historical Studies" (20 vols., 1842 et seq.). Died June 20, 1840. (See WALCKENAER, "Notice sur la Vie de Daunou," 1841.)

**Dau'phin** [Lat. *delphinus*], the former title of the eldest son and heir-apparent to the king of France. It was originally the title of the sovereign lords of the province of Dauphiné. In 1349, Humbert, lord of Vienno, dying without issue, bequeathed his possessions to Charles of Valois, on condition that the heir-apparent to the throne of France should bear the title of dauphin of Vienno. This title was abolished at the revolution of 1830.

**Dauphiné**, a former province in the S. E. of France, is now comprised in the departments of Drôme, Hautes-Alpes, and Isère. The chief towns were Grenoble, Vienne, Gap, and Valence. After it had been long governed by counts called *dauphins*, it was ceded to the crown of

France in 1349. It was bounded on the W. by the river Rhone.

**Dauw, or Burchell's Zebra** (*Asinus Burchelli*), a



Dauw.

wild ass of Southern Africa, resembling the true zebra, but not so beautiful, its stripes being far less brilliant, and not distributed over the whole body. It feeds in troops on the plains, while the zebra lives in the mountains. It has been domesticated, and in the Jardin des Plantes at Paris has long been acclimatized.

**Dav'enant** (Sir WILLIAM), an English dramatic poet, born at Oxford in 1605. He succeeded Ben Jonson as poet-laureate in 1637. He was a royalist in the civil war, and was confined for two years in the Tower. His principal work is "Gondibert," an epic poem. Died April 17, 1668.

**Davenport**, a city, river-port, and important R. R. centre, capital of Scott co., Iowa (see map of Iowa, ref. 5-L, for location of county), is pleasantly situated on the Mississippi at the foot of the Upper Rapids, 330 miles above St. Louis and 184 miles W. by S. from Chicago. It occupies the base and higher parts of a bluff which rises gradually and extends along the river three miles. A fine iron R. R. and carriage bridge across the Mississippi River, built by the U. S. government and the Chicago Rock Island and Pacific R. R. co. at a cost of \$1,200,000, connects Davenport with Rock Island, containing the great central armory and arsenal of the U. S., and with the city of Rock Island, on the Illinois shore.

Davenport was founded in 1835. It contains 30 churches, Griswold College, the college of the Immaculate Conception, a large business college, a complete system of graded and parochial schools, and an opera-house.

**Manufactures.**—The census of 1880 shows 188 manufacturing establishments here; capital, \$2,806,222; average number of hands employed, 1705; wages paid, \$685,469; value of products, \$4,468,978. Lumber, agricultural machinery, and farming implements are among the principal articles, but woollen goods, glucose, furniture, cordage, clothing, pottery, carriages, steam-engines and machinery, cigars, flour, etc. are also made.

**Waterworks, etc.**—The city is supplied by an extensive system of waterworks, has fire alarm telegraph, paid fire department, telephone connections, gasworks, and electric light. Davenport is in the midst of extensive coal-fields, and is the market for a large and highly cultivated farming region. It is the see city of the Episcopal Church in Iowa, and of the Davenport diocese of the Roman Catholic Church. Pop. in 1870, 20,038; in 1880, 21,831; in 1883, about 23,000. GEO. H. BALLOU, CITY ED. OF "DEMOCRAT."

**Davenport** (EDWARD L.), an excellent actor, was born in Boston, Mass., in 1816. His *début* was at the Lion Theatre, Providence, R. I., as Passion Will to Booth's Sir Giles Overreach, which last was one of his own best characters. He first appeared in Philadelphia at the Walnut Street Theatre in 1838. He played with success in Europe and in the principal American theatres. Died at Canton, Pa., Sept. 1, 1877.

**Davenport** (F. O.), U. S. N., born Oct. 3, 1842, in Michigan, graduated at the Naval Academy in 1860, became a lieutenant in 1862, and a lieutenant-commander in 1866. He served at the naval battery near Alexandria, Va., in the summer of 1861, and on board the gunboat Scioto during the bombardment and passage of Forts Jackson and St. Philip and at the capture of New Orleans, April 24, 1862. Retired Oct. 19, 1870. FOXHALL A. PARKER.

**Davenport** (HENRY K.), U. S. N., born Dec. 10, 1820, in Georgia, entered the navy as a midshipman Feb. 19, 1838, became a passed midshipman in 1844, a lieutenant in 1852, a commander in 1862, and a captain in 1868. He was present at the capture of the "Barrier Forts," China, in 1856, and at the bombardment and capture of Forts Hatteras and Clark, N. C., in 1861. He was in command of the steamer Hetzel, North Atlantic blockading squadron, from the latter part of 1861 to the end of 1864, was in action with gunboats on James River in 1861, and commanded a column of gunboats at the capture of Roanoke Island and Elizabeth City, N. C., in 1862. He was for more than a year senior officer in the sounds of North Carolina, during which period he participated in many battles and skirmishes while co-operating with the army, at one time receiving the thanks of the officer commanding Fort Anderson for saving his troops from capture by a superior force. In 1865-66 he commanded the Lancaster and Powhatan in the Pacific Ocean, and in 1871 was appointed to the command of the frigate Congress, in which service he died Aug. 18, 1872. Captain Davenport was a thorough seaman, and when he died had seen twenty-two years of actual service at sea.

FOXHALL A. PARKER.

**Davenport** (JOHN, B. D., an eminent Puritan divine and colonist, was born at Coventry, England, in 1597, was educated at Oxford, and entered the Anglican priesthood. In consequence of his Puritanical principles and practice he was obliged to leave the Established Church in 1635. In 1637 he came to Boston, Massachusetts Bay, and in 1638 became one of the founders of the New Haven colony. In 1639 he became one of the "seven pillars" of the government. He protected Goffe and Whalley, the regicides, and in 1668 became minister of the First church, Boston, where he died Mar. 15, 1670.

**David**, a town of Colombia, in Veragua, is on the Isthmus of Panama and near the Pacific Ocean. It has a trade in coffee, hides, rice, etc.

**Da'vid** [Heb. דָּוִד, "beloved;" Gr. Δαβίδ or Δαβίδ; Arab. Dāwūd], one of the most remarkable characters in history, a son of Jesse, was born at Bethlehem in Judæa about 1080 B. C. In his youth he followed the occupation of a shepherd, and he appears to have acquired great skill as a musician. When about twenty-two years of age he was received into the household of Saul, king of Israel, who, we are told, was troubled with an "evil spirit." David, by playing upon the harp, soothed and "refreshed" Saul, and "the evil spirit departed from him." Not long afterwards, David slew in single combat a Philistine giant named Goliath, and, according to the promise of the king, received Michal, Saul's daughter, in marriage. But Saul was offended by the praises which David received for his prowess, and not only regarded his son-in-law with bitter jealousy, but made repeated attempts upon his life. David was obliged to fly for safety to Achish, king of Gath. In 1055 B. C., Saul was slain in a battle with the Philistines, after which David was made king of the tribe of Judah, reigning at Hebron for seven years, while Ishbosheth, Saul's son, was in power on the E. side of the Jordan, and for two years was obeyed by all the tribes except Judah. After the murder of Ishbosheth, in 1048 B. C., David became king of the whole nation. He was victorious in all his wars, and under his sway the kingdom of Israel acquired great prosperity and power. One of his sorest trials was the rebellion and death of his favorite son, Absalom. David died in 1015, and Solomon, his son, succeeded to the throne. In David all the feelings and passions appear to have been singularly intense and powerful, and by them he was again and again betrayed into great faults, and even crimes. Yet his character, on the whole, exhibits a rare magnanimity, as shown in his sparing Saul, his bitterest enemy, when that king was completely in his power. (See I Sam xxiv.) It should be borne in mind that David was not subjected to the powerful restraints which public opinion exercises in some directions on modern European monarchs. His fear of God and his generous feelings were the only checks to

his mighty passions and that license which long-continued success and a power all but unlimited in his own dominions tended to foster. If we consider these things, we shall probably find few sovereigns, even in the most civilized times, possessing despotic power, whose characters will bear a favorable comparison with that of David. As a writer of religious poetry, and especially of that kind which comes home to the feelings of all sorely-trying hearts, David has no equal among the poets of the human race. He wrote 73 of the 150 lyrics which compose the book of Psalms. Of the many commentaries on the Psalter, some of the ablest and most important are those of Calvin (1578–1610), Hengstenberg (1849–52), Hupfeld (1855), Delitzsch (1860–67), and Perrowne (1864–68; 2d ed. 1870). Of recent English versions, the most noteworthy are those of Noyes (1831; 2d ed. 1846) and Conant (1871). (See REV. SAMUEL CHANDLER'S "Critical History of the Life of David," 2 vols. 8vo, 1766, reprinted in one volume in 1853.)

REVISED BY R. D. HITCHCOCK.

**David I.**, king of Scotland, the sixth son of Malcolm III., was born about 1080. He married, in 1110, Maud, a great-niece of William the Conqueror. He succeeded his brother, Alexander I., in 1124, and swore to maintain the right of his niece Matilda to the throne of England in case her father, Henry I., left no male issue. Henry died in 1135, and David afterwards waged war against Stephen, who disputed her claim to the throne. David invaded England, and was defeated at Northallerton in 1138. He promoted manufactures, education, and civilization. He died in 1153, and left the throne to his grandson, Malcolm IV.

**David II.**, or **David Bruce**, king of Scotland, born in 1223, was a son of Robert Bruce, whom he succeeded in 1229. His kingdom was invaded in 1332 by Edward Baliol, who defeated the army of David. The latter was expelled, and retired to France, but his subjects continued to fight for him, and he recovered the throne in 1342. Having invaded England in 1346, he was defeated, captured, and detained until 1357. He died in 1370.

**David (FÉLICIEN-CÉSAR)**, a French musician and composer, born at Cadenet (Vaucluse) Mar. 8, 1810. He became about 1832 a disciple of Saint-Simon, and visited the Levant with eleven fellow-disciples, from which he returned to Paris in 1835; published "Oriental Melodies" (1835) for the piano, which were not successful. In 1844 he produced "The Desert," an *ode-symphonic*, which had a great success. Among his other works are "Christophe Colomb," an *ode-symphonic* (1847), "La Perle du Brésil," an opera (1851), and "Herculeum" (1859). D. Aug. 2, 1876.

**David (JACQUES LOUIS)**, a celebrated French historical painter, founder of the French classical school of painting, was born in Paris Aug. 31, 1748. He was a pupil of Vien, with whom he visited Rome in 1775. Having passed several years in Rome and painted the "Triumph of Paulus Æmilius" and other works, he returned to Paris in 1780. He was admitted into the Royal Academy in 1783, revisited Rome in 1784, and painted a picture of the "Horatii," which was greatly admired. He produced the "Death of Socrates" in 1787, and "Brutus Condemning his Sons" in 1789. In the Revolution he was a violent Jacobin. Having been elected to the Convention in 1792, he voted for the death of the king, and was an accomplice or partisan of Robespierre. He was the manager of the national festivals and spectacles during the republic. He painted at this time several pictures relating to the events of the Terror—"The Death of Marat," "The Murder of Pelletier," "The Jeu des Paumes." He was appointed first painter to Napoleon about 1804, and was banished as a regicide in 1815. He afterwards resided at Brussels, where he died Dec. 29, 1825. His body was refused burial in France. "The Rape of the Sabinæ" is regarded as his masterpiece. (See "Vie de David," etc., par M. A. TH.\*\*\*, Brussels, 1826; MIEL, "Notice sur J. L. David," 1834; DELÉCLUZE, "David et son École," 1855.)

CLARENCE COOK.

**David (JÉRÔME FRÉDÉRIC PAUL)**, BARON, a French politician, born in 1823, a grandson of Jacques Louis David, in 1859 became a member of the Corps Législatif and a leader of ultra-Bonapartist party; was in 1867, and again in 1869, vice-president of the Corps Législatif. After the resignation of the Ollivier ministry (Aug., 1870), he was minister of public works in the short-lived cabinet of Count Palikao. He wrote "Réflexions et discours sur la propriété chez les Arabes" (1862). D. Jan. 30, 1882.

**David (PIERRE JEAN)**, a French sculptor known as **David d'Angers**, born at Angers Mar. 12, 1789. He gained at Paris the first prize (with a pension) in 1811, and then went to Rome to pursue his studies. He formed a friendship with Canova, returned to France in 1816, and produced a statue of the great prince of Condé, by which he acquired a high reputation. In 1826 he became a mem-

ber of the Institute. Soon after the revolution of 1830 he was employed by the government to fill the pediment of the Pantheon with sculptures. Among his works are the statue of the young drummer-boy Barra, busts of Washington, La Fayette, Arago, Goethe, and Lamartine, and statues of Cuvier, Racine, and Jefferson. He also made a large number of portraits in bas-relief, including many of the most celebrated men and women of his time. These bas-reliefs are among the finest things of their kind produced since the Italian medals of the early Renaissance. He was a republican member of the National Assembly in 1848. D. Jan. 5, 1856. REVISED BY CLARENCE COOK.

**David City**, R. R. junction, capital of Butler co., Neb. (see map of Nebraska, ref. 10–G, for location of county), is 56 miles N. W. of Lincoln, Neb. Pop. in 1880, 1000; in 1885, 1489.

**Da'vidists**, **Da'vid-Geor'gians**, or **Jo'rists**, a sect founded by David George or Joris, otherwise called John of Bruges, an Anabaptist leader, who was born at Delft in Holland in 1501 or 1502, and died at Bâle in 1556. He pretended to be the Messiah, denied the resurrection, and held various heretical opinions. The sect existed in Holland nearly a century after his death.

**David's Island** [named from a former owner], an island of 100 acres in Long Island Sound, within the township limits of New Rochelle, Westchester co., N. Y. It was purchased in 1867 by the U. S. government for \$38,500, to be used for military purposes, and is now used as a recruiting-dépôt. Pop. in 1880, 290.

**Davidson (GEORGE)**, A. M., PH. D. See APPENDIX.

**Davidson (JAMES WOOD)** was born in 1829 in Newberry district, S. C., and graduated with honors at the South Carolina College in 1852; was professor of Greek in Mount Zion College, Winnsboro', S. C., 1854–59, and has since been an instructor, except while serving in Virginia as an officer of Lee's army. He has published a "School History of South Carolina" and "The Living Writers of the South," besides other valuable works.

**Davidson (LUCRETIA MARIA)**, an American poetess, born at Plattsburg, N. Y., Sept. 27, 1808. She wrote verses in early childhood, and is said to have composed 278 poems. Died Aug. 27, 1825. A collection of her poems was published, with a memoir, by S. F. B. Morse in 1829.

**Davidson (MARGARET MILLER)**, a poetess, a sister of the preceding, was born Mar. 26, 1823. She was distinguished for her precocity and sensibility. Died Nov. 25, 1838. Her poems were praised by Washington Irving, who wrote a memoir of her life.

**Davidson (ROBERT)**, D. D., was born at Carlisle, Pa., Feb. 23, 1808. His father was president of Dickinson College. The younger Davidson studied theology at Princeton, became president of Transylvania University, and was for some time superintendent of public instruction in Kentucky. Among his numerous writings are "History of the Presbyterian Church in Kentucky," "The Christ of God," and "Elijah, a Sacred Drama." D. Apr. 6, 1876.

**Davidson (SAMUEL)**, D. D., LL.D. See APPENDIX.

**Davidson (THOMAS)**, F. R. S., F. G. S., an English palæontologist, born May 17, 1817, at Edinburgh. He has written "British Fossil Brachiopoda" and "Illustrations and History of Silurian Life."

**Davidson (THOMAS)**, M. A. See APPENDIX.

**Davidson (WILLIAM)**, born in Lancaster co., Pa., 1746, killed in the battle at Cowan's Ford, N. C., Feb. 1, 1781. He was educated in Charlotte Academy, North Carolina, and served as a major in Washington's army until 1779, when he was sent to reinforce the army of Lincoln. In an engagement at Calson's Mill he was severely wounded, but was, nevertheless, able to take the field again a few months later on as brigadier-general. He was detached to follow the movements of Cornwallis, and if possible intercept his progress. On Feb. 1, Cornwallis proposed to cross the Catawba at Cowan's Ford. To prevent the crossing was impossible, and in the fight Davidson was shot.

**Davidson College**, Mecklenburg co., N. C., was founded in 1837. The name was given in honor of Gen. William Davidson, a Revolutionary officer who fell at Cowan's Ford on the Catawba River, not far from where the college is situated. It had its origin in an hereditary thirst for sound learning and pure religion which characterized the people of Western North Carolina from a very early period. As early as 1770 they obtained a charter from the colonial legislature to incorporate "Queen's Museum" at Charlotte in Mecklenburg county, which was the first college ever attempted in the State. This charter was repealed by royal proclamation, but the institution was not abandoned. In 1777 it was rechartered, as "Liberty

Hall," and continued its operations until 1780, when it was closed by the progress of the Revolution. Again, in 1820, earnest efforts were made in Western North Carolina to establish an institution of high grade, to be called "Western College." This also failed. The next movement began in 1835 in Concord Presbytery. This led to the establishment of Davidson College in 1837, for which a charter was obtained in 1838. Thus it appears that Queen's Museum, Liberty Hall, Western College, and finally Davidson College, have been so many successive efforts to embody in a practical, working form the intellectual and religious life of Western North Carolina. In all these efforts the Scotch-Irish Presbyterian element was predominant; and Davidson College, while its charter distinctly announces that its object is "to educate youth of all classes, without any regard to the distinction of religious denominations," is under the government and control of Presbyterians exclusively. All the presbyteries of North Carolina, South Carolina, Georgia, and Florida are now represented in its board of trustees.

The institution at the beginning received a valuable landed estate from William Lee Davidson, Esq., the son of Gen. Davidson. Upon this land the college buildings were erected. The college did not attain to its present efficient equipment until after the munificent bequest of \$258,000 by Mr. Maxwell Chambers of Salisbury, N. C. It has seven professors and two organized courses of instruction—the one literary, and the other scientific. It has graduated 481 students, and of those who have gone out from its halls, 137 have entered the gospel ministry.

The Rev. R. H. Morrison, D. D., to whose enlightened Christian zeal and well-directed energy Davidson College owes its existence and much of its prosperity, was its first president. He was succeeded by the Rev. Samuel Williamson, D. D., in 1841; the Rev. Drury Lacy, D. D., became president in 1854, the Rev. J. L. Kirkpatrick, D. D., in 1860, and the Rev. G. Wilson McPhail, D. D., LL.D., in 1866. In 1871, when the presidency again became vacant by the death of Dr. McPhail, the trustees determined to substitute the office of chairman for the presidency of the college, and Prof. J. R. Blake was elected to the new office. In 1877, Rev. A. D. Hepburn, D. D., LL.D., was elected president, and was succeeded in 1885 by Rev. T. D. Witherspoon, D. D. J. R. BLAKE.

**Da'vie** (WILLIAM RICHARDSON), GENERAL, was born in England June 20, 1756, and emigrated to America in early youth. He graduated at Princeton in 1776, served as colonel in the Revolutionary war, and was a delegate from North Carolina to the convention which formed the Federal Constitution in 1787. In 1799 he was chosen governor of North Carolina. Died Nov. 8, 1820.

**Da'vies** (CHARLES), LL.D., an American officer and mathematician, born Jan. 22, 1798, in Washington, Conn., graduated at West Point in 1815. After a year in garrison at New England posts, he resigned Dec. 1, 1816, and was attached to the Military Academy as assistant professor till May 1, 1823, when he was appointed professor of mathematics, holding this position till May 31, 1837, when he again resigned for a like position in Trinity College, Hartford, Conn. He was appointed paymaster U. S. A. Nov. 17, 1841, holding office till Sept. 30, 1845, and was subsequently professor of mathematics and philosophy in the University of New York 1848-49, and of higher mathematics in Columbia College, New York City, 1857-65. After leaving West Point in 1837 he devoted most of his time and talents to the preparation of a complete series of mathematical text-books, adopted largely in public schools. He was a member of several scientific and educational associations. Died Sept. 18, 1876. GEORGE W. CULLUM.

**Davies** (HENRY E., JR.), an American lawyer and general, born in New York July 2, 1836, educated at Harvard, Williams, and Columbia Colleges, studied law, and was admitted to the bar in 1857. In April, 1861, he entered the army as captain Fifth New York Volunteers—was transferred July, 1861, as major to the Second New York Cavalry, of which regiment he subsequently became colonel, remaining in command till Sept., 1863, when he was commissioned a brigadier-general of volunteers, and assigned to a command in the cavalry corps of the Army of the Potomac, serving with distinction till the close of the war (brevet major-general of volunteers Oct., 1864). In June, 1865, he was made a major-general, and assigned to the command of the middle district of Alabama, which he held till Jan. 1, 1866, when he resigned. He was public administrator of the city of New York from Jan., 1866, to Jan., 1869, and assistant district attorney of the southern district of New York from July 20, 1870, to Dec. 31, 1872. G. C. SIMMONS.

**Davies** (Sir JOHN), an English poet and judge, born in Wiltshire in 1570, was educated at Oxford. He was ap-

pointed solicitor-general of Ireland in 1603, and published in 1612 an able work on the political state of Ireland. In 1620 he was elected a member of the English Parliament. His chief poem is entitled "Nosco Teipsum" (1599). He became lord chief-justice in 1626, and died Dec. 7, in the same year.

**Davies** (SAMUEL), D. D., a Presbyterian divine and eminent pulpit-orator of Welsh descent, was born near Summit Ridge, Newcastle co., Del., Nov. 3, 1723. He spent some years as a sort of missionary in Hanover co., Va. He was one of the founders of the College of New Jersey, and succeeded Jonathan Edwards as president of it in 1759, and died Feb. 4, 1761. A collection of his sermons was published in London soon after his death. The last American edition, in three volumes (1849), which claims to be complete, contains an essay on the life and times of the author by Rev. Albert Barnes. President Davies takes rank among the greatest of pulpit orators.

**Davies** (THOMAS), famous as the author of the "Life of David Garrick" (1780), was born probably in 1712, studied at Edinburgh, and became an unsuccessful actor in London, where he was also a bookseller and publisher. He was a friend of Dr. Samuel Johnson, who was warmly attached to him. Attacked by Churchill in the "Rosciad," he was compelled by ridicule to leave the stage. Died in 1785. (See BOSWELL'S "Life of Johnson.")

**Davies** (THOMAS A.), an American officer and merchant, born in 1809 in St. Lawrence co., N. Y., graduated at West Point in 1829. He served as lieutenant of infantry on garrison duty till he resigned Oct. 31, 1831; civil engineer on the Croton Aqueduct, New York, 1831-33 and 1840-41; and merchant in New York City 1833-39 and 1841-61. At the beginning of the civil war he resumed the military profession as colonel of Sixteenth New York volunteers, was appointed brigadier-general U. S. volunteers May 7, 1862, and served in Manassas campaign 1861, engaged at Bull Run; in Mississippi campaign 1862, engaged in the siege of Corinth; in Northern Mississippi 1862, engaged in the battle of Corinth, and command of various districts 1862-65. Brevet major-gen. U. S. volunteers July 11, 1865, for gallant and meritorious services, and mustered out Aug. 24, 1865. GEORGE W. CULLUM.

**Davies** (JOSEPH H.), an American lawyer and patriot, born in Bedford co., Va., Mar. 4, 1774, studied law and attained a high position in his profession, was U. S. attorney for the district of Kentucky, and vigorously opposed Aaron Burr in 1806. He was mortally wounded at the battle of Tippecanoe Nov. 7, and died Nov. 8, 1811. Several counties in the U. S. were named in his honor.

**Da'vila** (ENRICO CATERINA), an Italian historian, born at Sacco, near Padua, Oct. 30, 1576. He was educated at Paris, and entered the service of Henry IV. of France, and about 1606 the service of the Venetian republic, and commanded with success in several actions. He published in 1630 a "History of the Civil Wars of France 1559-98" ("Historia della Guerre Civili," etc.). Died in July, 1631.

**Davis** (ANDREW JACKSON), a clairvoyant and prominent Spiritualist, was born Aug. 11, 1826, at Blooming Grove, Orange co., N. Y. His first work, "The Principles of Nature, her Divine Revelations," etc. (1845), professes to have been dictated by him under spiritual influence, at a time when he had received almost no education. He has since published a number of other works, of which the principal is "The Great Harmonia" (5 vols., 1850-59). (See "The Magic Staff, an Autobiography of A. J. Davis," 1857.)

**Davis** (BENJAMIN F.), an American officer, born in Alabama in 1832, graduated at West Point in 1854, and served with distinction in the infantry and dragoons in New Mexico. In 1862 he became colonel of the Eighth New York Cavalry, and while leading a brigade to the charge was instantly killed, June 9, 1863, at the combat of Beverly Ford, Va.

**Davis** (CHARLES A.), an able Methodist Episcopal preacher, born Oct. 7, 1802, was admitted to preach in the Baltimore Conference in 1824. He occupied several of the most important pulpits of his denomination. After the division of his Church into two bodies he joined the Methodist Episcopal Church South. Becoming a post-chaplain of the U. S. navy, he advocated the national cause during the civil war, and united again with the Methodist Episcopal Church. He died at the Naval Hospital, Norfolk, Va., Feb. 20, 1867.

**Davis** (CHARLES HENRY), LL.D. U. S. N., born Jan. 16, 1807, in Boston, Mass., entered the navy as midshipman Aug. 12, 1823, became passed midshipman in 1829, lieutenant in 1834, commander in 1854, captain in 1861, commodore in 1862, and rear-admiral in 1863. In 1859, Davis was appointed superintendent of the American "Nautical



**Almanac.** In 1861 we find him a member of a board of officers assembled at Washington to inquire into and report upon the condition of the Southern coast, its harbors and inlets, with a view to offensive operations on the part of the government. This led to the organization of the expedition against Port Royal, in which Davis bore a conspicuous part as chief of staff. His services prior to and at the capture of Port Royal may be best gathered from Flag-Officer Dupont's official report of Nov. 11, 1861, in which, referring to Charles H. Davis, he says: "I have yet to speak of the chief of my staff and fleet-captain, Commander Davis. In the organization of our large fleet before sailing, and in the preparation and systematic arrangement of the details of our contemplated work—in short, in all the duties pertaining to the flag-officer—I received his most valuable assistance. He possesses the rare quality of being a man of science and a practical officer, keeping the love of science subordinate to the regular duties of his profession. During the action he watched over the movements of the fleet, kept the official minutes, and evinced that calmness in danger which, to my knowledge for thirty years, has been a conspicuous trait in his character." On the 9th of May, 1862, Davis relieved Flag-Officer Foote of the command of the Western flotilla off Fort Pillow, and on the following day beat off a squadron of eight iron-clads, which had steamed up the Mississippi and attacked him. The vessels with Davis at the time were seven in number. The action was a spirited one, and lasted nearly an hour; three of the hostile gunboats were disabled, but, taking refuge under the guns of Fort Pillow, could not be captured. On the 5th of June Fort Pillow was abandoned by the Confederates, and on the 8th Davis fell in with their iron-clads and rams opposite the city of Memphis. A running fight ensued, resulting in the capture of all the Confederate vessels but one, and the surrender of Memphis. For his services during the civil war Davis received the thanks of Congress and was made a rear-admiral. On his return from the Mississippi he was appointed chief of the bureau of navigation, and in 1865 superintendent of the Naval Observatory, in which capacity he served for two years, when he was detailed as commander-in-chief of our squadron on the coast of Brazil, where he remained until 1869. On his return to the U. S. he was ordered to Washington on special duty, and in 1870 was appointed to the command of the U. S. navy-yard at Norfolk, Va. Died at Washington, D. C., Feb. 18, 1877. FOXHALL A. PARKER.

**Davis (DANIEL)**, an American lawyer, the father of Admiral C. H. Davis, was born at Barnstable, Mass., May 8, 1762, settled at Portland, Me. (then called Falmouth), in 1782, and held many prominent offices in Massachusetts, of which Maine was then a part. In 1804 he removed to Boston, and in 1832 to Cambridge, Mass., where he died Oct. 27, 1835. He was the author of several legal works.

**Davis (DAVID)**, LL.D., an American jurist, born in Cecil co., Md., Mar. 9, 1815, educated at Kenyon College, O., studied law with Judge Bishop in Lenox, Mass., and in the Law School at New Haven, Conn. In 1836 he settled in Bloomington, Ill., where he continues to reside; he was elected to the lower house of the Illinois legislature 1844-45, to the constitutional convention which framed a new constitution for the State 1847; elected judge of the eighth judicial circuit of Illinois in 1848, re-elected in 1855, and again in 1861. While serving this last term he was appointed by President Lincoln an associate justice of the Supreme Court of the U. S. Oct., 1862. He resigned as U. S. judge, and was elected U. S. Senator from Illinois for the full term 1877-83; pres. *pro tem.* of U. S. Senate Oct. 13, 1881-Mar. 3, 1883.

**Davis (EDWIN HAMILTON)**, M. D., an American archæologist, born in Ross co., O., Jan. 22, 1811; graduated at Kenyon College in 1833. He became professor of materia medica and therapeutics in the New York Medical College in 1850. He wrote "Monuments of the Mississippi Valley" (in vol. 1. of the "Smithsonian Contributions"), etc.

**Davis (EMERSON)**, D. D., a Congregational divine and author, born at Ware, Mass., July 15, 1798, and graduated at Williams College in 1821, was for some time tutor in that college and preceptor in the academy at Westfield, Mass. He became in 1836 pastor of the First Congregational church in the latter town, where he remained for life, greatly honored and beloved, and exerting a wide and very useful influence, especially in educational affairs. In 1847 he received the degree of D. D. from Harvard College. He was vice-president of Williams College from 1861 to 1868. He published "The Teacher Taught" (1839), "History of Westfield" (1826), "The Half Century" (1852), and various minor essays, sermons, etc., besides five manuscript volumes of biographical writings, as yet unpublished. Died at Westfield, Mass., June 8, 1866.

**Davis (GARRET)**, born in Mount Sterling, Ky., Sept. 10, 1801, was admitted to the bar in 1823, became a Whig member of Congress (1839-47), and a Democratic U. S. Senator from Ky. (1861-72); was very active in preventing the secession of his native State in 1861. D. Sept., 1872.

**Davis (GEORGE LEONARD)**, U. S. N., born Aug. 10, 1833, in Massachusetts, entered the navy as a paymaster April 16, 1861, and commanded the powder division of the steamship Pensacola at the passage of Forts St. Philip and Jackson and capture of New Orleans in 1862. His services on that occasion are thus honorably mentioned in the official report of the executive officer of the Pensacola to Capt. Henry W. Morris of April 30, 1862: "The powder division was perfectly served under the command of Paymaster George L. Davis. Its good order and efficiency are worthy of special notice." Retired Jan. 17, 1881. Died Dec. 3, 1884. FOXHALL A. PARKER.

**Davis (GEORGE T.)**, U. S. N., born May 20, 1844, in Massachusetts, graduated at the Naval Academy as ensign in 1863, became a master in 1866, a lieutenant in 1867, and a lieutenant-commander in 1868. He was attached to the iron-clad steamer New Ironsides in 1863-64, during her various engagements with the forts and batteries in Charleston harbor, and was in both attacks on Fort Fisher in 1865; commander 1883; 1882-84 lighthouse inspector.

FOXHALL A. PARKER.

**Davis (GEORGE T.)** was born in Sandwich, Mass., Jan. 12, 1810, graduated at Harvard College in 1829, was admitted to the bar in 1832, was a State senator in Massachusetts several terms, and a Representative in Congress (1851-53). Died at Portland, Me., June 17, 1877.

**Davis (HENRY)**, D. D., an American Presbyterian divine, was born at East Hampton, N. Y., Sept. 15, 1771, and graduated at Yale in 1796. He was for seven years a tutor in Williams and Yale colleges; professor of Greek at Union College, Schenectady, N. Y., 1806-09; president of Middlebury College, Vt., 1809-17; president of Hamilton College, Clinton, N. Y., 1817-33. He was a preacher of very eminent ability, one of the founders of Auburn Theological Seminary, and an active friend of foreign missions. Died at Clinton, N. Y., Mar. 8, 1852.

**Davis (HENRY WINTER)**, LL.D., an American statesman, born at Annapolis, Md., Aug. 16, 1817. He was elected a member of Congress by the voters of Baltimore in 1855 and 1857. He was an eloquent speaker, and acted with the "American" party. In 1859 he was re-elected. Soon after the civil war began he became a radical Republican. He was chairman of the committee of foreign affairs in the Thirty-eighth Congress (1863-65). Died Dec. 30, 1865.

**Davis (ISAAC)**, LL.D., born in Northboro', Worcester co., Mass., June 2, 1799, and graduated at Brown University (of which he became one of the fellows) in 1822. He had an extensive and lucrative legal practice in Worcester, Mass., where he long resided. He was president of the Massachusetts Baptist State Convention 1833-40, president of board of trustees of Worcester Academy 1833-73, Democratic candidate for governor of Massachusetts in 1845, 1846, and 1861, mayor of Worcester in 1856, 1858, 1861, member of the State senate in 1843-54, member of governor's council 1851, member of the house of representatives (State) and chairman of committee on judiciary in 1852, member of the Massachusetts constitutional convention in 1853, and member of the Massachusetts board of education in 1852-60. Mr. Davis was a liberal and judicious patron of education, and was one of the most respected and influential citizens of Massachusetts. His "Addresses, Speeches, and Historical Discourses" have been published. D. Mar. 31, 1883.

**Davis (Rev. JAMES)**, an English dissenter, born in Kent June 1, 1812, graduated at Cheshunt College, became a preacher of London, and was many years secretary of the British branch of the Evangelical Alliance. He was a delegate of the Alliance at its meeting in New York in 1873.

**Davis (JEFFERSON)**, LL.D., an officer and statesman, born June 3, 1808, in Christian co., Ky., graduated at West Point 1828, served as lieutenant of infantry at Western posts 1828-33, of First Dragoons as adjutant 1833-34, and on frontier service 1834. After resigning June 30, 1835, he became a cotton planter in Warren co., Miss., 1835-46, presidential elector from Mississippi 1844, member U. S. House of Representatives 1845-46, colonel First Mississippi Rifle Volunteers in the war with Mexico 1846-47, engaged at Monterey and Buena Vista (severely wounded), member of the U. S. Senate 1847-51, and chairman of the committee on military affairs 1849-51, secretary of war in President Pierce's cabinet 1853-57, member of the U. S. Senate and chairman committee on military affairs 1857-61, President of the Southern Confederacy Feb. 4, till captured May 10, 1865, at Irwinville, Ga., prisoner of war 1865-67 at Fort

Monroe, Va. He was released on bail, and finally set free in 1868; wrote "Rise and Fall of the Southern Confederacy." GEORGE W. CULLUM.

**Davis** (JEFFERSON C.), an American general, born in Clarke co., Ind., Mar. 2, 1828. He was one of the garrison of Fort Sumter when it was bombarded by the insurgents in April, 1861. He commanded a division at the battle of Stone River, which ended Jan. 2, 1863, and a corps of the army of Gen. Sherman in the march from Atlanta to the sea, in Nov. and Dec., 1864. D. Nov. 30, 1879.

**Davis** (JOHN), a celebrated English navigator of the sixteenth century, died 1605, made three voyages to find the N. W. passage to the East Indies. On the first he discovered the strait bearing his name, 1585; on the third, 1587, he reached the strait, afterward explored by Hudson. (See his "The World's Hydrographical Description," 1595.)

**Davis** (JOHN), LL.D., born in Plymouth, Mass., Jan. 25, 1761, graduated at Harvard in 1781, became a lawyer of Plymouth in 1786. After holding other important offices, he became in 1795 comptroller of the U. S. treasury, in 1796 Massachusetts district attorney, and in 1801 U. S. district judge for Massachusetts. He was an eminent antiquary and a learned scientist. Died at Boston, Mass., Jan. 14, 1847. He was a prominent member of many learned societies, and published several addresses and papers, chiefly upon scientific and historical subjects.

**Davis** (JOHN), LL.D., an American Senator, was born in Northborough, Mass., Jan. 13, 1787, and graduated at Yale in 1812. He was elected a member of Congress in 1824, and governor of Massachusetts 1833-35 and 1840-41. In 1835 he was chosen a Senator of the U. S. for six years by the Whigs, and again elected in 1845. He advocated a protective tariff. He was often called "Honest John Davis." Died April 19, 1854.

**Davis** (JOHN A. G.), an able jurist of Albemarle co., Va., was born in 1801 in Middlesex co., Va., and graduated at William and Mary College, where he was a law professor 1830-40; he was also a practising lawyer, and for some time a journalist at Charlottesville. He wrote a number of valuable legal works. Died Nov. 14, 1840.

**Davis** (JOHN CHANDLER BANCROFT), an American lawyer, born at Worcester, Mass., Dec. 29, 1822, educated at Harvard College, studied law and followed the practice of his profession. In 1849 he was appointed secretary of legation at London, but returned to the U. S. in 1852, and resumed his profession. He was assistant secretary of state 1869-71, agent of the U. S. at Geneva during the meeting of the tribunal of arbitration for the settlement of all points of difference between the U. S. and Great Britain 1871-72; assistant sec. of state 1873-75; U. S. minister at Berlin in 1875, and judge of the U. S. court of claims 1877; assistant secretary of state 1881-82.

**Davis** (Sir JOHN FRANCIS), BART., K. C. B., an English officer and Orientalist, was born in London in 1795. He first went to China in 1816. He was chief superintendent at Canton, and in 1841-48 governor of Hong Kong. Among his works is "The Chinese, a General Description of China and its Inhabitants" (2 vols., 1836). He has written several works upon Chinese literature.

**Davis** (JOHN LEE), U. S. N., born Sept. 3, 1825, at Carlisle, Sullivan co., Ind., entered the navy as a midshipman Jan. 9, 1841, became a passed midshipman in 1847, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, and a captain in 1873. In Nov., 1849, Davis, with one of the boats of the *Preble*, carrying two officers and twelve men, boarded and captured a piratical Chinese junk off Macao, killing three of her crew and taking the rest prisoners. He was the executive officer of the *Waterwitch* in her engagement (Oct. 12, 1861) with the Confederate ram *Manassas*, and afterwards with a squadron off Pilot Town, at the mouth of the Mississippi. He commanded the gun-boat *Wissahickon* in the fights with Fort McAllister of Nov. 19, 1862, and of Jan. 27, Feb. 1, and Feb. 28, 1863. On Mar. 9, 1863, off Charleston he sunk the blockade-runner *Georgiana*, and on June 5, 1863, chased the *Isaac Smith* ashore off Fort Moultrie, where she was destroyed. In command of the iron-clad *Montauk* he participated in all the battles of the summer and fall of 1863 in Charleston harbor with Forts Sumter, Gregg, Moultrie, and Wagner and Batteries Bee and Cumming's Point. In command of the *Sassacus* he took part in the Fort Fisher fights, and was recommended for promotion by Admiral Porter. He was one of the members of the board of 1866-67 appointed to examine volunteer officers for admission into the navy; member of lighthouse board 1873-76; commanded the *Trenton*, flagship of European station, 1877-79. He became commodore; was made acting rear-admiral on Asiatic station 1883. FOXHALL A. PARKER.

**Davis** (JOHN W.), M. D., a politician, was born in 1790

in Lancaster, Pa., completed his medical studies at Baltimore, and in 1823 became a resident of Indiana, where he was soon chosen to fill responsible public offices. He was elected a surrogate, was twice Speaker of the Indiana house of representatives, a commissioner to treat with the Indians, was a Democratic member of Congress, elected in 1835, in 1839, and in 1843, when he was chosen Speaker of the House of Representatives at Washington. In 1848 he became U. S. commissioner to China, was governor of Oregon Territory (1853-54), and in 1852 was president of the convention at Baltimore which nominated Franklin Pierce for President. Died at Carlisle, Ind., Aug. 22, 1859.

**Davis** (MATTHEW L.), an American writer, born in New York in 1766, was an intimate friend of Aaron Burr. His chief work is "Memoirs of the Life of Aaron Burr" (2 vols., 1836-37). Died June 21, 1850.

**Davis** (NATHAN SMITH), M. D., was born at Greene, Chenango co., N. Y., Jan. 9, 1817, and received his medical education at Geneva, N. Y. He was in 1848 editor of the "Annalist" in New York City. Since 1849 he has been a resident of Chicago. He was editor of the "Chicago Medical Journal" (1849-59), and in 1860 became editor of the "Chicago Medical Examiner." He has published a volume on "Agriculture," a "History of Medical Education," "Clinical Lectures" (1873), and other works. He is professor of the principles and practice of medicine in Chicago Medical College.

**Davis** (NATHANIEL), of Limestone, Ala., served in the house and senate of that State from 1840 to 1852. He was uneducated, but not without considerable natural gifts. He died in 1853.

**Davis** (NICHOLAS), a Virginian who settled in Limestone, Ala., was a representative in the first legislature held in Alabama, and served subsequently in the senate from 1820 to 1828.

**Davis** (NOAH), a Baptist divine, born near Salisbury, Mass., July 28, 1802, entered the ministry in Norfolk, Va. He was one of the founders of the Baptist General Tract Society (established in 1824, afterwards the American Baptist Publication Society), of which he became the manager. He removed to Philadelphia, where he fulfilled his duties in the Tract Society with great energy and success. Died July 30, 1830.

**Davis** (NOAH), an American jurist, born at Haverhill, N. H., Sept. 10, 1818, attended the district school at Albion, N. Y., whither his parents had removed in 1825, then the seminary at Lima, and was admitted to the bar in 1841. In 1844 he entered into partnership with Sanford E. Church, afterwards judge of the court of appeals, with whom he practised law in Albion for about fourteen years. He was appointed a justice of the supreme court of New York upon the resignation of Hon. James Mullett, in which dignity he continued through the two terms succeeding, until in 1864 he resigned in order to take a seat in Congress. He commenced the practice of law in New York City in 1869, and the same year again took a seat in Congress, resigning in 1870 in order to assume the duties of U. S. attorney for the southern district of New York, and was elected judge of the supreme court of the same district in 1873. There devolved upon him the conduct of the important trials of Edward Stokes for the murder of Fisk and of William M. Tweed for malfeasance in office.

**Davis** (PAULINA WRIGHT). See APPENDIX.

**Davis** (REUBEN), a native of Tennessee, was born Jan. 18, 1813. He was a physician, and afterwards a lawyer and judge in Mississippi, serving on the bench of the high court of errors and appeals, was for a time colonel of Mississippi Rifles in the Mexican war, and was twice elected to Congress from Mississippi before the late civil war, during which he favored the Confederate cause.

**Davis** (THOMAS T.) was born at Middlebury, Vt., Aug. 22, 1810, graduated at Hamilton College, Clinton, N. Y., in 1831, and was admitted to the bar in 1833. In 1862 and 1864 he was elected a representative to Congress from New York. He is well known as a manufacturer, and is connected with coal-mining and railroad interests.

**Davis** (TIMOTHY) was born in Gloucester, Mass., April 12, 1821, learned the printer's trade, and was afterwards a merchant of Boston, Mass. He was elected in 1854 and 1856 to Congress from the Gloucester district of Massachusetts, and in 1861 was appointed to a position in the Boston custom-house by President Lincoln.

**Davis's Strait** [named in honor of Capt. John Davis, noticed above] connects Baffin's Bay with the Atlantic Ocean, and lies between Greenland and British North America. It is about 160 miles wide at the narrowest part. A constant current runs southward through this strait from the circumpolar regions. Davis's Strait is frequented by many whaling ships, and became, after its discovery, in

1585, the starting-point for the expeditions to find the north-west passage to India.

**Davits** (plu.), [etymology uncertain], the wooden or iron frame used for hoisting and lowering boats on ship-board. The "fish-davit" is a gaff used in fishing the anchor. Boat-davits have been to some extent superseded by ingenious BOAT-LOWERING APPARATUS (which see).

**Davors** (Jo.), author of a work, now rare and valuable, called "The Secrets of Angling" (London, 1613). This work is quoted by Walton, and the writer's name is doubtless a fictitious one. The authorship has been ascribed to John Donne, John Davisson, John Davies, and other writers of that day.

**Davoud Pasha**, a Turkish minister, born in Mar., 1816, is a Catholic Armenian. He studied at Berlin, and became professor at the military college at Constantinople. He afterwards was secretary of the embassy at Berlin, became director of the construction of telegraphs, and in 1861 was appointed governor of Lebanon during the strife between the Druses and the Maronites, which post he resigned in 1868, becoming minister of public works.

**Davout, or Davoust** (LOUIS NICOLAS), duke of Auerstadt and prince of Eckmühl, an able French marshal, born near Noyers (Yonne) May 10, 1770. He was a fellow-student of Bonaparte at Brienne, and entered the army in early youth. In 1793 he gained the rank of general of brigade, and in 1798 went with Bonaparte to Egypt. He became a general of division in 1800, and commanded the cavalry of the army of Italy in that year. Having received a marshal's baton in 1804, he led the right wing at Austerlitz in Dec., 1805, and defeated the Prussians at the battle of Auerstadt, Oct. 14, 1806. For his services at Eckmühl he was created prince of Eckmühl in 1809. He took part in the Russian campaign of 1812, and was wounded at Borodino. He was afterwards governor of the Hanse Towns, and defended Hamburg for several months against the allies. During the Hundred Days (1815) he was Napoleon's minister of war. He was commander-in-chief of the French armies in 1815, after the battle of Waterloo. Died June 4, 1823. (See CHÉNIER, "Vie du Maréchal Davout," 1866.)

**Davy** (SIR HUMPHRY), BART., F. R. S., a celebrated English chemist, was born Dec. 17, 1778, at Penzance, Cornwall. At an early age he displayed a taste for fiction and poetry, and when eleven years old is said to have composed part of an epic of which the hero was Diomedes, son of Tydeus. Even in this work he manifested great powers of imagination and invention. He has left some respectable fugitive poems of a later date. His father died when he was sixteen, and shortly after this event Gregory Watt, son of the inventor James Watt, took lodgings at his mother's house. The young men were congenial in tastes, and a warm intimacy grew up between them, which seems to have played an important part in determining the studies and directing the genius of young Davy. But to Mr. Davies Gilbert the cause of science is still more indebted for the encouragement which he early gave to Davy, and finally for presenting him to the notice of the Royal Institution in London. He was associated in 1798 with Doctor Beddoes at Bristol in the Pneumatic Institution founded by that gentleman. The next year appeared his first contribution to science, under the name of "Essays on Heat and Light, with a New Theory of Respiration," which formed part of a volume published by Doctor Beddoes. In 1800 his "Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide and its Respiration," attracted much attention among scientists. These "Researches" made known his discovery of the peculiar intoxicating or exhilarating properties of nitrous oxide gas, and contain, besides, the results of interesting and dangerous experiments on the respiration of nitrogen, hydrogen, carburetted hydrogen, carbonic acid, and nitrous gases. In 1801 he lectured for the first time before the Royal Institution, in which he was made a professor in 1802. He was pre-eminently successful as a lecturer. In 1807 he delivered before the Royal Society his second Bakerian lecture, in which he gave an account of the decomposition by galvanism of the fixed alkalies, his great achievement, by which he proved that these alkalies are merely metallic oxides. It has been justly said that since the time of Sir Isaac Newton no contribution has been made to the "Philosophical Transactions" equal in importance to Davy's account of this great discovery. It is lamentable that one whose intellectual gifts were of so high an order should not have been above the intoxication of fame. Yet it is true that after Davy's rapid rise to fame he was sometimes guilty of an overbearing spirit, especially in his relation to younger seekers for distinction, a circumstance the less justifiable when we consider how much he himself owed to the kindness and generosity of scientific men. He was knighted in 1812, and not long

afterwards he married a widow (Mrs. Apreece) of accomplishments and fortune. He was made a baronet in 1818. One of the most important of his inventions is the safety-lamp (1815-17). He became president of the Royal Society in 1820, and was elected to that office for seven succeeding years. In 1827 his failing health compelled him to resign. He died May 28, 1829, at Geneva.

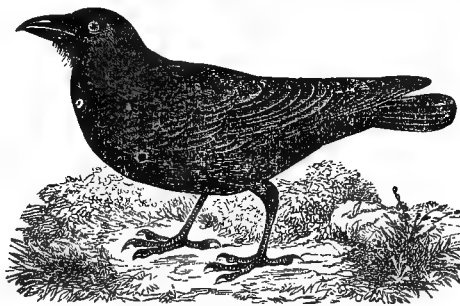
The following are a few of his many important works: "Elements of Chemical Philosophy" (1812); "Elements of Agricultural Chemistry" (1813); papers concerning "Fire-Damp," etc. and accounts of his researches relating to "Oxymuriatic Acid" and "Fluoric Compounds." After his death were published his "Consolations in Travel," consisting principally of reflections and speculations of a religious nature. Davy appears to have been endowed to the fullest extent with all those gifts necessary to a profound student of the laws of nature. His intellect was at once comprehensive and penetrating, and he possessed, in addition, an inexhaustible invention and fertility in resources, joined to an enthusiasm which no difficulties could discourage. (See "Life of Sir Humphry Davy," by Dr. J. A. PARIS, 1831; "Memoirs of the Life of Sir Humphry Davy," by his brother, DR. JOHN DAVY, 1836.)

REVISED BY J. THOMAS.

**Davy** (JOHN), M. D., a brother of Sir Humphry Davy, was born at Penzance, Cornwall, May 24, 1791, received his medical education at Edinburgh, graduating in 1814; entered the British army service, and was on duty chiefly in foreign parts. He published various professional and other works, of which the best known is a "Life" of his illustrious brother. He was himself an able scientific observer. Died April 24, 1868.

**Davy's Safety-Lamp**, invented by Sir Humphry Davy (1815-17), consists of a common oil lamp surrounded by wire gauze of 400 meshes to the square inch. It is used in coal-mines where fire-damp abounds. The explosion of fire-damp was formerly a very frequent cause of the destruction of life and property. This loss has been materially diminished by the safety-lamp. The principle is as follows: When fire-damp (light carburetted hydrogen gas mixed with air) is touched by a flame it explodes with great violence, but its flame cannot pass through fine wire netting, because the wire conducts away the heat, leaving the gas on the outside too cold to take fire, for it happily requires an intense heat to inflame the fire-damp. The space within the wire netting sometimes becomes filled with the flame. It is customary in well-regulated mines for the workmen to withdraw at such times until after good ventilation has been restored. The safety-lamp is unfortunately no protection against the very explosive "white-damp," which is charged with sulphuretted hydrogen. This gas is readily detected by its smell, which resembles that of rotten eggs. It is fatally poisonous to miners even when much diluted with air. Latterly, various other safety-lamps have been invented, but thus far there is no absolute protection against the explosion of gases in coal-mines. Vigilance in observing the signs of the presence of dangerous gases, and in securing good ventilation, is indispensable to safety. Recent observations appear to show that terrestrial magnetism has a certain influence, as yet unexplained, upon the generation of these gases.

**Daw, or Jackdaw**, the *Corvus monedula*, a bird of the crow family, found in Europe, Asia, and Africa, fourteen inches long, black, with a smoky-gray neck. Daws



Daw, or Jackdaw.

are very cunning, social, and active birds, often nesting in church-towers and old castles. They build a nest of sticks, of which they sometimes collect a large quantity. They frequent large towns.

**Dawes** (HENRY LAURENS), an American lawyer and statesman, born at Cummington, Mass., Oct. 30, 1816, graduated at Yale in 1839, was newspaper editor, and studied and practised law. He was a member of both

houses of the legislature of Massachusetts, district attorney, and has been a member of Congress since 1857, and occupied a prominent position as chairman of the committee on appropriations and that of ways and means. He has been U. S. Senator from Massachusetts since 1875.

**Dawes** (Rev. WILLIAM RUTTER). See APPENDIX.

**Dawson** (BOGUMIL), a German actor, born at Warsaw May 18, 1818, of Jewish stock. From 1852 to 1866 he was engaged at the Royal Theatre in Dresden, where his renderings of Shakespeare's, Goethe's, and Schiller's characters were much admired. From 1866 to 1868 he was in America. Died Feb. 2, 1872.

**Dawson**, on R. R., capital of Terrill co., Ga. (see map of Georgia, ref. 6-G, for location of county). It has a car-factory, and contains the South Georgia Male Institute. Pop. in 1870, 1099; in 1880, 1576.

**Dawson** (HENRY BARTON), an historian, was born at Gosherton, Lincolnshire, England, June 8, 1821, and with his parents came to the U. S. in 1834. In 1845 he became a temperance journalist in New York. He has published several historical and antiquarian works, chiefly relating to the Revolutionary period in the U. S. He has been a Democratic editor in Yonkers, N. Y. (1855-66), and in the latter year became editor of the "Historical Magazine."

**Dawson** (JOHN WILLIAM), LL.D., F. R. S., an eminent geologist, born at Pictou, Nova Scotia, Oct., 1820. He was educated at the University of Edinburgh. Under the direction of Sir Charles Lyell he made explorations in the province of Nova Scotia in 1841, and gave an account of its geology in the "Proceedings of the Geological Society of London." He was appointed superintendent of education in Nova Scotia in 1850, and principal of McGill College at Montreal 1855, of which he is now vice-chancellor. In 1848 he published a "Handbook of the Geography and Natural History of Nova Scotia," "Hints to the Farmers of Nova Scotia" (1853), "Acadian Geology" (1855; enlarged ed. 1868), "Archæia, or Studies of the Cosmogony and Natural History of the Hebrew Scriptures" (1859); also an excellent popular treatise on geology, published serially in the "Leisure Hour" (1871-72), republished (1873) under the title "The Story of the Earth and Man." He has contributed numerous geological memoirs and articles to the "Proceedings of the Geological Society of London," "The Canadian Naturalist," "Silliman's Journal," and other periodicals. He is author of the admirable article on Geology published in this work, "The Origin of the World," 1877; "Fossil Men and their Modern Representatives," 1880. In 1882 became pres. of Royal Society of Canada.

**Dawson** (LUCIEN L.), U. S. M. C., born Feb. 5, 1837, in Kentucky, entered the marine corps as second lieutenant Jan. 13, 1859, became a first lieutenant early in 1861, and a captain Nov. 23 of the same year. He was brevetted major for gallant and meritorious services at the assault on Fort Fisher on Jan. 15, 1865, where he led the marines of the fleet. Resigned Dec. 20, 1880. FOXHALL A. PARKER.

**Dawson** (WILLIAM C.), a distinguished lawyer, jurist, and statesman of Georgia, born Jan. 4, 1798, was educated at the university of the State, graduated in 1816, studied law at Litchfield, Conn., and settled at Greensboro', Ga., in his native county. For twelve years he was clerk of the house of representatives of the general assembly of the State. He was several times a member of the house and senate of the State legislature. He was a member of the House in the Federal Congress from 1837 to 1842; afterwards he was judge of the superior courts in his State, and U. S. Senator 1849-55. He died May 5, 1856.

**Dawsonville**, capital of Dawson co., Ga. (see map of Georgia, ref. 2-G, for location of county), about 50 miles N. N. E. of Atlanta. Pop. in 1880, 199.

**Dax** (anc. *Aque Augustæ*), a town of France, department of Landes, is pleasantly situated on the Adour, 25 miles N. E. of Bayonne. It has a cathedral, a bishop's palace, and some manufactures of earthenware, brandy, leather, etc. Here are hot saline springs, which were used for bathing by the ancient Romans, and are still frequented by invalids. Pop. 10,218.

**Day** [Lat. *dies*; Fr. *jour*; Ger. *Tag*], a word signifying either the interval of time during which the sun is above the horizon, or the time occupied by a complete revolution of the earth with reference to other celestial bodies. In the latter sense it denotes intervals of different duration, according as the body with which the revolution is compared is fixed or movable.

The astronomical or solar day, also designated the apparent day, is the time which elapses between two consecutive returns of the same terrestrial meridian to the centre of the sun. Astronomical days are of unequal length, for

two reasons: 1, the unequal velocity of the earth in its orbit, which results in a greater apparent daily motion of the sun in winter than in summer; 2, the obliquity of the ecliptic, which causes the sun's apparent daily motion in right ascension (or in the plane of the earth's equator) to be less at the equinoxes than at the solstices. The astronomical day is computed from noon to noon.

The civil day, or mean solar day, is the time occupied by the earth in one revolution on its axis as compared with the sun. It is supposed to move at a mean rate in its orbit, and to make 365.2425 revolutions in a mean Gregorian year. This mode of measuring time makes the days all of equal length, and any special hour of the civil day sometimes precedes, and sometimes succeeds, the corresponding hour of the astronomical day. Most nations agree in fixing the beginning and end of the civil day at midnight.

The sidereal day is that portion of time which elapses between two successive culminations of the same star. Owing to the great distance of the stars, and their apparent fixedness in space, it is not perceptibly affected by the earth's orbital revolution, as is proved by all known astronomical observations. A sidereal day contains twenty-three hours fifty-six minutes four seconds of mean solar time. It is divided into twenty-four sidereal hours, which are subdivided into sidereal minutes and seconds. This is the universal astronomical mode of computing time.

The Jews, who used a lunar calendar, reckoned the day from evening to evening. The day was divided in different manners—in three or in six parts of unequal length. Before the Captivity the night was divided into three watches. When the New Testament mentions four watches, the reason is that in the mean time the Græco-Roman division of the night had been adopted. Hours were probably derived from Babylon, as was the dial. At the time of our Lord the division was common, however. The Sabbath was the only day which had a name; the others were simply numbered.

In most languages the word equivalent to our "day" is also used in a much more extended sense to denote an indefinite period of time. We speak of events which have transpired "in our own day." This figure of speech is especially common in Oriental languages, and is frequently found in the Bible.

**Day** (BENJAMIN F.), U. S. N., born Jan. 16, 1841, in Ohio, graduated at Naval Academy as ensign in 1861, became lieutenant in 1862, lieutenant-commander in 1866, and commander 1876; commanded naval force on Rio Grande 1877-78. He was attached to the steamer New London, West Gulf blockading squadron, in 1862-63, and was wounded in a night engagement on the Mississippi July 9, 1863. His services on this occasion are thus highly spoken of by his commanding officer, Lieut.-Com. George H. Perkins, in his report to Rear-Admiral Farragut of July 13, 1863: "The conduct of Lieutenant Day, my executive officer, deserves particular attention, who, after being wounded in the head, remained at his post and rendered valuable service, encouraging the men by his bravery and coolness." He was in the engagement with Howlett House batteries on James River in 1864, and in both attacks on Fort Fisher in 1865. Lighthouse inspector 8th dist. 1882-84. FOXHALL A. PARKER.

**Day** (GEORGE EDWARD), D. D., was born at Pittsfield, Mass., Mar. 19, 1815, graduated at Yale (1833) and at the Yale Theological Seminary (1838), was assistant instructor in sacred literature there from 1838 to 1840, was twice settled in the ministry, from 1840-47 in Marlboro', Mass., and from 1848 to 1851 in Northampton, Mass., from 1851 to 1866 was professor of biblical literature in Lane Theological Seminary, and since 1866 has been professor of the Hebrew language and literature and biblical theology in the theological department of Yale College. He has taken great interest in the instruction of the deaf and dumb, and has published (1845-61) two reports on the subject. From 1863 he edited the "Theological Eclectic" till 1871, when it was united with the "Bibliotheca Sacra." He translated and edited Van Oostersee's "Titus" in Lange's "Commentary," and has also translated (1871) Van Oostersee's "Biblical Theology of the New Testament." He was one of the contributors to Smith's "Bible Dictionary," and published many articles in leading reviews.

**Day** (Rev. HENRY NOBLE), an author and educator, was born at New Preston, Conn., Aug. 4, 1808, graduated at Yale in 1828, was ordained to the Congregational ministry at Waterbury, Conn., in 1836, became professor of sacred rhetoric at the Western Reserve College, O., in 1840. He was a railroad president for many years, and president of the Ohio Female College (1858-64). Among his numerous educational works are "The Art of Elocution," "Elements of Logic," and "The Science of Aesthetics." He is now a resident of New Haven, Conn.

**Day** (JEREMIAH), D. D., LL.D., an American mathematician, born in New Preston, Conn., Aug. 3, 1773, graduated at Yale College in 1795, became in 1801 professor of mathematics and natural philosophy in that college, and was president of the same (1822-1846). Among his works are an "Introduction to Algebra" (1814) and "Navigation and Surveying" (1817). Died Aug. 22, 1867.

**Day** (JOHN), a dramatist of the Elizabethan age, of whose life nothing is known. Six dramas of his have come down to us, of which the most remarkable is "The Parliament of Bees," a unique production as singular as it is charming. "The Isle of Gulls," founded upon Sir Philip Sidney's "Arcadia," was printed in 1606.

**Day** (THOMAS), an English author, born in London June 22, 1748, became heir to an ample fortune. He sympathized with the American patriots, and wrote two poems, entitled "The Devoted Legions" (1776) and "The Desolation of America" (1777). He selected from a foundling hospital two girls, whom he educated according to the system of Rousseau, with an intention to marry one of them, but he was disappointed by the ill-success of his experiment, and married Esther Milnes in 1778. His chief work is "Sandford and Merton" (1783-89), a popular juvenile tale of great merit. He was killed by the kick of a horse Sept. 28, 1789.

**Day-Lily** (*Hemerocallis*), a genus of liliaceous plants having a perianth with bell-shaped limb and sub-cylindrical tube, and globose seeds. Several varieties are cultivated in gardens; among these is the fragrant yellow day-lily (*Hemerocallis flava*). It is a native of Northern China, Siberia, and Hungary; it has been accounted good food for cattle, but another species, the *Hemerocallis fulva*, has more profuse foliage and is equally acceptable to cattle.

**Days'man**, a name used in England in former times, and sometimes now used in the northern counties, to signify an umpire or elected judge. Its use dates from the Middle Ages, when the word "day" was specially employed in judicial proceedings to denote the day assigned for the hearing of a cause. This word is also used in Scripture: "Neither is there any daysman betwixt us, that might lay his hand upon us both." (Job ix. 33.)

**Dayton**, capital of Lyon co., Nev. (see map of Nevada, ref. 3-C, for location of county), is on R. R. and Carson River, 12 miles E. S. E. of Virginia City. Silver-mines have been opened in the vicinity. Here are several quartz-mills. Pop. in 1880, 391.

**Dayton**, a handsome city and important R. R. centre, capital of Montgomery co., O. (see map of Ohio, ref. 6-C, for location of county), on the left (E.) bank of the Great Miami, at the mouth of the Mad River, 60 miles N. N. E. of Cincinnati, and 67 miles W. by S. of Columbus; lat. 39° 44' N., lon. 84° 11' W. The Miami Canal passes through it, connecting the Ohio with Lake Erie. A marble court-house, designed after the Parthenon, is 167 feet long and 62 feet wide. An annex, of Dayton marble, of more than double the superficies of the original court-house, is completed. There are forty-eight churches, among which the First and Second Presbyterian and Grace (M. E.), built of Dayton marble, are fine specimens of architecture. The city has fifteen public schools, a high school, the Cooper Seminary for girls, St. Mary's (Catholic) Institute for boys, and Prof. Deavor's College, preparatory academy for boys. It has a public library of 5000 volumes, 4 national and 3 private banks, 8 local insurance companies, 3 daily, 2 weekly, 1 tri-weekly and 2 weekly (German), and 3 weekly religious papers; also 3 semi-monthly and 5 monthly publications. It has a large water-power, and is lighted with electricity and gas.

**Manufactures**.—The U. S. census for 1880 shows 495 manufacturing establishments; capital, \$6,063,334; average number of hands employed, 6025; wages paid, \$2,293,630; value of products, \$11,985,493. A very extensive manufactory of railroad cars, a number of large agricultural implement works, with about 8000 hands, six large breweries, two distilleries, factories of stoves, paper, cotton, and woollens, and extensive limestone quarries, which have furnished the materials for many buildings in Cincinnati, are among the industries of Dayton.

Here is the National Soldiers' Home for disabled soldiers and sailors, on whose roll are the names of 4500 veterans. It has an admirable hospital, a library of 5000 volumes, and extensive grounds—600 acres. The resident manager is Col. Leonard A. Harris of Cincinnati. The tax-duplicate of Dayton is \$28,000,000. The streets of Dayton, some of them 133 feet wide, cross each other at right angles, and twenty-six macadamized pikes radiate from the city. It is in the heart of the Miami Valley, a beautiful and productive region. Pop. in 1870, 30,473; in 1880, 38,678; in 1885, about 45,000. W. D. BICKHAM, ED. DAYTON "JOURNAL."

**Dayton**, on R. R., capital of Columbia co., Washington Territory (see map of Washington Territory, ref. 5-E, for location of county). Pop. in 1880, 996.

**Dayton** (ELIAS), an American general, born in New Jersey in 1735. He became a colonel about 1777, and served at battles of Brandywine, Germantown, and Monmouth; member of Congress (1787-88). Died July, 1807.

**Dayton** (JONATHAN), LL.D., an American statesman, son of the preceding, born at Elizabethtown, N. J., Oct. 16, 1760. He served with distinction in the Revolutionary war, and was a delegate from New Jersey to the convention which framed the Federal Constitution in 1787. In 1791 he was elected a member of Congress, in which he acted with the Federal party. He was Speaker of the House of Representatives for two terms (1793-97), and was chosen a Senator of the U. S. in 1799. Died Oct. 9, 1824.

**Dayton** (WILLIAM LEWIS), LL.D., an American statesman, nephew of the preceding, born in Somerset co., N. J., Feb. 17, 1807. He studied law, was admitted to the bar in 1830, and practised at Trenton. In 1842 he was appointed a Senator of the U. S. to fill a vacancy, and in 1845 he was elected to the national Senate by the legislature of New Jersey for a term of six years. He voted with the Whigs, and opposed the extension of slavery. In 1856 he was nominated as the Republican candidate for Vice-President, but was not elected. He was appointed minister to France in 1861. Died in Paris Dec. 1, 1864.

**De**, a Latin particle, commonly signifying "down" or "from;" it is often *intensive*, and sometimes *privative* or *negative*, having occasionally nearly the force of the English particle *un*; e. g. *descendo* (from *de*, and *scando*, to "climb"), literally, to "climb down;" *decoquo*, to "boil down," to "boil thoroughly;" *deform* (from *forma*, "form," "beauty," "grace"), to "deprive of grace or beauty;" *decompose*, to "un-compound." *De* is also a preposition, signifying "concerning," also "from" or "down from."

**Dea'con** [from the Gr. *διάκονος*, a "servant;" Ger. and Lat. *diaconus*], in early times an officer of a church, whose duty it was to collect and dispense alms. According to an opinion generally prevailing among Protestants, the office was at first secular, although it is evident that deacons frequently exercised spiritual functions. The office grew, like that of the bishop, out of the apostolate, which at first embraced all ministerial functions and duties, but which afterward naturally and necessarily split into many offices, according to time and circumstances. The church at Jerusalem first chose seven deacons, who taught and baptized, as is shown by the example of Philip the deacon. In the second and third centuries the duties of deacons were increased, and it subsequently became expedient to divide their functions among the archdeacons, deacons, and sub-deacons. The offices of archdeacon and deacon were counted among the higher clerical orders (*ordines majores*); and after the twelfth century that of sub-deacon was so reckoned. In the Greek, Roman Catholic, Anglican, and Methodist Episcopal churches deacons are clergymen inferior in rank to ministers or priests, and are usually probationers for the latter office. For a long time the deacons continued to be what they had been in the apostolic Church—the dispensers of the charitable funds of the congregation; Jerome calls them "ministers of the tables and of widows." Their duty was to visit the old and the sick, the widows and the afflicted, the prisoners, etc., and to administer relief under the direction of the bishop. But in course of time, as the sick were gathered into hospitals, the poor into almshouses, the orphans and widows into asylums, and as each of these institutions received a special officer for its proper management, the principal duty of the deacon became to assist in the public worship, more especially in the administration of the sacraments—to arrange the altar, to distribute the consecrated cup, etc. In the Roman Catholic Church the peculiar robes of a deacon are the dalmatica and the stole. At Rome there are eighteen cardinal deacons, of whom the celebrated Antonelli was one. In Protestant churches the position of deacons is various. The Baptists and Congregationalists have deacons as superintendents of the temporal affairs of the church, and also as assistants in the administration of the sacraments. Among Presbyterians their place is often supplied by the ruling elders, but in the Free Church of Scotland and in some other Presbyterian bodies there are regularly ordained deacons.

**Dea'coness** [Gr. *ἡ διάκονος*; Lat. *ancilla, ministra, diaconissa*], the title of a rank of female officers in the apostolic and early Christian Church. They assisted in the care of the poor, especially of their own sex, gave instruction to the younger catechumens, arranged the agapæ or love-feasts, and took care of the sick. Until the fourth century, the deaconess was required to be a maiden, or



widow but once married, and sixty years of age, but the age was fixed at forty by the Council of Chalcedon (451 A. D.). She was assisted by the sub-deaconess. The office gradually died out, but sooner in the Latin than in the Greek Church. Several Western councils in the fifth and sixth centuries forbade the consecration of deaconesses, although the office appears not to have been wholly extinct till the tenth or eleventh century. At Constantinople there were deaconesses as late as the beginning of the thirteenth century, with no trace of them anywhere else in the East. In monasteries, nuns who take charge of the altar are called deaconesses. The Sisters of Charity and other like organizations perform a work analogous to that of ancient deaconesses. There is a movement for the resumption of the office in the Anglican and some other Protestant churches. Among the German Protestants the experiment has been successfully tried. A large and excellent Protestant school for deaconesses was established in 1835 at Kaiserswerth, Prussia. They are divided into two classes—nursing sisters and teaching sisters. Many similar institutions have since sprung up in Europe.

**Dead Color.** In painting, a color is said to be dead when it has no gloss upon it. This is effected by the use of less oil and more turpentine than in ordinary paints.

**Dead-head,** the extra length of metal given to a cast gun. It serves to receive the dross (Lat. *caput mortuum*, literally, "dead-head") which rises to the top of the liquefied metal, and which, were it not for the deadhead, would form the muzzle of the gun. When cooled and solid the deadhead is cut off. In popular language "dead-head" is used to denote a person who travels on a railroad or enters a place of amusement, etc. without paying.

**Dead-Letter Office,** in the U. S. postal department, is the place where unclaimed letters are sent. After remaining one month at the post-office to which they are directed, "dead" or unclaimed letters are sent to Washington, and are opened in the dead-letter office. When the writer's name and address can be ascertained the letter is returned to him; otherwise the letter is destroyed. In a single year nearly 3,000,000 letters went to the dead-letter office; partly classified as follows: 58,000 letters had no county or State direction; more than 400,000 lacked stamps, and 3000 were posted without any address at all. The sum of \$92,000 in cash, and more than \$3,000,000 in drafts, checks, etc., were found in these letters. It appears that on an average every letter that is misdirected, or that goes to the dead-letter office from any cause, contains one dollar.

**Deadly Nightshade.** See *BELLADONNA*.

**Dead Net'tle** (*Lamium*), a genus of plants of the order Labiate, with a 5-toothed calyx and 2-lipped corolla, the upper lip arched, the lower trifid. The genera *Galeopsis* and *Galeobdolon*, resembling the *Lamium*, are often called by this name. *Lamium purpureum* and other species are common weeds in Great Britain, and are naturalized in the U. S. There is an old belief that the touch of the dead nettle causes an irritation which may end in death; hence the name. It appears, however, to be quite harmless.

**Dead Reck'oning,** a term used in navigation, signifies the calculation of a ship's place at sea without taking observation of the heavenly bodies. The chief elements from which the reckoning is made are the point of departure (*i. e.* the latitude and longitude of the place from which she sailed), the course or direction of her movement (ascertained by the compass), the rate of sailing, measured from time to time by the log, and the time that has elapsed. The data are liable to errors and uncertainties, in consequence of currents, changes in the course and intensity of the winds, fluctuations in the declination of the compass, and other causes of disturbance. (See *NAVIGATION*, by LIEUT.-COMMANDER ALEX. H. McCORMICK, U. S. N.)

**Dead Sea, or Sea of Sodom** [Arab. *Bahr Loot*, "Sea of Lot," anc. *Lacus Asphaltites*], called in Scripture the **Salt Sea**, a celebrated lake in the southern part of Palestine. Its northern end is about 20 miles E. of Jerusalem. Its length, as determined by Lieut. Lynch in 1848, is 40 geographical miles, and its breadth from 9 to 9½ geographical miles. The greatest depth, according to Lieut. Dale (1848), is 1308 feet; according to Lieut. Symonds (1841), 1350 feet. Its depression below the Mediterranean, as measured by Lieut. Dale, is 1316.7 feet, and its bed is accordingly by far the deepest known fissure on the surface of the earth. The Dead Sea is fed by the Jordan and other streams, but has no apparent outlet, and the surplus water is carried off by evaporation. It is enclosed between naked cliffs of limestone, which on the eastern side rise 2000 feet or more above the water. The shores present a scene of desolation and solitude encompassed with deserts and dreary salt-hills. On the southern shore is a remarkable mass of rock-salt called *Usdum* (Sodom), which is supposed to indicate the site of the ancient city of Sodom. Large quan-

ties of asphaltum were thrown up to the surface of the lake by the earthquakes of 1834 and 1837. The water of this lake is remarkable for its great specific gravity (which is 1.25, or one-fourth greater than pure water) and its intense saltiness, nearly seven times that of the sea, but varying considerably at different seasons. About 25 per cent. is the average proportion of saline matter by weight. The chlorides of sodium, magnesium, and calcium are the most abundant salts dissolved in it. Ducks have been seen swimming on its surface. The bed occupied by this lake is part of a long and narrow depression or fissure which extends from the Lake of Galilee southward, and is nearly 200 miles in length. The adjacent table-land is more than 3000 feet above the Mediterranean, so that the fissure is nearly 6000 feet deep. (See LIEUT. LYNCH, "Narrative of U. S. Expedition to the River Jordan and the Dead Sea," 1849.)

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**Deadwood,** a city, capital of Lawrence co., Dak. (see map of Dakota, ref. 6-A, for location of county), in Black Hills gold dist., in S. W. part of Terr. Pop. in 1880, 3777.

**Deaf and Dumb, or Deaf-Mutes** [Fr. *sourde-muets*]. Those born deaf are dumb, because they cannot learn to speak without the guidance of the sense of hearing, which enables them to imitate sounds. The same is true of those made deaf by disease or accident in early infancy. After learning to speak, the occurrence of deafness does not greatly impair the speech, although persons becoming deaf during childhood sometimes retain throughout life the childish tone which they have learned. The average number of deaf-mutes in Europe in 1830 was about 1 in 1500 of the total population; in 1850, according to the investigations of Dr. Peet, 1 in 1360. In the U. S. the census of 1880 gives the whole number of deaf-mutes as 33,878. Very possibly these returns are only approximate, parents being often reluctant to acknowledge this defect in their children, and census marshals negligent.

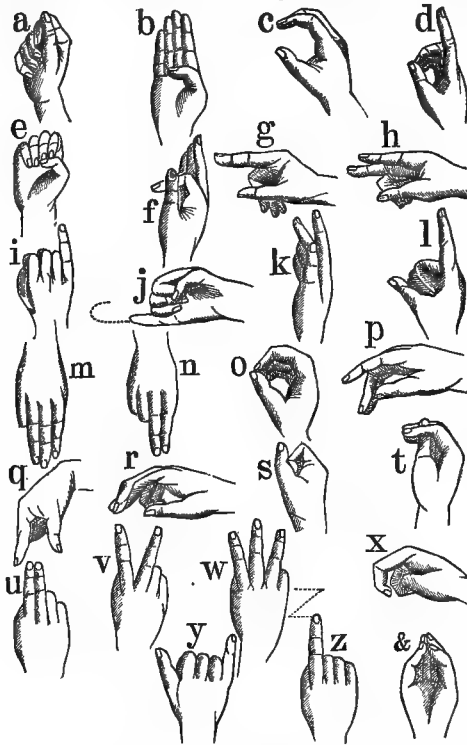
Congenital deafness is reasonably believed to be caused by imperfection of development under influences which lower the grade of nutrition in the embryo during gestation, or which affect, through the constitution of one or both of the parents, the immediate result of conception. Among these influences the most marked appear to be intemperance, marriages between those nearly related, syphilis, and scrofula. Boudin asserts that in France nearly 25 per cent. of deaf-mutes are the offspring of marriages of consanguinity; and somewhat similar estimates have been obtained by Drs. Howe and Bemiss in their statistical inquiries upon the effects of such marriages in the U. S.

On account of the comparative helplessness of deaf-mutes they were placed, in the code of Justinian, among persons incapable of the legal management of their affairs. During the Middle Ages they were deprived of the right of feudal succession. Yet in all times they have occasionally shown considerable capacity for culture. Pliny mentions Quintus Pedius, a deaf-mute, related to the emperor Augustus, as a successful painter at Rome; and in later times the uncle of one of the kings of Sardinia, notwithstanding the same defect, acquired a good education. The earliest account of a deaf-mute being taught to speak is ascribed to Bede, about 700 A. D. Rodolph Agricola of Groningen, who died in 1485, first mentioned an instructed deaf-mute. Jerome Cardan, half a century later, wrote philosophically on the principles involved in such instruction. Ponce de Leon, a Spanish monk, who died in 1584, and Pasch, a clergyman of Brandenburg, were the first teachers of whom we have any account. Juan Pablo Bonet published, at Madrid, the earliest known treatise on deaf-mute instruction. He gave a manual alphabet quite different from those which Bede has preserved as used by the ancients. About 1660 to 1700 Dr. John Wallis of Oxford and John Conrad Amman of Holland published remarkable treatises on this art.

In England the first manual alphabet was published by George Dalgarno, by birth a Scotchman, but residing for a long time at Oxford. He died in 1687. The first school for deaf-mutes in Great Britain was established in Edinburgh in 1760 by Thomas Braidwood. Some years afterwards it was removed to the neighborhood of London, and thus no doubt suggested the origination of an asylum in London in 1792, of which Dr. Joseph Watson was the first principal. The first public establishment in the world for the instruction of deaf-mutes was founded at Leipsic in 1778 by the elector of Saxony, under the directorship of Samuel Heinicke.

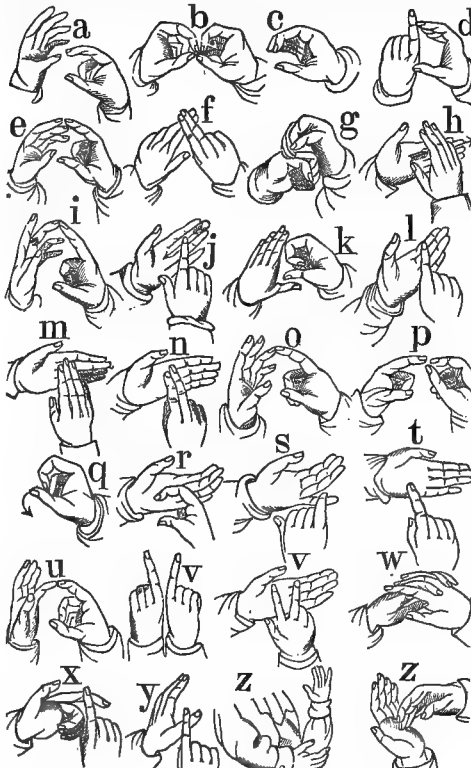
The credit of systematizing the instruction of the deaf and dumb in France is ascribed "to the abbé Charles Michel de l'Épée of Paris," but greater success was in some individual cases attained by a Spaniard, Jacob Rodríguez Pereira, whose school was conducted at Bordeaux. These men undoubtedly both contributed to the work; as did also Sicard, the successor of the abbé de l'Épée, and Itard. In the U. S. the system matured by the experience of

the French was brought over in 1816 by the late Doctor Thomas H. Gallaudet, with the personal aid of Laurent



One-handed Alphabet.

Clerc, an educated deaf-mute. Other names especially associated with useful labors on behalf of the same class are those of Dr. F. A. P. Barnard, Lewis Weld, and William W. Turner, of the Hartford Institution; H. P. Peet, LL.D.,



Two-handed Alphabet.

of New York; Abraham B. Walton of Philadelphia, J. A. Jacobs of Kentucky, and the two sons of Thomas H. Gal-

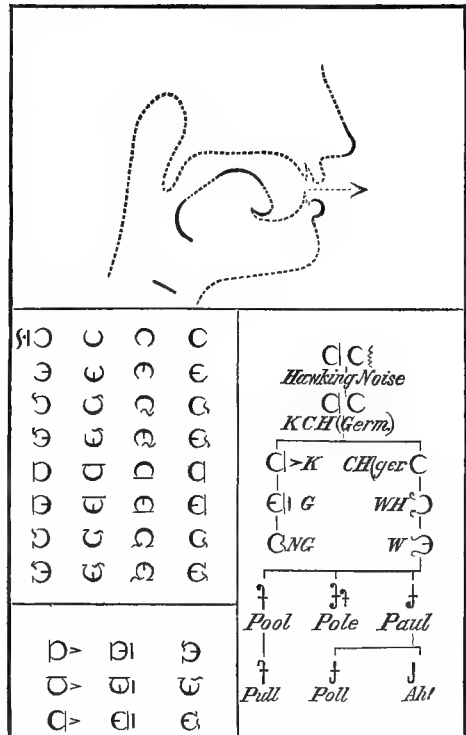
laudet (Thomas and E. M.), and Doctor S. G. Howe of Boston.

The most remarkable instance on record, perhaps, is that of the instruction, under the care of Doctor Howe, of Laura Bridgman (see biographical sketch in this volume). By attracting her attention through the sense of touch, it was found possible to develop to a considerable degree her intelligence and capacity for communication with others. A similar example occurred earlier in Julia Brace in the Hartford Asylum, while under the charge of the Rev. Thomas H. Gallaudet.

The two principal modes of conveying instruction to the deaf and dumb are by the manual *sign-language*, and by the pupils watching the lips of the teacher during articulation. Real objects and models, pictures, etc. can of course also be used. The sign-language is much the most easily and rapidly acquired, and is more generally employed in Europe, as well as in this country. It is largely in use among the American Indians, and by means of it natives of the most distant portions of the continent can understand each other. It is said that a party of Indians present in London at an exhibition of performances by deaf-mutes were delighted to find themselves able to converse with the latter by signs.

The method of teaching by articulation, the pupil learning to recognize words (and, in time, to utter them) by closely watching the motions of the lips and tongue in speech, is not favored by all experienced instructors. Except in very few cases it has not been adopted in the Hartford Asylum. The argument urged against it is, that the great length of time required for its acquisition can be better employed in obtaining knowledge according to the sign-method. Yet it has sometimes proved very successful, as in the private school of Miss Rogers at Chelmsford, Massachusetts. In Christiania, Norway, in 1872, a deaf-mute was, by instruction in this way, prepared creditably to enter the university as a student. Some have supposed that by means of lip-teaching intelligent deaf-mutes might become pupils in the common schools. Itard, and his successor Blanchet, in France, and the Abbé Carton, founder of an institution for the deaf and dumb in Bruges, Belgium, are amongst those who have especially labored on behalf of the method of teaching by articulation. This method was at first employed at the Clarke Institution at Northampton, Massachusetts, but has now given place to the Bell system.

A new method of teaching articulation has recently been brought into notice in this country. It is called *visible*



Bell's Visible Speech.

speech, and was invented by A. Melville Bell, a professor of vocal physiology in England, about 1848. It consists of a species of phonetic writing, based not upon sounds, but on the action of the vocal organs in producing them.

The characters of this universal alphabet, as matured in 1864, reveal to the eye the position of those organs in the formation of any sound which the human mouth can utter. In 1869 the first attempt was made in England to apply this alphabet in the instruction of deaf-mutes; and in 1872 it was introduced by Mr. A. Graham Bell, the son of the inventor, into the Clarke Institution at Northampton, where it has superseded the old method of imitation, and is the only method of teaching articulation used. It is now used in the American Asylum, with a limited number of both congenital and semi-mute pupils, with success, and to some extent in New York institutions. Its practical value as a means of instruction with all classes of deaf-mutes has not been as yet sufficiently tested. Mr. A. Graham Bell has opened a school for instructing teachers in this system in Boston.

Of institutions for the education of deaf-mutes, the largest in Europe is in London (300 pupils); in America, and probably in the world, in New York (488 pupils).

*Institutions for the Deaf and Dumb in the United States, 1883.*

NAME AND LOCATION.	Opened.	Pupils.			Teachers.		
		Male.	Female.	Total.	Male.	Female.	Total.
American Asylum, Hartford, Conn.....	1817	126	84	210	7	9	16
New York Institution, City.....	1818	310	178	488	9	10	19
Pennsylvania " Philada.....	1820	206	156	362	12	9	22
Kentucky " Danville.....	1823	98	69	167	6	8	9
Ohio " Columbus.....	1829	274	231	505	18	14	27
Virginia " Staunton.....	1839	44	36	80	7	2	9
Indiana " Indianap.....	1844	175	153	328	9	9	18
Tennessee " Knoxville.....	1845	90	57	147	5	3	8
North Carolina " Raleigh.....	1844	56	48	104	7	3	10
Illinois Inst., Jacksonville.....	1846	325	250	575	8	23	31
Georgia Inst., Cave Spring.....	1846	53	40	93	4	1	5
S. C. Inst., Cedar Spring.....	1849	26	32	58	3	1	4
Missouri Inst., Fulton.....	1851	152	98	250	6	6	12
Louisiana Inst., Baton Rouge.....	1852	25	18	43	2	2	4
Wisconsin Inst., Delavan.....	1852	134	103	237	5	9	14
Michigan Institution, Flint.....	1854	145	126	271	7	9	16
Iowa Inst., Council Bluffs.....	1855	170	120	290	10	9	19
Mississippi Inst., Jackson.....	1856	35	48	83	4	2	6
Texas Inst., Austin.....	1857	65	32	97	3	3	6
Columbia " Washington, D.C.....	1857	83	17	100	12	2	14
Nat. Col. " Washington, D.C.....	1864	45	...	45	9	...	9
Alabama Inst., Talladege.....	1860	30	21	51	4	1	5
California Inst., Berkeley.....	1860	80	46	126	4	5	9
Kansas Institution, Olathe.....	1861	102	88	190	3	6	9
Minnesota " Faribault.....	1863	82	65	147	6	4	10
Massachusetts (Clarke) Institution, Northampton.....	1867	49	45	94	...	14	14
Arkansas Inst., Little Rock.....	1868	47	33	80	2	3	5
Maryland Institution, Frederick City.....	1868	60	48	108	8	7	10
Nebraska Institution, Omaha.....	1869	74	41	115	3	5	8
West Virginia " Romney.....	1870	41	30	71	4	1	5
Oregon " Salem.....	1870	16	17	33	2	1	3
St. Mary Institution (Catholic), Buffalo, N. Y.....	1862	94	78	167	...	11	11
Institution for Improved Instruction, N. Y. City.....	1867	108	79	187	3	12	15
Horace Mann School, Boston.....	1869	41	50	91	...	9	9
St. Joseph Institution, Fordham, N. Y.....	1869	125	154	279	2	19	21
Institution for Colored, Baltimore, Md.....	1872	8	7	15	2	...	2
Colorado Institute, Colorado Springs, Col.....	1874	19	30	49	2	2	4
Erie Day School, Erie, Pa.....	1874	9	3	12	...	1	1
Chicago Day School, Ill.....	1875	30	28	58	3	3	6
Central N. Y. Inst., Rome, N. Y.....	1875	111	69	180	8	3	11
Cincinnati Day-School, Cincinnati, O.....	1875	21	14	35	1	1	2
Western Pa. Institution, Turtle Creek, Pa.....	1876	79	41	120	3	5	8
Western N. Y. Institution, Rochester, N. Y.....	1876	81	81	162	2	11	13
Portland Day School, Portland, Me.....	1876	17	18	35	...	4	4
Rhode Island School, Providence, R. I.....	1877	16	17	33	...	3	3
St. Louis Day School, St. Louis.....	1878	17	32	49	1	2	3
N. E. Industrial School, Beverly, Mass.....	1880	11	8	19	1	1	2
Dakota School, Sioux Falls, Dak.....	1880	14	9	23	1	...	1
Oral Branch Pa. Institution, Philadelphia, Pa.....	1881	45	28	73	...	9	9
Seranton Oral School, Seranton, Pa.....	1883	7	7	14	...	1	1
New Jersey Institution, Trenton, N. J.....	1883	47	35	82	2	3	5
Eight Denominational and private institutions.....		115	63	178	11	8	19
Total in 58 institutions.....		4013	3156	7169	213	284	497

REVISED BY E. M. GALLAUDET.

\* A distinct organization within the Columbia Institution. Its officers and students are included in the latter.

**Deafness** [Lat. *surditas*; Fr. *sourdit  *; Ger. *Taubheit*], loss or imperfection of hearing, may be congenital or acquired, permanent or temporary, complete or incomplete. It may be (1), "nervous"—that is, caused by organic or functional disease of the auditory nerve or of the brain itself. Deafness of this kind is sometimes curable, but frequently it is permanent. It may be (2), the result of local disease or accident. Disease of the structures of the ear frequently follows scarlet fever, and is often of a serofulous character. When such disease leads to organic changes, even if they be slight, permanent, and perhaps complete, deafness may result. (3), Cerumen (ear-wax) frequently fills the passage of the ear. In such cases oil should be dropped into the ear, and a gentle flow of warm water from a syringe will generally remove the obstruction. (4), When the *membrana tympani* (ear-drum) is accidentally perforated, much good is often done by the use of Toynbee's artificial ear-drum. (5), The Eustachian tube may be the seat of mucous inflammation, and may require surgical treatment. Counter-irritation behind the ears, the use of general tonics, etc. may be beneficial; and this is more especially true of the deafness of aged people. (See TOYNEBEE on "Diseases of the Ear," 1860; ROOSA, "On Diseases of the Ear," new ed. 1874.)

Since the year 1844, when the attention of physicians was first called to the subject, the growth of minute fungi (*Aspergillus*, etc.) in the ear has been reported to be a common cause of disease of that part. The meatus and tympanum are sometimes covered with the growth, in the form of white or yellow mould on their surfaces. Tinnitus, inflammation, and the accumulation of wax are attendant symptoms, and the treatment consists in the application of a solution of carbolic acid, five grains to the ounce of water. The fungi are perhaps the effects of disease rather than the cause.

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**De  k** (FRANCIS), an eminent Hungarian statesman and orator, born at Kehida in the county of Zala (Szalad) Oct. 17, 1803. He studied law, which he practised in his youth, was elected to the National Diet in 1832, and became the leader of the liberal party. Soon after the revolution of Mar., 1848, he became minister of justice, and projected important reforms in that department. He resigned office when Kossuth obtained power in Sept., 1848. On the defeat of the Hungarian patriots in battle in 1849, he quitted public life and retired to his estate. Having been elected to the Diet in 1861, he became the leader of the moderate party and the most popular man in Hungary. He was the author of the address sent by the Diet to the emperor, and of the protest against the imperial rescript in 1861. De  k is regarded as the master-spirit of the movement by which the constitutional autonomy of Hungary was restored in 1867, and large concessions to civil and religious liberty were extorted from the emperor. From that time he remained the recognized leader of the liberal party, commonly called, after him, the "De  kist," and which had without interruption a majority of the Hungarian Diet. He refused all offers of a place in the ministry, but no change in the ministry was made without his consent. Died Jan. 28, 1876.

**Deal** [from the Ang.-Sax. *dael*, a "portion," akin to the Ger. *Theil*, "part" or "piece,"] originally a piece of any kind of timber, afterwards applied particularly to fir or pine, the commercial name used especially in Great Britain for boards exceeding six feet in length and seven inches wide. Smaller boards are called battens. Deals are generally three inches in thickness; when thinner, they are usually called planks, but thin boards are often called deals. They are imported into Great Britain chiefly from Sweden, Norway, and British America, and are sawed into thinner pieces for use.

**Deal**, a maritime town and bathing-place of England, in Kent, is on an open beach of the North Sea, near the S. extremity of the Downs, 8 miles N. N. E. of Dover. It has been one of the Cinque Ports since the early part of the thirteenth century. A good anchorage extends between Deal and Goodwin Sands, 8 miles distant. The place is defended by Deal Castle, Sandown Castle, and Walmar Castle, in the last of which the duke of Wellington died in 1852. C  sar landed near Deal in 55 B. C. The castle was built by Henry VIII. in 1539. Its roadstead is famous as a resort for shipping, and the place is much frequented on account of the excellent bathing it affords. The Deal pilots are noted for their skill and daring. Its principal activity is its trade in the supply of provisions and naval stores. Here passengers and mails are landed, though less frequently than in former years. Its trade is small, and its manufactures are not important. Boat-building and some other industries are carried on. It is divided into Lower, Middle, and Upper Deal. Pop. in 1881, 8500.

**Deal Fish** [so called because its thin and wide body

somewhat resembles a *deal* or plank], the *Trachypterus arcticus*, a species of the family Trachypteridae, 4 to 6 feet long, found in northern latitudes in Europe. An allied species occurs on the W. coast of the U. S.

**Dean** [Lat. *decanus*, from *decem*, "ten," because the dean anciently presided over ten canons], an ecclesiastical title applied to officers of several different kinds. In some of the Anglican churches deans are dignitaries next in rank to the bishops. They preside over the chapters of canons and prebendaries, and in the old dioceses nominally elect the bishops. In England they are attached to each diocese. Rural deans are inspectors of parishes, who make report of their visitations to the bishop. Deans of college faculties are the presiding or executive officers. Various chapels in England and the chapel-royal of Scotland have deans attached to them. The three Scottish deans are Presbyterians of the national Church.

**Dean (Amos), LL.D.**, was born at Barnard, Vt., Jan. 16, 1803, graduated at Union College in 1822, became an eminent lawyer, and was a professor of medical jurisprudence in the medical school and of law in the law school at Albany, N. Y. Died Jan. 26, 1868. He was the author of many valuable law treatises, and also published "Philosophy of Human Life" (1839), "Medical Jurisprudence" (1854), and other works. Since his death his "History of Civilization" (7 vols. 8vo) has been published (1868-69).

**Dean (James), LL.D.**, was born at Windsor, Vt., Nov. 26, 1776, graduated at Dartmouth in 1800, was tutor in the University of Vermont (1807-09), and professor of mathematics there (1809-14, 1821-24). He published a "Gazetteer of Vermont" (1808). Died Jan. 20, 1849.

**Dean (John Ward)**, an antiquary, was born at Wiscasset, Me., Mar. 13, 1815. He published a "Memoir of Rev. Nathaniel Ward" (1868), "Memoir of Rev. Michael Wigglesworth" (1871), and a great number of accurate and valuable papers upon history, biography, and genealogy.

**Dean (Julia)**, a beautiful and talented actress, was born at Pleasant Valley, N. Y., July 22, 1830. Her grandfather and father (Samuel and Edwin Dean) were actors of repute. Her mother was the actress Julia Drake. She married a Mr. Hayne in 1855, was divorced in 1866, and married a Mr. Cooper soon after. She had great popularity in the West and South. Died Mar. 6, 1868.

**Dean (Rev. Paul)**, a distinguished minister of the Universalist and Unitarian denominations, was born in Barnard, Vt., in 1789. He held the doctrine of the so-called Restorationists, and was pastor of churches in Boston and in Easton, Mass. He published numerous sermons, etc. Died at Framingham, Mass., Oct. 1, 1860.

**Dean (William), D.D.**, a Baptist missionary, born at Morrisville, N. Y., June 21, 1807, and in 1834 became a missionary of the society now known as the American Baptist Missionary Union. His labors have been devoted to the Chinese in their native country, and also in Siam, where they are very numerous. He is the author of several religious works in the Chinese language, into which he has translated parts of the Bible.—**Mrs. Theodosia A. B. Dean**, his second wife, died in 1843. A memoir of her life has been published.

**Deane (Charles), LL.D.**, was born at Biddeford, Me., Nov. 10, 1813, and became a merchant in Boston. He is the author of numerous historical papers of value, among which are "Notices of Samuel Gorton" (1850), "Memoir of George Livermore" (1869), and "The Forms of Issuing Letters-Patent by the Crown of England" (1870).

**Deane (James)**, a judge and missionary to the Indians of New York State, was born at Groton, Conn., Aug. 20, 1748, and graduated at Dartmouth College in 1773. At the age of twelve he became associated with the Rev. Mr. Mosely, a missionary to the Six Nations. After graduating from college he went as missionary to the Canadian Indians, and was employed by Congress to pacificate the northern Indians. He was commissioned as a major, and served in the Revolutionary war as an interpreter at Fort Stanwix. He was taken prisoner by the savages, but his life was saved by the efforts of some of their women. He was afterwards, for a long time, a judge in Oneida co., N. Y., and held other offices of trust. From him the village of Deanesville was named. He wrote upon Indian mythology a paper which is believed to be lost. Died at Westmoreland, Oneida co., N. Y., Sept. 10, 1823.

**Deane (James), M.D.**, a geologist, born at Coleraine, Mass., Feb. 24, 1801, studied first law, and then medicine, of which he commenced the practice in 1831. He was an excellent operative surgeon. In 1835 he made known his discovery of remarkable fossil footprints in the new red sandstone near Greenfield. After his death his work upon these footprints was published by the Smithsonian Institu-

tion. He was the author of a valuable report "On the Hygienic Condition of the Survivors of Ovariectomy," and other papers. Died June 8, 1858.

**Deane (John)**, an English seaman, born about 1679, who while in command of the Nottingham galley was wrecked in 1710 on Boon Island, off the coast of Maine. Here the crew remained twenty-one days, and having eaten the body of one of their number who had died, they were finally rescued. Deane published an account of this affair (Boston, 1711; 5th ed. 1762), appended to a sermon on the event by Cotton Mather, but his mate and others of the crew published a different statement (London, 1711). Deane was (1714-20) a naval officer under Peter the Great, but was banished to Kasan. He was afterwards a long time British consul at Ostend. His name is appended to a "Letter" (1699) from Moscow to the marquis of Caermarthen regarding the state of the Russian navy. Died at Wilford, Notts, Aug. 19, 1761.

**Deane (Samuel), D.D.**, a poet, born at Dedham, Mass., July 30, 1733, graduated at Harvard College in 1760, and was librarian and tutor there for several years. He was pastor of the Congregational church at Falmouth, afterwards called Portland, Me. (1764-1814), author of "Pitchwood Hill" and other poems, a "Geographical Dictionary" (1790), and other works. Died Nov. 12, 1814.

**Deane (Samuel)**, a divine, poet, and historian, was born Mar. 30, 1784, at Mansfield, Mass., and graduated at Brown University, Providence, R. I., in 1805. In 1810 he became pastor of the Second Congregational church in Scituate, Mass., where he remained for life. He published an excellent history of that town in 1831, besides several poems, sermons, etc. Died Aug. 9, 1834.

**Deane (Silas)**, an American diplomatist, born at Groton, Conn., Dec. 24, 1737. He graduated at Yale College in 1758. He was a member of the Continental Congress in 1774, and was sent to France in 1776 as a political and financial agent. He was recalled in 1777, charged with having deviated from his instructions by making extravagant contracts, and by profuse promises to many French officers whom he persuaded to enter the service of the U. S. There is, however, very little doubt that Deane was a thoroughly able and honest man, as well as a zealous patriot. He was the victim of the unhappy jealousy of unworthy men, who wrought his social and financial ruin. Died in England Aug. 23, 1789. In 1842 too tardy justice was done his memory by Congress, which after careful examination of his accounts found that a large sum was due to his heirs, which sum was paid fifty-three years after his death as a poor man in a land of strangers and enemies.

**Deane (William Reed)**, a genealogist, was born at Mansfield, Mass., Aug. 21, 1809. He was a nephew of Samuel Deane, the historian of Scituate. He was a large and able contributor to periodical literature, writing chiefly upon antiquarian subjects, genealogy, and the early New England history. Died June 16, 1871.

**Dean, Forest of**, in Gloucestershire, England, is a picturesque hilly tract, having an area of 22,000 acres, between the Severn and the Wye. It is mostly the property of the Crown, and nearly half of it is enclosed for the growth of timber for the navy. Here are forests of oak, beech, and other trees, coal and iron mines, and stone-quarries. This forest was formerly notorious for the debased moral and social condition of its inhabitants, who have been largely reclaimed by the influence of religious instruction. They number between 10,000 and 12,000, and formerly enjoyed many privileges acquired partly by birth and partly by working a year and a day in the forest. They were exempted from rates and taxes, they could utilize the pasturage, they had a right of mining—only one-sixth of the produce being due to the crown—and they had access to the woods for timber for their houses. The district is governed by a lord-warden.

**Dean of the Chapel Royal** is a title rather out of place in the Presbyterian Church of Scotland, which has no deans. It is held by three clergymen of the Established Church, and is a mere remnant of Episcopacy. The duties of the office are merely nominal, consisting in an occasional sermon before the queen when she visits Scotland, but the revenues are considerable. The occupants are appointed by the crown, and recent appointments have been conferred in connection with chairs in the University of Edinburgh not otherwise endowed.

**Dearborn (Henry)**, an American general, born in Hampton, N. H., Feb. 23, 1751. He served as captain at the battle of Bunker Hill, 1775, and as major in the campaign against Burgoyne in 1777. In 1778 he fought with distinction at Monmouth. He was a member of Congress from Massachusetts (1793-97), and secretary of war under Jefferson (1801-09). Having obtained the rank of

major-general, he captured York (now Toronto) in Canada April 27, 1813. He was U. S. minister to Portugal (1822-24). Died June 6, 1829.

**Dearborn** (HENRY ALEXANDER SCAMMELL), a son of the preceding, was born at Exeter, N. H., Mar. 3, 1783, graduated at William and Mary College in 1803, became a lawyer in Massachusetts, was a brigadier-general of militia for the defence of Boston in 1812, was a member of Congress (1831-33), and as adjutant-general of Massachusetts loaned arms to Rhode Island during "Dorr's rebellion" (1843), for which act he was removed. He was the author of several biographical and commercial treatises. Died July 29, 1851.

**Deas** (CHARLES), an American painter, born in Philadelphia, Pa., in 1818. He was a grandson of Ralph Izard, the patriot of South Carolina, and was a pupil of John Sanderson. The best known of his pictures were Indian and prairie scenes from the far West. He became insane and died in —.

**Deasy** (RICKARD), LL.D., an Irish Roman Catholic statesman and jurist, born in 1812 and educated at the University of Dublin (Trinity College), was called to the bar in 1835, became queen's counsel in 1849, a serjeant-at-law in 1858, solicitor-general for Ireland in 1859, attorney-general in 1860, and a baron of the Irish exchequer in 1861. He was M. P. 1855-61, belonging to the "moderate Catholic" party, and representing the county of Cork; judge of court of appeals after 1878. Died May 6, 1883.

**Death** [Gr. *thánatos*; Lat. *mors, mortis*; Fr. *mort*; Ger. *Tod*], the cessation of vital functions in animals and plants. The active phenomena observed after death, such as material decay and loss of heat, are merely continuations of processes which have been going on through life. The corresponding operations of repair having ceased, the destructive processes become manifest. In a short time, however, in ordinary conditions, new and much more rapid destructive changes are induced. (See DECAY.)

Local or partial death of an animal is called mortification, gangrene, or sphacelus; if in a bone, it is necrosis. Molecular death of animal tissue is called ulceration, except in bony tissues, when it has the name of caries. Systemic death is said by Bichat to be either—1, by "syncope," or fainting, when the heart's action fails from lack of its usual stimulus; 2, by "asphyxia,"\* when suffocation occurs or the lungs cease to act; or, 3, by "coma," when death begins at the brain. Other authorities add to these forms death by (4) "anæmia," or deficiency of the blood, by (5) "asthenia," or weakness, and (6) by starvation; but these may be regarded as varieties of the first form, or syncope. Still others reckon as distinct forms of death (7) that by paralysis—which is indeed one of the causes of the second form—that produced by asphyxia, or apnoea. An eighth form, "necræmia," or death by the blood, when the latter element is poisoned or changed in character by disease, is mentioned by writers. It would be difficult to assign some instances (such as instantaneous death from an injury) to any one of these categories. It is asserted by many careful observers that death is usually painless, and that the apparent agony or struggle so often observed is automatic. Cases are on record of burial after apparent death. Such terrible mistakes may be prevented by observing the rule of preserving bodies until unequivocal signs of decay are observed. REVISED BY WILLARD PARKER.

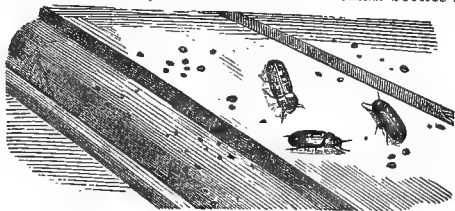
**Death Adder.** See ACANTHOPIHIS.

**Death, Brothers of,** a name sometimes given to the monks of the order of St. Paul the Hermit, which was suppressed by Pope Urban VIII. about 1630. They always carried with them a death's head to remind them continually of death.

**Death, Punishment of.** See CAPITAL PUNISHMENT, by REV. ABEL STEVENS, A. M., LL.D.

**Death Valley.** See APPENDIX.

**Death-Watch,** the name of certain small beetles in-



Death-Watch.

habiting human dwellings, and producing a sound like the

\*This use of the word "asphyxia" (which literally means "lack of pulse") is most unfortunate, though sanctioned by usage. A better word is "apnoea"—i. e. "failure of breath."

ticking of a watch. This sound being more readily heard in the stillness attending sickness, it has given rise to the superstitious belief that it prognosticates death; hence the name, "death-watch." The noise is produced by the insect beating its head against the wood in which it is concealed. It is supposed to be the call of the male to its mate. The common death-watch (*Anobium*) is a species of borer. It is about a quarter of an inch in length, and of a dusky-brown color. A number of species are found both in Europe and the U. S. The *Artropos pulsatorius*, a very different insect, is called in England by the same popular name, and for the same reason.

**De Augmentis**, or, more fully, **De Augmentis Scientiarum** (i. e. "On the Advancement of the Sciences," or, as Bacon himself renders it, "[On] the Advancement of Learning," employing this word in a somewhat wider signification than is usual at the present time), a celebrated treatise written by Lord Bacon, and forming the opening chapter of his great work, the "Instauratio Magna." It is next to the "Novum Organum" Bacon's most important philosophical treatise.

**Débâcle**, a French word signifying "the breaking up of ice" in a river or harbor. The term is used by geologists to denote a sudden rush or flood of water, which breaks down all opposing barriers, and leaves its path covered with scattered fragments of rock and other débris. The term is used also to designate any political, moral, or financial crash.

**Debatable Land**, a tract of country on the western border of Scotland and England, lying between the Esk and Sark. It was for a long time a cause of contention between the two countries, and even after its division by royal commissioners in 1542, continued to be a refuge for outlaws. It was divided by a line drawn from E. to W. between the rivers, the eastern part being adjudged to England, and the western half to Scotland.

**Debenture** [from the Lat. *debentur*, "they (i. e. debts) are owing" (from *debeo*, to "owe")], a term applied to different documents or writings acknowledging a debt, as the acknowledgments given by railroad companies for special loans; also an instrument or writing by which government is charged to pay to a creditor or his assigns sums found due. The term is particularly applied to custom-house certificates, entitling the exporter to a drawback or bounty.

**De'bir** (i. e. a "sanctuary"), a city of the tribe of Judah several times mentioned in the Bible, was situated W. of Hebron in the hill-country, and in a dry and arid place. It was captured by Joshua, or rather by Othniel, was inhabited by the Anakim, and had a Canaanitish king. It was afterwards given to the priests of the Hebrews. It was also called Kirjath-sepher and Kirjath-sannah. Its site is not at present accurately known. There was also a place of this name near Jericho, and probably another belonging to the tribe of Gad, E. of the river Jordan.

**Déblai** [supposed to be derived from the Low Latin *deblado*, to "take away grain," or perhaps anything of a granular or crumbling nature], in fortification, is any hollow place or excavation in the ground made during the construction of a parapet or siege-work. The earth taken from the cavity is the remblai.

**De Blaquieres**, BARONS, a noble family of Ireland, received the baronetcy in 1784 and entered the baronage in 1800.—SIR WILLIAM BERNARD DE BLAQUIERE, fifth Lord de Blaquieres, was born in 1814, and succeeded his brother in 1871. He is an officer of the royal navy, though now on the retired list.

**Deb'orah**, a Hebrew prophetess and judge, the wife of Lapidoth, gained celebrity by her successful efforts to liberate the Israelites from Jabin, king of Canaan. (See Judges iv.) She is supposed to have composed the spirited and beautiful lyric which forms the fifth chapter of Judges, a psalm over the victory, describing the battle in the most vivid colors.

**Débouch** [from the Fr. *déboucher*, to "pass out," to "empty itself," as a river], a military term, signifying to march out from a wood, defile, or other confined place into open ground; also an outlet or available issue by which an army can march out.

**De Bow** (JAMES DUNWOODY BROWNSON), an American writer on commerce and statistics, was born at Charleston, S. C., July 10, 1820. He studied law, and was admitted to the bar in 1844. In 1845 he removed to New Orleans and founded "De Bow's Commercial Review," which he edited for many years. He became in 1847 professor of political economy in the University of Louisiana. Died at Elizabeth, N. J., Feb. 27, 1867.

**Debrec'zin**, a royal free town of Hungary, capital of the county of Bihar, is on an extensive sandy plain 110 miles E. of Pesth. The houses are mostly but one story





signally successful; the demand notes, though at first rejected by the banks, before the close of the year were at a premium; and the interest-bearing notes became very acceptable, and were readily converted, with their accumulated interest, into the permanent 6 per cent. bonds. The current of public preference was then changed in favor of the government issues, which at first were received with aversion, particularly by the banks. A very large issue of these notes took place, the 7.30 notes reaching \$140,094,750, and the 3.65 one-year notes a large sum, with the full \$50,000,000 of demand notes. Of the 6 per cent. twenty-year bonds issued in redemption of the one- and three-year notes, there were \$189,321,200, none being now outstanding, and paid in 1881. On Feb. 12, 1862, \$10,000,000 more of demand notes were issued, of which \$88,296 remain outstanding; also \$15,850 of the 7.30 notes are still out, both being probably lost.

The preceding very successful issues laid the basis for the first great popular loan, authorized Feb. 25, 1862, of \$500,000,000 of 6 per cent. bonds, redeemable after five and payable after twenty years—the standard 5.20s of the stock list. A large subscription was at once made, and the full \$500,000,000 were issued. The acts of Mar. 3, 1864, and Jan. 28, 1865, added \$15,000,000 more to the authorization. Being redeemable after five years, nearly all of these have been called in, only \$357,000 remaining out Apr. 1, 1884. By this act of Feb. 25, 1862, \$150,000,000 of circulating notes were authorized and made a legal tender; \$50,000,000 to be in place of the demand notes of July 17, 1861. On July 11, 1862, \$150,000,000 more were authorized, and on Mar. 3, 1863, \$150,000,000 more—\$450,000,000 in all. The whole amount was issued, and formed the great volume of currency known as *greenbacks*. Of this issue \$400,000,000 was made permanent, but contractions in 1868 and 1869 reduced the amount, and \$346,681,016 only remained out Apr. 1, 1884. The act of Feb. 25, 1862, also authorized the acceptance of \$25,000,000 of deposits at 5 per cent. interest; this authorization was increased to \$50,000,000 Mar. 17, 1862, and to \$100,000,000 July 11, 1862. On June 30, 1864, a further sum of \$50,000,000 was added, this to pay 6 per cent. interest; all this, described as temporary loan, was to be repaid on ten days' notice, and was so repaid in 1865 and 1866, except \$78,560 unclaimed. This temporary loan was very advantageous to both citizens and the government; the full amount authorized in each case was promptly offered, and the repayment reluctantly accepted when the necessities of the government no longer required the money.

The act of Mar. 1, 1862, authorized the issue of certificates of indebtedness to public creditors in adjustment of any claims, such certificates to bear 6 per cent. interest, and to run one year. The sum of \$561,753,241 of such certificates was issued, all of which were redeemed in 1863, 1864, and 1865, except \$4000. A most important service was rendered by these certificates, particularly in obtaining war-supplies. They were readily taken, and facilitated the funding of general indebtedness as they matured. The act of July 17, 1862, authorized the issue of postage-stamps as currency, and made them receivable in payments to the U. S. in sums less than five dollars. An act of Mar. 3, 1863, authorized the use of fractional notes (parts of a dollar) in place of postal currency, limiting the amount to \$50,000,000; which authorization was confirmed by the act of June 30, 1864. This issue was promptly called for to the extent of \$30,000,000, and it was varied from that sum to the large amount of \$45,722,061, outstanding Jan. 1, 1873. So much time has elapsed since the issue of the legal-tender notes and the smaller notes here described that it is safe to assume that without important changes in the general financial policy, they would both have remained as nominal rather than real debt; but the fractional notes have been called in, leaving \$6,984,317 outstanding, probably mostly lost.

By act of Mar. 3, 1863, a loan of \$900,000,000 was authorized at 6 per cent. for ten or forty years, principal and interest payable in coin; of which \$75,000,000 only was issued, and taken at a premium of 3½ to 4 per cent.; preference being given because of a possible distinction existing adverse to the payment of the principal of the 5.20s in coin. This act was repealed June 30, 1864, but the sum of \$186,900 remains outstanding. The same act, Mar. 3, 1863, also authorized \$400,000,000 of one-, two-, and three-year treasury notes, at not over 6 per cent. interest, to be a legal tender for their face-value, principal and interest payable in lawful money. Of these there were—

One-year notes, issued.....	\$44,520,000, at 5 per cent.	\$39,865 out.
Two-year notes, ".....	166,480,000, at 5 " "	30,600
Three-year notes (comp'd).....	266,595,440, at 6 " "	208,670

This act authorized the exchange of new treasury notes for any of these issues outstanding at any time; and provided for \$150,000,000 more of currency, not at interest, to facilitate such exchange. In all, \$477,595,440 of these treasury

notes of 1863 were issued; all of which, with the exception above stated, were cancelled or exchanged before May 15, 1868. It will be seen that but a small amount of permanent loan was created in 1863, treasury notes being largely used. The loans of 1864 began with an issue of \$200,000,000, authorized Mar. 2, 1864, at 5 or 6 per cent., principal and interest payable in coin; \$196,117,300 was issued at 5 per cent., to run forty years—10.40s of 1864—and \$3,882,500 at 6 per cent. Most of the 5 per cents. brought a premium of from 1 to 7 per cent., and \$186,900 remain out, with nothing of the 6 per cents. On June 30, 1864, another loan of \$400,000,000 was authorized, at 6 per cent.—5.20s of 1864—\$125,561,300 being issued, and only \$49,400 remaining out Apr. 1, 1884. But the demand was enormous at this time; and the loans not being fully taken, the act of June 30, 1864, authorized the issue of \$200,000,000 of 7.30 treasury notes, to run three years; which authority was extended by act of Mar. 3, 1865, to embrace \$600,000,000 more. Under this authority \$829,992,500 of 7.30 interest-bearing notes were issued, all of which were duly redeemed or exchanged before the 15th of July, 1868, except the sum of \$134,350, not presented, and in part probably lost. On July 1, 1864, the secretary of the treasury was directed to invest a part of the sum accruing from naval captures as a navy pension fund, in registered securities bearing 3 per cent. interest in currency; which was done to the extent of \$14,000,000; but this is a nominal or contingent liability only, so far as the capital is concerned.

The loans of 1865 began with the authorization of \$600,000,000 of 6 per cent. 5.20 bonds by act of Mar. 3, to be applied only to the reimbursement of treasury notes or other outstanding obligations of the government. Two issues were made—on July 1, 1865, \$322,998,950, and on Nov. 1, 1865, \$203,327,250; of which issues \$279,950 were out on Apr. 1, 1884. By authority of the same act, as construed by act of Apr. 12, 1866, a further issue was made in July, 1867, of \$379,616,050, and of \$42,539,350 on July 1, 1868; these sums being employed to retire treasury notes and other obligations, but not to increase the public debt. Some of these last issues remain out—viz. \$557,900 of 1867, and \$100,250 of 1868. They are described as consols of 1865, 1867, and 1868. By act of Mar. 3, 1867, \$50,000,000 of temporary loan certificates of deposit were authorized, bearing 3 per cent. interest, to be used to redeem compound-interest notes; and the act of July 25, 1868, authorized \$25,000,000 more. Under both acts \$85,150,000 of such certificates were issued, of which none were outstanding Apr. 1, 1884.

On July 8, 1870, certain war-claims of Maine and Massachusetts were adjusted by the issue of \$678,362 of certificates bearing 4 per cent. interest in currency; none of which yet remain out. By act of July 14, 1870, \$200,000,000 at 5 per cent., \$300,000,000 at 4½ per cent., and \$1,000,000,000 at 4 per cent. of new thirty-year bonds, principal and interest payable in coin, were authorized, to be used solely to retire 6 per cent. or other bonds of earlier issues. No action was taken until after the act of Jan. 20, 1871, which increased the 5 per cents. to \$500,000,000, with interest payable quarterly. On May 1, 1871, \$200,000,000 were issued, and exchanged for 6 per cents. at par; and on Feb. 1, 1873, \$300,000,000 more were contracted to be so exchanged, on the same terms as in 1871. The bulk of the present debt now stands under these acts—viz. \$250,000,000 at 4½ per cent., \$737,643,950 at 4 per cent., and \$234,808,650 of a new 3 per cent. funding loan, authorized July 12, 1882.

By acts of July 1, 1862, and July 2, 1864, bonds guaranteed by the U. S., and bearing 6 per cent. interest, to run thirty years, were authorized to be issued to the several Pacific Railway companies, on the completion and acceptance of finished portions of the several roads. During 1868 and 1869, chiefly, sums of \$25,885,120 to the Central Pacific, of \$27,236,512 to the Union Pacific, of \$6,303,000 to the Kansas Pacific, with \$5,198,880 to certain branch roads, were duly issued. For the present the interest on these bonds has been paid by the U. S., but they are secured by mortgage on the entire lines of the roads, of which they represent but one-half of the capital stock.

The mere numerical statement of the vast transactions through which the present debt was created almost precludes explanation of the not less remarkable circumstances transpiring in connection with these movements. The magnitude of these transactions is without a parallel in history, and the wholly unexpected power developed in 1862 to conclude great loans without resort to European markets produced a profound effect on both the government and the people. The popular loan of \$515,000,000 in 1862 was the most remarkable of these events in its magnitude and its entire success; but subsequently a long period elapsed in 1863 and 1864 during which a permanent funded loan could with difficulty be placed. Very heavy issues of treasury notes and currency became necessary,

with all the aid derivable from temporary loans, certificates of indebtedness, and compound-interest notes. At this time the severest trial of the credit and resources of the government took place. Gold rose in Sept., 1864, to 250 or more, and although many favorable results in practical business ensued from this high price of gold, investors in permanent securities were alarmed, and many looked forward to a necessity that might compel the sealing of the existing debt and a funding at gold values, for the purpose of creating a stock certain to be reimbursed, principal and interest, in gold. Heavy holders relieved themselves as far as practicable, and no opening appeared to place new loans advantageously. But at the close of 1864 a favorable reaction took place: great profits had been realized on produce-shippments outward during the year; gold declined rapidly, and the basis of its highest advance was shown to have been in part fraudulent as well as simply speculative; confidence was restored, and the coming close of the war reassured the country as to future increase of the debt. So large a share of treasury notes and certificates bore interest as also to render claimants and holders easy until a proper opportunity should be afforded to consolidate this floating debt, and the apprehended decline of securities was, for these reasons, almost wholly averted.

At this time the first material attempts at placing securities abroad began, the German market being first opened, though leading bankers still refused to quote them at all.\* In England an attempt to place the small sum of \$10,000,000 in Mar., 1863, on government account, wholly failed, and the bonds, which were 5.20s of 1862, were returned to the treasury. Great as was the profit of purchasing 6 per cent. gold-bearing securities at the low price they bore in gold in London, there was absolutely no investment in them, and only long afterward were any considerable numbers taken.

This adverse opinion in Europe was not, on the whole, unfavorable to American interests, since the appreciation of values occurring at and after the close of the war was felt almost wholly by our own people. So strong had the people become through the self-reliance imposed by these trials that the productive force of the country was at its highest point, and profits were realized so largely as to render all alike indifferent to the standing our credit might have in any foreign market. Subsequent to the close of the war the securities of undoubted position as regards payment of the principal in gold began to go abroad quite as freely as the public interests demanded. While discussions were pending in 1868 and 1869 as to the legal position of the principal of the 5.20s of 1862 and other like issues, the market for these continued to be confined to the U. S., but no necessity at any time existed for enlarging it, and no public interest has been prejudiced by the general restriction of sales abroad. Active as the discussion was in 1868 and 1869 as to the ultimate redemption of the issues referred to, it had immediate good effects in favoring the acceptance of the consols of 1867 and 1868, which were specifically pledged to be reimbursed in coin; and it ended in a general acquiescence in the view that sound policy required that no distinction should be recognized in the basis of these great loans, and that they all could be and would be reimbursed in coin. The practical point was fully turned by the Funding act of July, 1870, under which \$500,000,000 of stocks fully pledged as payable in coin are taking the place of a like capital sum of 6 per cents. of the earlier issues, covering nearly all upon which doubt was at any time raised.

The conspicuous measures of wise legislation through which such vast sums have been raised and expended within the brief period of ten or twelve years have in part been indicated in the course of the above citation of events. They were, briefly, the demand and interest-bearing notes of July, 1861, the popular loan of May, 1862, and the legal-tender issues of Feb. and July, 1862, and Mar., 1863. The National bank system was also important, together with the large issues of treasury notes, temporary loans, etc., in 1864. After the close of the war it became easy to fund all these temporary securities without loss to the government or its creditors. The full effect of these beneficial measures was seen in the unexampled prosperity of the country, not only while the debt was accumulating and prices were high—even inordinately so—but also through the entire period of gradual return to normal prices in 1869. At this time a great and steady reduction of the debt began, sustained by full or increasing revenues and reduced expenditures, for nearly four years to the close of 1872; the total cancellation

of 6 per cent. bonds being \$299,891,100, and the total reduction of debt \$363,697,000. The monthly interest charge was reduced one-fifth, being \$8,516,808, as compared with \$10,532,462 on Mar. 1, 1869. With the retirement of \$300,000,000 of 6 per cents., and the substitution of a like sum of 5 per cents., as then provided, a further reduction of \$250,000 took place in the monthly interest charge, or over \$3,000,000 yearly.

The several issues of bonds constituting the body of the funded debt have always borne a premium in lawful money, and have steadily appreciated in value as measured in gold. At the time of the first purchases in extinguishment of the principal, in May, 1869, the net cost of the bonds in gold was 83 per cent. of the par value; rising to 93.5 per cent. Jan. 5, 1870; to 97 per cent. Jan. 4, 1871, and to 99.99 per cent., or par, Jan. 4, 1872, and so remaining. The value of these securities is thus at par in gold for those liable to recall and cancellation, while all not so liable have always borne a large premium in currency, and usually a small premium in gold, being quoted in currency at 16 to 18 and sometimes 20 per cent. premium when gold was 12 to 14 per cent., or 2 to 5 per cent. above par. The steady maintenance, for the entire period since their issue, of a premium on all the permanent securities constituting the debt, is a remarkable proof of the stability of the public credit.

By act of Feb. 25, 1862, an amount of the gold receipts from customs sufficient to pay, in each fiscal year, 1 per cent. of the entire debt of the U. S. was set apart as a sinking fund for its redemption; but the pressure of current demands on the treasury prevented any action under this law until May, 1869; after which date, up to June 30, 1872, there was purchased \$99,397,600 of bonds of the various issues known as 5.20s, at a net cost in currency of \$110,997,186. The interest of the bonds or debt so purchased being also set apart for the same purpose, the sinking fund became, by act of July 14, 1870, a cumulative appropriation in extinguishment of the debt, though not distinguished in operation from the regular mode of monthly purchase then begun with surplus funds of the treasury. Thus, though the general debt was less in 1872 than in 1870, the 1 per cent. of the sinking fund, with its accumulated interest, gave the sum of \$32,679,553 to be applied to such purpose in the latter year, as compared with \$27,660,879 in 1870. The maintenance of the sinking fund as a practical agency for paying the debt would depend on the continuance of surplus revenues. It has so continued, and the large annual surplus has extinguished the debt quite as rapidly as has been desirable for the large investment interests depending on it. By direction of the act of July 14, 1870, the bonds purchased for the sinking fund, with all others purchased in extinguishment of the debt, were cancelled and destroyed, and the sinking fund was made a permanent annual appropriation from the customs revenue.

The history of former loans of the U. S. government, as well as those of the last decade, shows that only small reductions of their nominal or face-value have been suffered in negotiation, and that all obligations have been paid in full. By various small loans and issues of treasury notes \$21,820,000 was borrowed from 1791 to 1800; the principal of debt remaining under the consolidation in 1791 being \$75,463,476. Before the year 1810 this was reduced to \$45,209,737, nothing having been borrowed from 1800 to 1810. In 1810, \$2,750,000 was borrowed; and in 1812-17, \$107,511,234 was realized from various loans, an aggregate discount of \$6,169,681 being submitted to in their negotiation—nearly 6 per cent. In 1820 and 1821 the sum of \$8,000,000 more was borrowed, without discount; and in 1824 and 1825, \$10,000,000 more, also at par. But the debt was rapidly reduced, and wholly paid before the end of the year 1835; a large surplus revenue accumulating in 1836, which was distributed to the several States in 1837. In the same year loans again began, and the sum of \$67,981,573 was realized from such loans from 1837 to 1844, much loss being incurred. The debt was reduced in the two following years, standing at \$15,550,000 in 1846; in 1847, 1848, and 1849 large loans were made, realizing \$82,967,200. Large receipts of revenue served to reduce this debt to less than \$30,000,000 in 1857, to which \$20,000,000 of bonds was added in 1858, with some treasury notes, giving \$60,000,000 of debt at the commencement of the late war. At one period only (in 1835) was the debt wholly paid off.

Comparatively little has been written in permanent form on the subject of the national debt of the United States, other than the official reports of the secretaries of the treasury, entitled the "Finance Reports," 1861 to 1872. In these the principles and policy of the government are clearly elucidated, and the history of the several issues, withdrawals, and cancellations is fully given. The principal publications referring to the subject are J. G. GIBBONS, "On the Public Debt of the United States" (1867); "How

\* Among the efforts made to avert the danger and discouragements that appeared imminent in the latter part of 1864 was the preparation and publication of a statement of the national resources, issued under the auspices of the treasury department, and very largely distributed by that department, by the secretary of state to representatives of the government abroad, and by loyal associations in various States.

the National Debt can be Paid," by William Elder (1867); "Is our Prosperity a Delusion?" (1868); "The Science of Wealth," by Amasa Walker (1867-72); BAXTER, "On the National Debt of England and the United States" (1872), with various pamphlets, speeches, reports, etc. by other authors. During the war many pamphlets were published by individuals, proposing plans for the liquidation or extinguishment of the public debt, or in opposition to specified measures of the government, but few were of great importance or of permanent value. The measures actually adopted were, on the whole, wisely framed and singularly successful in their operation. The difficulties temporarily existing, or feared by some, disappeared with the lapse of time, and the public acquiescence became universal. It is not easy now to see what one of the great measures actually inaugurated could have been spared from the list of enactments necessary to sustain the country in the peculiar exigencies arising during the last twenty-five years.

LORIN BLODGETT.

**Dec'agon** [from the Gr. *déka*, "ten," and *γωνία*, an "angle"], a plane geometrical figure having ten sides and ten angles. If the sides and angles are all equal, the figure is a regular decagon, and inscribable in a circle. A regular decagon may be formed from a regular pentagon by describing a circle round the latter, bisecting the arcs between its angular points, and drawing lines joining the angular points to the points of the intermediate section.

**Decaisne** (JOSEPH), born at Brussels Mar. 18, 1807, studied botany, more especially vegetal physiology, and was appointed assistant at the Jardin des Plantes in Paris in 1832, and director in 1851. In 1834 he became one of the directors of the "Annales des Sciences Naturelles" (the department of botany), and in the course of time he published a great number of scientific essays and papers. But he has become most widely known by his apt application of his science to practical problems; as, for instance, in his "Sur l'analyse et la composition chimique de la betterave à sucre" (1839), "Histoire de la maladie des pommes de terre" (1845), "Recherches sur la garance" (1847), etc.

**Decalcomanie.** See APPENDIX.

**Decalitre** [Fr.], a measure equivalent to ten litres. (See LITRE.)

**Dec'alogue** [Heb. עֲשֶׂרֶת הַדְּבָרִים; Gr. *dekálogos*, or *oi déka logoi*, "the ten words"], called also the **Ten Commandments**, and often spoken of as the "moral law," in distinction from the ceremonial law of the Jews, is that part of the law of Moses contained in Exodus xx. 3-17 and repeated in a hortatory form in Deuteronomy v. 7-21. It was originally written upon two tablets of stone (Ex. xxx., etc.), which were placed within the ark of the covenant. The text of Scripture (Ex. xxxiv. 28) appears to fix the number of these commandments at ten, but various opinions exist as to the manner of dividing them. The arrangement recognized by the Greek Church and most Protestants, called the Origenian division, is that which was approved, though not originated, by Origen. It had been approved by Philo and Josephus, and was generally adopted by the Christian Church. But in the West it faded out, and was revived by Leo Judæ (1482-1542) in his catechism, 1534, and by Calvin, 1536. The Roman Catholics, at least in their catechisms, unite into one what most Protestants consider the first and second commandments, and divide the tenth Origenian commandment into two. This was Luther's arrangement, and is generally, though not universally, followed by the Lutheran Church. It is called the first Masoretic arrangement. The modern Jews adopt what is called the Talmudical arrangement, which gives as the first commandment the words contained in Ex. xx. 2, and has for its second commandment the first and second of the Origenian arrangement. The second Masoretic, adopted by English Roman Catholics, differs from the first Masoretic only in inverting the order of the ninth and tenth commandments. The ten commandments, with the exception of the two regarding the Sabbath and reverence to parents, are negative ones, forbidding certain actions, and leaving positive precepts to other laws or to the individual conscience. The Decalogue is generally regarded as a moral code, binding from its own nature. It is, however, admitted that the fourth (or Sabbath) commandment has a positive as well as a moral element in it. Christ reduced the ten commandments to two.

REVISED BY R. D. HUTCHCOCK.

**Decam'eron** [It. *Decameron*, from the Gr. *déka*, "ten," and *ἡμέρα*, a "day"], the name given by Boccaccio to his celebrated collection of tales, which are supposed to be narrated in turn during ten days by a party of guests assembled at a villa to escape from the plague, which raged at Florence in 1348.

**De Camp** (JOHN C.), U. S. N., born Oct. 5, 1812, in

New Jersey, entered the navy as a midshipman Oct. 1, 1827, became a passed midshipman in 1833, a lieutenant in 1838, a commander in 1855, a captain in 1862, a commodore in 1866, and a rear-admiral (retired list) in 1870. He commanded the Iroquois at the passage of Forts St. Philip and Jackson and capture of New Orleans, and, in short, in every action on the Mississippi under Farragut, to and including Vicksburg, in all of which he was conspicuous for gallant bearing. D. June 24, 1875. FOXHALL A. PARKER.

**Decamps** (ALEXANDRE GABRIEL), a celebrated French painter of history and landscapes, was born in Paris Mar. 3, 1803. He visited the Levant about 1827, and painted mostly Oriental scenes with striking light-effects. He painted history, landscapes, genre, and animals, all with success. Among his works are the "Defeat of the Cimbri" (1834), a "Souvenir of Turkey in Asia," and "Les Singes Experts." His historical works are commended for grandeur of conception and a bold and free style of treatment. At the Exposition of 1855 his pictures divided the public attention with those of Ingres, Delacroix, and Verne. Died at Fontainebleau Aug. 22, 1860. (THÉOPHILE SILVESTRE, "Histoire des Artistes Vivants," Paris, 1856.)

**De Candolle** (AUGUSTIN PYRAME), M. D., an eminent botanist of French extraction, born at Geneva Feb. 4, 1778. He studied at Geneva, and in 1796 he removed to Paris, where he studied chemistry and medicine, and became a pupil of the botanist Desfontaines and enjoyed the friendship of Cuvier and Humboldt. He published a "History of Succulent Plants" (1799-1803). In 1804 he graduated with an "Essay on the Medicinal Properties of Plants." Lamarck's "Flora of France," the first volume of which appeared in 1804, was prepared by him. He became in 1808 professor of botany at Montpellier, and published in 1813 his "Elementary Theory of Botany," a profound work, in which he developed his new system of classification according to the natural method. In 1816 he removed to Geneva. He projected a great work which should give a description of all known plants, and published two volumes (1818-21), with the title "Regni Vegetabilis Systema Naturale." Perceiving that the life of one man was not adequate to complete the work on so vast a scale, he modified his plan, and undertook to present a methodical arrangement of all known plants by orders, genera, and species in his "Prodromus Systematis Naturalis Regni Vegetabilis" (10 vols., 1824-46), which he did not live to finish. This is a very important book of reference for working botanists. Among his other works is "Organographie Végétale" (1827). Died at Geneva Sept. 9, 1841.—His son, ALPHONSE LOUIS PIERRE DE CANDOLLE, born Oct. 28, 1806, has written several botanical works, published his father's "Mémoires et Souvenirs" (1862), and continued the "Prodromus." (See FLOURENS, "Éloge historique de P. de Candolle," 1842; DELARIVE, "A. P. Decandolle, sa Vie et ses Travaux," 1851.)

**Decanta'tion** [from the Fr. *décanter* (It. *decantare*), to "pour"], the act of decanting; the pouring off a clear liquid from its sediment or subsidence. Chemists often resort to this process instead of filtration to separate the clear supernatant liquid from precipitates, and they sometimes perform the decantation by means of a siphon.

**Decapita'tion** [Late Latin *decapitatio*, from Lat. *de*, "from," "off," and *caput* (gen. *capitis*), a "head"], a form of CAPITAL PUNISHMENT (which see) in which the head is severed from the body by an executioner. Under the English government hanging has taken the place of decapitation, the last instance of the latter having occurred in 1745. This mode of punishment is still used in some of the German states and in France. In France the GUILLOTINE (which see) is still used. Decapitation is of very ancient origin. It is a frequent punishment among Oriental nations.

**Dec'apod** [from the Gr. *déka*, "ten," and *πούς* (gen. *ποδός*), a "foot"], a name applied by Cuvier to an order of crustaceans, comprehending those which have ten thoracic feet. The same name is also applied to a tribe of cephalopods, including those which have ten locomotive and prehensile appendages proceeding from the head, two of which are longer than the rest, and called tentacles. Decapod crustaceans are usually divided into three sub-orders—the long-tailed, the irregularly-tailed, and the short-tailed decapods. Shrimps, prawns, lobsters, and crawfish are examples of the first sub-order; the other two sub-orders contain the numerous species of crab.

**Decapolis** [from the Greek *déka*, "ten," and *πόλις*, "a city"], not a province, but only ten cities, of Palestine, like the Hanse Towns, which had certain privileges not now known. Decapolis is described by Eusebius in his "Onomasticon" as "the part lying on the other side of the Jordan about Hippos, and Pella, and Gadara." The ancient lists vary. Ptolemy speaks of eighteen cities; Eusebius omits Scyth-

opolis—the only one of the ten that was on the west side of the river; Damascus is sometimes named, and sometimes omitted; Pliny's list includes Damascus and omits Capitolias. They were mostly Greek cities, some of which, at least, were settled by the followers of Alexander the Great. They were subdued by the Maccabees (Josephus, "Ant." xiii. 15. 4). When Pompey conquered the East (63 B. C.), he annexed them to Syria, detaching them from the Judæan government. Surrounded as they were by Jews, these cities then united in a defensive alliance. The original union was probably of these four: Hippos, Pella, Gadara, and Scythopolis (on the west side of the river). Afterward there were added Philadelphia, Gerasa, Dion, Raphana, Capitolias, and Canatha. Of these ten, only Scythopolis, Gadara, and Canatha are now inhabited, though all but Raphana have been identified. Hippos has been identified with Fik; Pella, with Tubakat Fah'l; Gadara, with Um Keis; Philadelphia, with Rabbath-ammon; Gerasa, with Gerash; Dion, with Eidun; Capitolias, with Beit er Ras; and Canatha, with Kunawat. Scythopolis, the ancient Beth-shean, is now called Beisan. (See SELAH MERRILL'S "East of the Jordan," 1881.) R. D. HITCHCOCK.

**Decatur, Ala.** See APPENDIX.

**Decatur,** capital of De Kalb co., Ga. (see map of Georgia, ref. 3-G, for location of county), is finely situated on R. R., 6 miles E. N. E. of Atlanta. Pop. in 1870, 401; in 1880, 639.

**Decatur,** a city and important R. R. centre, capital of Macon co., Ill. (see map of Illinois, ref. 6-E, for location of county), about 1 mile N. of the Sangamon River and 39 miles E. of Springfield. It has one rolling-mill and several factories. Pop. in 1870, 7161; in 1880, 9547.

**Decatur,** R. R. centre, capital of Adams co., Ind. (see map of Indiana, ref. 4-G, for location of county), on the St. Mary's River, 21 miles S. S. E. of Fort Wayne. It manufactures wagon material and stoves. Pop. in 1870, 858; in 1880, 1905.

**Decatur,** on R. R., Van Buren co., Mich. (see map of Michigan, ref. 8-H, for location of county), 116 miles E. by N. of Chicago. Pop. in 1870, 1420; in 1880, 1267.

**Decatur,** capital of Newton co., Miss. (see map of Mississippi, ref. 7-G, for location of county). Pop. in 1880, 47.

**Decatur,** capital of Meigs co., Tenn. (see map of Tennessee, ref. 7-H, for location of county), on the Tennessee River, 140 miles E. S. E. of Nashville. Pop. in 1870, 99; in 1880, 175.

**Decatur,** on R. R., capital of Wise co., Tex. (see map of Texas, ref. 2-H, for location of county), is 200 miles N. of Austin City, on a beautiful eminence. Pop. in 1880, 579.

**Decatur** (STEPHEN), a famous American commodore, was born at Sinnepuxent, Md., Jan. 5, 1779, and entered the navy in 1798. In Feb., 1804, he led a small party which burned in the harbor of Tripoli the American frigate Philadelphia after she had been captured. For this gallant exploit he was raised to the rank of captain. Having taken command of the frigate United States, he captured the British frigate Macedonian Oct. 25, 1812. A gold medal was voted to him by Congress for this victory. He was blockaded by a superior force in the harbor of New London in 1813-14. In May, 1815, he was appointed commander of a squadron of three frigates and seven smaller vessels, which was sent to chastise the Algerines. He captured two Algerine vessels of war June 17 of that year, and compelled the dey of Algiers to sue for peace. He was killed in a duel by Commodore James Barron Mar. 22, 1820. He was noted for his resolute spirit and cool intrepidity. (See his life in SPARKS'S "Am. Biography.")

**Decaturville,** capital of Decatur co., Tenn. (see map of Tennessee, ref. 7-D, for location of county), 6 miles from the W. bank of the Tennessee River, 100 miles W. S. W. of Nashville. Pop. in 1870, 188; in 1880, 252.

**Decay'** [remotely from the Lat. *decado*, to "fall"] is the comparatively slow oxidation or burning which moist organic matter undergoes when exposed to air. It is not usually accompanied by perceptible increase of heat, unless putrefaction or fermentation is associated with it. Substances rich in nitrogen are especially liable to decay; consequently, most animal substances decay more rapidly than any vegetable matters except the softest and most nitrogenous. The decay of animal substances after death is, according to the observations of Duvernoy, probably but the continuation of the normal disassimilation which goes on throughout life; but as the corresponding processes of repair have ceased, the decay becomes apparent for the first time after death. The decay of nitrogenous matters in the proper circumstances is accompanied by certain processes known as putrefaction and fermentation—processes which are accompanied by the growth of fungi, often microscopical, and

by complex chemical changes which materially hasten the process of destruction.

**Decazes** (ÉLIE), DUKE DE, born at Saint Martin du Laye, in the department of Gironde, Sept. 28, 1780, died in Paris Oct. 24, 1860. He belonged to a family of magistrates ennobled by Henry IV., studied law, began to practise at the bar in Paris, and received some appointment at the court of cassation, but his promotion was slow. Napoleon disliked him on account of the fidelity and discretion with which he continued to serve Louis Bonaparte, the king of Holland, even after his abdication. After the restoration he was appointed minister of police in 1815, minister of the interior in 1817, and prime minister in 1819; but in 1820 he was compelled to resign. He was a constitutional monarchist, strongly opposed to the ultra-royalists and hated by them, and they formally accused him of conniving at the attempt of Louvel. The king, however, was very far from giving any credence to such a suspicion; he made him a duke, and appointed him minister to England.

**Decazes** (LOUIS CHARLES ÉLIE AMANIEN), DUKE DE, born in Paris May 9, 1819, a son of the preceding. He early entered the diplomacy, and was minister plenipotentiary to Spain and Portugal in 1848, but retired into private life when the Revolution broke out. In 1871 he was elected a member of the National Assembly. He took his seat in the right centre, but, though he generally followed his party, he never openly and formally declared himself a monarchist. In 1873 he was appointed minister of foreign affairs, and he retained that position till 1877, under exceedingly trying circumstances, but with dignity, and enjoying the confidence both of the house of representatives and of the foreign cabinets.

**Decazeville,** a town of France, department of Aveyron, about 20 miles N. E. of Villefranche. It has extensive blast furnaces and iron-forges. Coal mines are worked in the vicinity. Pop. in 1881, 16,233.

**Dec'can** [Sanskrit, *Dacshina*, "the south"], a term formerly applied to the whole of Hindostan S. of the Nerbudda River or Vindhya Mountains, but now usually limited to the country between the Nerbudda and the Kistnah. It comprises Aurungâbâd, Beeder, Berar, Bejapoor, Candesh, Gundwana, Northern Circars, and Orissa. Deccan was first invaded by the Mohammedans in 1294, when Diogiri was stormed and pillaged. Over a quarter of a century later on, in 1325, the Mahommedans pushed their conquests still farther, and annexed to the empire of Delhi the whole country as far S. as the Kistnah.

**Decem'ber** [Fr. *Décembre*, from the Lat. *decem*, "ten"], the twelfth and last month of the year, is so called because in the ancient Roman calendar it was the tenth month of the year.

**Decem'viri** (sing. **Decemvir**), [Lat., from *decem*, "ten," and *vir* (plu. *viri*), a "man"], a name applicable to ten persons appointed for particular purposes, but more especially applied to the ten magistrates elected from the Roman patricians to draw up a code of laws founded on the more approved institutions of Greece; they were also invested with supreme authority to govern the state. The experiment proved entirely successful; their laws were approved by the senate and engraven on ten metal tablets; and their official duties were discharged with so much satisfaction that, at the expiration of their year of office, it was resolved, as their work was not completed, to continue the same form of government. A new commission, invested with the same power, was appointed for the next year, to which the plebeians were admitted, the result of which was two additional tablets, thus completing the famous Twelve Tables which in subsequent times became the foundation of all Roman law. The new decemviri, however, proceeded to the most violent acts of despotism, perpetrating various outrages on the persons and families of the plebeians, which so exasperated the people that an insurrection broke forth; the decemviri were driven from office, and the ordinary magistrates were re-established.

The *decemviri litibus judicantis* ("ten men for settling lawsuits") formed a kind of court for trying civil cases, and, later, for matters involving life and death. The *decemviri sacris faciundis* (the "ten men for performing sacred duties"), first instituted about 387 B. C., were five patricians and five plebeians who had charge of the Sibylline books until the time of Cicero, when they were made fifteen in number. They were considered sacred to Apollo. There were also decemviri for dividing the public lands.

**Decen'rial** [from the Lat. *decennium*, a "period of ten years" (from *decem*, "ten," and *annus*, a "year")], occurring every ten years. For example, the U. S. census is decennial. The decennial games (*decennia* or *decennalia*) among the later Romans were celebrated in consequence



of the fact that the emperor Augustus pretended to refuse the empire for life, choosing to be elected to it for a period of ten years, at the end of which time he accepted it for ten years more, and so on till the end of his life. The fiction was kept up till the last days of the empire by the observance of the decennial games.

**Dechant** (Rev. JACOB WILLIAM) was born at Kreuznach, in the Palatinate, Feb. 18, 1784, and emigrated to America in 1805. He was ordained to the ministry of the German Reformed Church in 1808. He labored with success as a missionary among the Germans of Ohio and Pennsylvania, and instructed numbers of theological students. Died of cholera Oct. 5, 1832.

**De Charms** (RICHARD), an American Swedenborgian minister and writer, born in Philadelphia Oct. 17, 1796, graduated at Yale College in 1826. He published "The New Churchman Extra," "Freedom and Slavery in the Light of the New Jerusalem," "The Doctrine of the Lord," and several volumes of sermons. His first sermon, on the "Paramount Importance of Spiritual Things," was published in 1828 at Philadelphia, and reprinted in London. Died Mar. 20, 1864.

**Deciduous** [Lat. *deciduus*, from *de*, "down," and *cado*, to "fall"] **Trees** are trees whose leaves fall off in autumn and are annually renewed in the spring. The greater part of the trees and shrubs of temperate climates are deciduous, but in tropical countries the forest trees maintain generally a perennial verdure, except where the diversities caused by the wet and dry seasons are extreme. Trees that are not deciduous are called evergreen.

**DECIDUOUS TEETH**, called also, in mammals, **TEMPORARY** or **MILK TEETH**, are the teeth which appear in infancy, and which after a time fall out, and are succeeded by the permanent teeth. In children there are twenty such teeth, ten in each jaw—four molar, two canine, and four incisor teeth. In reptiles and fishes all teeth are deciduous, being continually cast out and renewed.

**Dec'imal** [from the Lat. *decimus*, "tenth" (from *decem*, "ten")], a number written in the scale of tens. The name is especially applied to a **DECIMAL FRACTION** (which see).

**Decimal Fraction** is a fraction whose denominator is a decimal number or power of ten. Thus,  $\frac{1234}{1000}$  is a decimal fraction. It may be decomposed into the sum  $\frac{1000}{1000} + \frac{200}{1000} + \frac{30}{1000} + \frac{4}{1000} = 10 + 2 + \frac{3}{10} + \frac{4}{1000}$ . By an obvious extension of the method of local values, where each digit has ten times the value of the like digit which immediately follows it, the above decimal fraction may be, and usually is, written thus: 12.34, where the decimal point after the 2 merely serves to indicate which digit represents *units*. In this form a decimal fraction is termed a *decimal*.

For the purpose of indicating the units' place the method of Sir Isaac Newton, of using a point placed for distinction near the top of the figures, is frequently used. The operations of addition, subtraction, multiplication, and division may be applied to decimals in exactly the same manner as to integers. The only additional rules in decimals refer to the position of the decimal point.

In their abbreviated form, decimal fractions are now extensively employed in arithmetical calculations. A subdivision of weights and measures on the principle of decimal division was introduced into France at the time of the Revolution, and has since been adopted by a large portion of the civilized world.

**Decima'tion** [Lat. *decimatio*, from *decem*, "ten"], in Roman history, the selection by lot of one man out of every ten, who was put to death in cases of mutiny or other grave offence committed by a body of troops. Decimation has seldom been practised in modern times. Blücher decimated a body of mutinous troops before the battle of Waterloo.

**Decimi**, *dā'che-mee* [from the Lat. *decimus*, "tenth"], an Italian term used in music, signifying an interval of ten diatonic degrees, as from C to E, or third above the octave, as which it is always treated in harmony. In double counterpoint, where a necessary difference has to be made, it is treated differently from the third, although the same harmonic rules obtain; also in thorough-bass, where the figure 9 rises a degree to 10, instead of falling a degree to 8.

**De'cius** (CAIUS MESSIUS QUINTUS TRAJANUS), a Roman emperor, born in Pannonia about 200 A. D. He became a general in the service of the emperor Philip, and had command of an army which revolted against Philip and proclaimed Decius. In the battle that ensued Philip was defeated and killed in 249 A. D. A severe persecution of the Christians occurred in the reign of Decius, who was killed in battle by the Goths in Nov., 251 A. D.

**Decius Mus** (PUBLIUS), a Roman consul and patriot who obtained celebrity by devoting himself to the *Dii Manes* as a sacrifice. In a battle against the Latins (337 B. C.) he

rushed into the midst of the enemy and was killed. His son, P. Decius Mus, imitated his example in 296 B. C., when he commanded against the Gauls.

**Deck** [from the Ang.-Sax. *decan*, to "cover," and allied to the Lat. *tectum*, a "covering" or "roof" (from *tego*, *tectum*, to "cover"); Fr. *pont* or *tillac*], a planked flooring, forming also a covering or division to a ship. In large vessels there are several decks, as the upper, main, lower, and orlop decks. Smaller ships have two whole and one half deck, and still smaller only one of each.

**Decker** (THOMAS), an English dramatist, of whose life very little is known. In Henslowe's "Diary" he appears deeply engaged in theatrical works during the last year of the sixteenth century, and, according to his own account, he was "threescore" in 1637. He wrote plays of very various character and with very different partners—Ford, Rowley, Middleton, Webster, and others—but his own part of the plays is generally tolerably recognizable on account of its humor and sprightliness. His principal plays are "Fortunatus," "The Honest Whore," "Shoemaker's Holiday," etc. None of them, however, is now ever brought on the stage.

**Declara'tion** [Lat. *declaratio*, from *declaro*, to "make clear"], an affirmation; the act of declaring; a public announcement; a public expression of facts or opinions; a proclamation. Among the most memorable of all political documents is the American **DECLARATION OF INDEPENDENCE** (which see). The first Colonial Congress passed an important "Declaration of Rights" at Philadelphia on the 14th of Oct., 1774. Though less famous than the Declaration of Independence, it is of scarcely less importance in the history of our country. (See GILLET'S "Federal Government," 1871, pp. 17-27.) A "Declaration of the Rights of Man" was adopted by the National Assembly at Paris Aug. 18, 1789. The "Declaration of Thorn" (Lat. *declarat'io Thorunensis*) was a confession of faith drawn up at Thorn, in Poland, in 1645, for the use of the Reformed churches, the design being to settle controverted points.

**DECLARATION**, in law, is a specification of a cause of action by a plaintiff against a defendant; the pleading in which a plaintiff sets forth his case against the defendant. It contains certain formal or substantial parts, such as the title, venue, the cause of action, and the conclusion. If the plaintiff fails to declare within a certain time, the defendant may obtain judgment of *non pros*. The term is used in other significations in other branches of the law—e. g. declaration of trust, declaration of uses, declaration in evidence, etc.

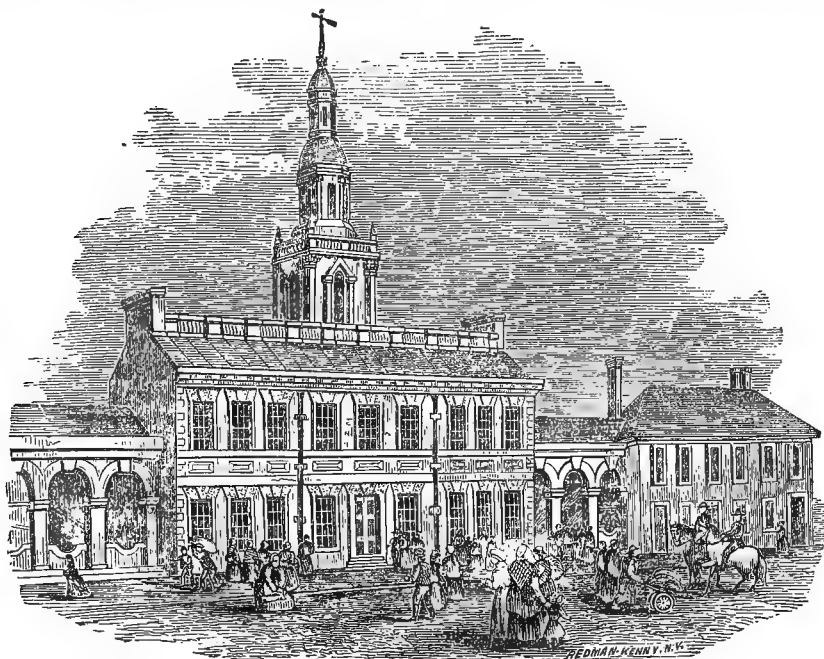
**DECLARATION OF WAR**, the formal announcement by a government of its intention to wage war against another, is a proceeding which is observed among all civilized nations, though instances have frequently occurred where *de facto* wars have been carried on without such notification, as between the English and Spanish at sea at various times during the reigns of Elizabeth and James I. of England. Powerful nations have also sometimes, without any such declaration, attacked the weak, designing a breach of international law. In the U. S. the declaration of war is a power exercised by Congress alone. During the age of chivalry, a herald made declaration of war at the enemy's court, his tabard on his arm. No offence was taken at his defiance, which was frequently rewarded by gifts of money from the party defied. (See **INTERNATIONAL LAW** No. II., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

**Declaration of Independence.\*** The first Congress of the thirteen British colonies, which led to their ultimate union in resistance to the British crown, and their jointly throwing off their allegiance to the same, as well as their ultimate union as the United States of America, met in Philadelphia on the 5th of Sept., 1774. The immediate cause of this assemblage was what was called "the Boston Port Bill," that is, an act of Parliament by which the port of Boston was closed and the custom-house removed to Salem, because of the destruction of the tea at the former place. This was looked upon by the friends of constitutional liberty in all the colonies as a direct attack by usurpation upon the chartered rights of Massachusetts. If they should silently permit this gross outrage to be perpetrated upon a sister colony, they saw no security against similar outrages being perpetrated in turn upon their own chartered or constitutional rights. It was now that the cry of "The cause of Boston is the cause of us all" was raised in Virginia, and extended from the Penobscot to the Altamaha. The result was the call of a general Congress of all the colonies, to meet, by deputies, at the time and place stated, for joint consultation and joint action in maintenance of principles essential to the preservation of the rights and liberties of all. The idea of independence or

\*By Hon. Alex. H. Stephens.

separation was at this time entertained by no one. Upon the assembling of this Congress, Peyton Randolph of Virginia was chosen the president of it, and Charles Thompson secretary. In all the deliberations of this body each colony stood upon an equal footing with the others, without

regard to population, wealth, or the number of delegates sent. All questions were decided by the colonies present, each having one vote only. They urged several measures upon the consideration of their constituents as proper means for obtaining a general redress of grievance, and



Old Pennsylvania State-house, or "Independence Hall" (where the Declaration was signed), as it appeared in 1776.

also prepared and published a declaration of what they considered the indefeasible rights of all the colonies under the British constitution. They adjourned on the 26th of Oct., 1774, with a recommendation to the colonies to meet in Congress again, by deputies, on the 10th of May, 1775.

In speaking of the papers issued by this assemblage, Lord Chatham said in the British Parliament that, though he had studied and admired the free states of antiquity, the master-spirits of the world, yet for solidity of reasoning, force of sagacity, and wisdom of conclusion no body of men could stand in preference to this Congress. All this, however, incensed rather than appeased the ministry. On the 1st of April, 1775, they had 3000 troops in Boston for the purpose of enforcing their iniquitous measures at the point of the bayonet. Hostilities soon ensued. The battles of Concord and Lexington were fought. Engagements also took place at Ticonderoga, Crown Point, and Skenesborough in New York.

It was in this state of things that the second Congress of the colonies assembled at Philadelphia on the 10th of May, 1775, according to the recommendation of its predecessor. Peyton Randolph of Virginia was again chosen president, but soon being called home on urgent business, John Hancock of Massachusetts was, on the 24th of May, chosen president of the Congress in his stead. The crisis was now becoming not only serious, but alarming. The purpose of Great Britain to reduce the colonies to absolute subjection without any redress of grievances seemed to be evident. The Congress, with firmness and without hesitation, determined to resist force by force. Troops were raised for the purpose. In setting forth the reasons for their action in thus defending themselves and their constituents, they declared that they had "no wish to separate from the mother-country, but only to maintain their chartered rights." "In our native land," said they, "and in defence of the freedom which is our birthright, and which we have ever enjoyed till the late violation of it, for the protection of our property, acquired solely by the honest industry of our forefathers and ourselves, against violence actually offered, we have taken up arms. We shall lay them down when hostilities shall cease on the part of the aggressors, and all danger of their being renewed shall be removed, and not before."

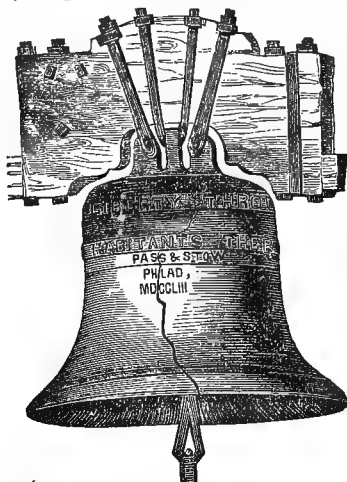
On the 14th of June, 1775, at the instance of Massachusetts, George Washington, one of the delegates of Virginia, was unanimously appointed commander-in-chief of all the colonial forces. He was commissioned in the name of the united colonies, the name of each colony present by its deputies being set forth in the commission. This office he

accepted on the condition that he should receive no salary except the payment of his actual expenses.

Three days afterwards the battle of Bunker Hill was fought. Washington did not reach the vicinity of Boston until the 12th of July, 1775, when he assumed the command of the colonial army assembled there. It was not until the early part of the year 1776 that the public mind throughout the colonies began generally and seriously to consider the question of independence, though a portion of the people of North Carolina had taken this view of the subject almost from the beginning of the recent troubles. As early as the 20th of May, 1775, their celebrated Mecklenburg convention assembled and announced their famous declaration, severing for ever themselves from all their allegiance to the crown of Great Britain.

In Jan., 1776, Massachusetts instructed her delegates in the Congress of the colonies at Philadelphia to vote for independence. South Carolina gave similar instructions to her delegates in March. Georgia and North Carolina did the same in April. In May, Gen. Washington wrote from the head of the army, then at New York, "A reconciliation with Great Britain is impossible. . . . When I took command of the army I abhorred the idea of independence; but I am now fully satisfied that nothing else will save us." In the same month Virginia instructed her delegates in Congress to vote for independence. New Hampshire, New Jersey, and Maryland followed in giving similar instructions to their delegates early in June. Pennsylvania and New York delayed action, still indulging hopes of an adjustment of the controversy. The general instructions of the colonies to their delegates were to renounce all allegiance to the British crown, and to form a confederation among themselves as independent States. On the 7th of June, Richard Henry Lee, a delegate from Virginia, moved a resolution in Congress that "these united colonies are, and of right ought to be, free and independent States, . . . and that a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approbation." This resolution was adopted on the 11th of June. Two committees were appointed under it—one to prepare a Declaration of Independence, and the other to prepare Articles of Union or Confederation. The committee to prepare the Declaration of Independence consisted of Thomas Jefferson of Virginia, John Adams of Massachusetts, Benjamin Franklin of Pennsylvania, Roger Sherman of Connecticut, and Robert R. Livingston of New York. They reported on the 28th of June, but action on the report was deferred for some days for the delegates from Pennsylvania and New York to receive their instructions

and powers to vote for the Declaration. This celebrated paper was drawn up by Mr. Jefferson, the chairman of the committee, being only slightly modified in some parts, as



The "Liberty Bell" was first imported from England in 1753. It was cracked at the first ringing after its arrival, and recast in Philadelphia in the same year. Upon the fillets around it were cast (twenty-three years before the Declaration of Independence) the prophetic words, "Proclaim liberty throughout all the land, unto all the inhabitants thereof." After the first reading of the Declaration it was rung for more than two hours, with the firing of cannon and the beating of drums. The bell has been broken for many years. It now hangs from the ceiling over the hallway of the old State-House, Phila.

it now stands, at the suggestion of other members. It came up for final action on the 4th day of July, when it received the unanimous vote, not only of all the colonies, but of all their delegates in Congress. It was voted upon by colonies as separate and distinct political bodies, and as it stands on the journal is in these words:

IN CONGRESS, July 4, 1776.

THE UNANIMOUS DECLARATION OF THE THIRTEEN UNITED STATES OF AMERICA.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established, should not be changed for light and transient causes; and accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these Colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having, in direct object, the establishment of an absolute tyranny over these States. To prove this, let facts be submitted to a candid world:

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his Governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and, when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation

of large districts of people, unless those people would relinquish the right of representation in the Legislature; a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the State remaining, in the mean time, exposed to all the danger of invasion from without, and convulsions within.

He has endeavored to prevent the population of these States; for that purpose, obstructing the laws for the naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislature.

He has affected to render the military independent of, and superior to, the civil power.

He has combined, with others, to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation.

For quartering large bodies of armed troops among us:

For protecting them, by a mock trial, from punishment, for any murders which they should commit on the inhabitants of these States:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent:

For depriving us, in many cases, of the benefits of trial by jury:

For transporting us beyond seas to be tried for pretended offences:

For abolishing the free system of English laws, in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these Colonies:

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the powers of our governments:

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation, and tyranny, already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections among us, and has endeavored to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions, we have petitioned for redress in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince, whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consan-

guinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the Representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name and by the authority of the good people of these Colonies, solemnly publish and declare, That these United Colonies are, and, of right, ought to be, *free and independent States*; that they are absolved

from all allegiance to the British crown, and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved; and that, as *free and independent States*, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which *independent States* may of right do. And, for the support of this Declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other, our lives, our fortunes, and our sacred honor.

John Hancock  
 Sam<sup>d</sup> Adams Eliz. Livingston  
 Rob<sup>t</sup> Treat Pauncefoot W<sup>m</sup> Floyd  
 John Adams Fran<sup>s</sup> Lewis  
 Elbridge Gerry  
 Josiah Bartlett Rich<sup>d</sup> Stockton  
 Sam<sup>l</sup> Huntington  
 Ste<sup>p</sup> Hopkins John Hart  
 Abra<sup>m</sup> Clark Lewis Morris  
 John Morton  
 Matthew Thornton  
 Roger Sherman John Penn  
 Wm Whipple Jas<sup>o</sup> Witherspoon  
 William Ellery Wm Hooper  
 Oliver Wolcott Rob<sup>t</sup> Morris  
 Ben<sup>j</sup> Franklin Wm Williams  
 Wm Paca  
 Tra<sup>s</sup> Hopkinson Tho<sup>s</sup> Stone  
 Charles Carroll of Carrollton

Th Jefferson Geo Taylor  
 Edward Rutledge Joseph Hewes  
 Jas Smith Geo Robt  
 Geo Lymer Tho M Heat  
 Bullon Gwinnett Geo Read  
 James Wilson Thomas Lynch Junr  
 Samuel Chas George Wythe  
 Benjamin Rush Lyman Hall  
 Richard Henry Lee  
 Arthur Middleton Tho Nelson p.  
 Casar Rodney Carter Braxton  
 Mery Harrison Geo Walton  
 Francis Lightfoot Lee  
 Tho: Peywara Junr

**Declaration of Independence, The Mecklenburg.** More than thirteen months before the adoption of the Declaration, above given, by the Continental Congress, a series of resolutions embodying a similar declaration had been adopted by the citizens of Mecklenburg co., N. C., at a public meeting holden at Charlotte, the seat of justice of the county. Of this important historical incident different accounts are given. According to the statement generally received in North Carolina, the meeting above referred to was held on the 20th day of May, 1775, and the document itself was in the words following:

"Resolved, 1. That whoever directly or indirectly abetted, or in any way, form, or manner, countenanced the unchartered and dangerous invasion of our rights, as claimed by Great Britain, is an enemy to this country—to America—and to the inherent and inalienable rights of man.

"Resolved, 2. That we, the citizens of Mecklenburg county, do hereby dissolve the political bands which have connected us to the mother-country, and hereby absolve ourselves from all allegiance to the British crown, and abjure all political connection, contract, or association with that nation, who have wantonly trampled on our rights and liberties, and inhumanly shed the blood of American patriots at Lexington.

"Resolved, 3. That we do hereby declare ourselves a free and independent people; are, and of right ought to be, a sovereign and self-governing association, under the control of no power other than that of our God and the general government of the Congress; to the maintenance of which independence we solemnly pledge to each other our mutual co-operation, our lives, our fortunes, and our most sacred honor.

"Resolved, 4. That as we acknowledge the existence and control of no law or legal officer, civil or military, within this county, we do hereby ordain and adopt as a rule of life, all, each, and every of our former laws; wherein, nevertheless, the crown of Great Britain can never be considered as holding rights, privileges, immunities, or authority therein.

"Resolved, 5. That it is also further decreed that all, each, and every military officer in this county is hereby retained in his former command and authority, he acting conformably to these regulations. And that every member present of this delegation shall henceforth be a civil officer—viz. a justice of the peace in the character of a 'committee-man,' to issue process, hear and determine all matters of controversy, according to said adopted laws, and to preserve peace and union and harmony in said county; and to use every exertion to spread the love of country and fire of freedom throughout America until a more general organized government be established in this province."

Other accounts give May 31, 1775, as the date of the meeting; and make the declaration to consist of a preamble and twenty resolutions, of which twelve (the fourth to the fifteenth inclusive) make provision for the military organization of the male population and for the administration of justice, and the rest, with the preamble, are as follows:

"Whereas, By an address presented to His Majesty by both houses of Parliament in February last, the American colonies are declared in a state of actual rebellion, we conceive that all laws and commissions confirmed or derived from the authority of the king and Parliament are annulled and vacated, and the former civil constitutions of these colonies for the present wholly suspended. To provide in



some degree for the exigencies of this county in the present alarming period, we deem it proper and necessary to pass the following resolves—viz.:

"I. That all commissions, civil and military, heretofore granted by the crown to be exercised in these colonies, are null and void, and the constitution of each particular colony wholly suspended.

"II. That the Provincial Congress of each province, under the direction of the great Continental Congress, is invested with all legislative and executive powers within their respective provinces, and that no other legislative or executive power does or can exist at this time in any of these colonies.

"III. As all former laws are now suspended in this province, and the Congress has not yet provided others, we judge it necessary, for the better preservation of good order, to form certain rules and regulations for the internal government of this county until laws shall be provided for us by the Congress. . . .

"XVI. That whatever person shall hereafter receive a commission from the crown, or attempt to exercise any such commission heretofore received, shall be deemed an enemy to his country; and upon confirmation being made to the captain of the company in which he resides, the said company shall cause him to be apprehended and conveyed before two selectmen, who, upon proof of the fact, shall commit said offender to safe custody until the next sitting of the committee, who shall deal with him as prudence may direct.

"XVII. That any person refusing to yield obedience to the above rules shall be considered equally criminal and liable to the same punishments as the offenders last mentioned.

"XVIII. That these resolves be in full force and virtue until instructions from the Provincial Congress regulating the jurisprudence of the province shall provide otherwise, or the legislative body of Great Britain resign its unjust and arbitrary pretensions with respect to America.

"XIX. That the eight militia companies of this county provide themselves with proper arms and accoutrements, and hold themselves in readiness to execute the commands and direction of the general Congress of the province and this committee.

"XX. That the committee appoint Col. Thomas Polk and Dr. Joseph Kennedy to purchase three hundred pounds of powder, six hundred pounds of lead, and one thousand flints for the use of the militia of this county, and deposit the same in such place as the committee may hereafter direct.

"Signed by order of the committee,

"JOSEPH BREVARD, Clerk of the Committee."

There seems to be no difficulty in believing that both accounts are true, and both documents genuine. The action of the 20th of May must have necessitated some more full provision for the public safety and for securing the order of society than had been made at that time; and such a meeting as that of the 31st must doubtless have been held, whether the previously adopted declaration had then been reiterated or not. (The historical questions connected with this matter, will, however, be found fully discussed by the Hon. William A. Graham of North Carolina, under the title MECKLENBURG DECLARATION OF INDEPENDENCE, HISTORY OF.) F. A. P. BARNARD.

**Declaration of Rights**, a state paper presented to the prince and princess of Orange (afterwards William III. and Mary II.) at the time the crown was tendered to them (Feb. 13, 1689). The declaration had been drawn up by the Convention-Parliament, and complained of the following grievances which England had endured during the reign of James II.: The exercise of the dispensing power, the establishment of illegal ecclesiastic tribunals, unlawful taxation, the unlawful maintenance of the army, interference with the courts and the elections, the levying of excessive bail, the infliction of barbarous punishments, and the refusal to hear petitions. The declaration then asserted the rights which had been thus violated, and claimed various privileges for the nation. The substance of this declaration became the "Bill of Rights," passed in the second session of the first Parliament under William and Mary.

**Declen'sion** [Fr. *déclinaison*; Lat. *declinatio*, from *declino*, *declinatum*, to "bend aside," to "infect"], a term applied in grammar to the inflection of nouns, adjectives, and pronouns according to their different cases. Such inflections in English are limited to three cases—the nominative, the genitive or possessive, and the accusative or objective. Thus, the personal pronoun *he* is declined as follows: nom. *he*, gen. *his*, acc. *him*, etc. But this regular inflection is limited in our language to pronouns. Our substantives have ordinarily but one change of case inflection, which occurs in the genitive, and is formed by the addition of *s*, with an apostrophe, to the nominative. In

Latin there are six cases, in Greek five, in German four, in Russian seven, in Sanscrit eight, and in some languages even more. Of the cases, the first is the nominative or name-case (from the Lat. *nomino*, *nominatum*, to "name," and more remotely from *nomen*, a "name"). It is that form which is usually found in a list of nouns or names, in which case the subject-noun is always found. The genitive case (Lat. *casus genitivus*, from *gigno*, *genitum*, to "beget," implying the origin or source), also called the possessive case, indicates either the source or the possessor. Thus, when we say the "sun's light," the sun is not the possessor of the light which it has emitted, but its source. In some cases the genitive implies a relation which is neither origin nor possession. Thus we speak of "Cæsar's enemies," in which case the possession is formal, and not logical. The dative case (Lat. *casus dativus*, from *do*, *datum*, to "give") frequently denotes attribution or giving. Thus, in Latin we say "*Dedit mihi librum*," "He gave (to) me the book," in which example the pronoun is dative. The dative, however, frequently does not imply any giving or attribution; as in the Lat. "*Dis invidius*," "hateful to the gods," where a certain relationship is implied. The dative in Greek and Latin seldom signifies motion to any place. The accusative (from the Lat. *accuso*, *accusatum*, to "accuse"), called also the objective case, is frequently the object of an active verb or of a preposition, and in general is regarded as indicating the object towards which motion is directed or the place at which it ends. The vocative (from the Lat. *voco*, *vocatum*, to "call") is the form of a noun in which a person is addressed or apostrophized. In English this case is identical in form with the nominative. The ablative (from the Lat. *ab*, "away," and *fero*, *latum*, to "carry") is properly the case of a noun from which something is taken or carried away. The Latin ablative also represents the instrumental and locative cases. The instrumental case properly designates the means by which anything is done, and is found in the Sanscrit and Russian. In most languages some other case, or a preposition with its object, takes its place. The locative case (from the Lat. *loco*, *locatum*, to "place") is that form of a noun which indicates that it stands for the place where anything is, or is done. It is used in Sanscrit and Russian. In the latter language it is called *predložnii*, or "prepositional," because it is always accompanied by a preposition.

The Latin ablative includes, as we have seen, also the locative and the instrumental. In the Sanscrit, to which the Latin has a very near affinity, the instrumental, dative, and ablative plural are, in many words, almost identical with each other. For example, in the Sanscrit *bhūs* (signifying "the producer," hence the "earth," and also a "cow")—akin to the Lat. *bos*—has *bhūbhyās* in the dative and ablative plural, and *bhūbhīḥ* in the instrumental. The likeness between these forms and the Lat. *bābus* (dative and ablative of *bos*) is very remarkable, especially when we consider that *bos* in all its cases has a short penultima, except in the dative and ablative plural; while *bhūs* has also a short penultima except in the dative, locative, instrumental, and ablative plural cases, fully represented in Latin by the dative and ablative.

Certain particular methods of inflecting words are also called declensions. Thus, declinable words are in some languages classified in groups according to the various methods in which their cases are formed. These groups are called the "first declension," "second declension," etc.

J. THOMAS.

**Declina'tion** [Lat. *declinatio*, from *declino*, to "bend downward or deviate"], in astronomy, the angular distance of a celestial body from the celestial equator, measured along a great circle passing through the centre of the body and the poles of the heavens; or it may be defined to be the arc of a circle of declination passing through the place of the heavenly body, intercepted between that place and the celestial equator. The place of a star in the heavens is determined by means of its right ascension and declination, which correspond to longitude and latitude on the surface of the earth.

**Declination of the Magnet'ic Nee'dle** is the deviation of the axis of a magnetic needle (that is, the straight line which joins its poles) from the astronomical meridian. This declination is sometimes towards the W. and sometimes towards the E. From a table of observations made at Paris, it appears that since 1580 the declination has varied more than 31 degrees. In 1663 it vanished. From the date of the first observations till 1820 it advanced progressively westward, but since that time it has assumed a retrograde movement towards the E. The declination of the magnetic needle at London in 1865 was 20° 30'. At present it is scarcely perceptible at Cape Hatteras. To the W. of that point it is easterly, and to the E. the variation is westerly. (See MAGNETISM, by PROF. A. M. MAYER, Ph. D.)

**Declinom'eter** [a word improperly formed from the Lat. *declinatio*, "declination," and the Gr. *μέτρον*, a "measure"], an apparatus for measuring the declination of the magnetic needle, or the force of terrestrial magnetism in the plane of the horizon.

**Decomposi'tion** [from the Lat. *de*, "from," "un," and *compono*, *compositum*, to "put together"], a term used in chemistry to signify the separation of compound substances into their elementary parts. When compounds are resolved into their elements, or when the chemical constitution of substances is altered, they are said to be decomposed; and when in this operation new products are formed, such products are called the results of decomposition. Thus, ammonia is the result of the decomposition of certain animal substances; carburetted hydrogen gas is the result of the decomposition of pit-coal, etc. Chemists use the terms simple and compound, or single and double decomposition, to distinguish between the less and more complicated cases. When a compound of two substances is decomposed by the intervention of a third, which is itself simple or which acts as such, the case is one of simple decomposition; water, for instance, is a compound of oxygen and hydrogen. When the metal potassium, which is a simple body, is thrown into it, it is decomposed; the hydrogen is liberated in the form of gas, and the oxygen combines with the potassium to form potassa. (See CHEMISTRY.)

**Deco'rah**, a city, capital of Winneshiek co., Ia. (see map of Iowa, ref. 2-J, for location of county), situated on the Upper Iowa River, is the terminus of the Decorah branch of the Milwaukee and St. Paul R. R. It contains the Norwegian Lutheran College, an excellent graded public school, woollen-mills, paper-mill, foundries, flour-mills, wagon manufactories, and other industries. Pop. in 1870, 2110; in 1880, 2951.

**Dec'orate** [from the Lat. *decoro*, *decoratum*, to "adorn"], to adorn, embellish; to cover with external ornaments. To decorate graves is to garnish them with flowers. The anniversary on which flowers are placed on soldiers' graves in the U. S. is called Decoration Day, and is observed on May 30th. This day is said to have been chosen because it was the date of the discharge of the last soldier of the Union army of the civil war.

**Decorated Style**, in architecture, is also known as the "Middle Pointed" or pure Gothic style. It succeeded the First Pointed or Early English (1169-1272) by a transition so gradual that its origin in England is variously assigned to dates between 1272 and 1307, although in Germany and France it was considerably earlier. It finally passed by an equally gradual transition into the Perpendicular Gothic of the fifteenth century. The Decorated Style is regarded as the perfect flower of Gothic architecture. It is marked by geometrical window-tracery, richly ornamented doorways, delicate mouldings, and elaborately carved imitations of leaves, as of the vine and oak, often conventionalized, but not unfrequently copied from nature.

**Decoy** [from *de*, "away," and the old English verb *cōy*, to "entice"]; to entice; to lead by artifice into a snare or into danger; to entrap by insidious means. As a substantive it signifies any object or thing by which persons or animals are enticed and lured into danger, etc.; a device by which aquatic birds, chiefly ducks, are enticed from a lake or river into a narrow winding canal or ditch, which, gradually becoming narrower, at last terminates under a cover of network several yards long. To draw the birds into this snare a tame duck called a decoy-duck is sometimes employed.

**Decrescen'do**, in music, is a gradual diminishing of sound, the reverse of CRESCENDO (which see). It is marked thus —

**Decre'tal** [from the Lat. *decretum*, a "decree"], a decree of the pope, having the same authority in canon law as the decrees in civil. The body of the canon law consists—1st, of the *Decretalium*, a collection made by Gratian, a Benedictine monk, after 1150, and drawn from the opinions of the fathers, popes, and councils; 2d, of the *Decretalia*, collected by Pope Gregory IX. (1227-41) from the decretal rescripts or epistles of the popes. A *liber sextus* was added by Boniface VIII. (1294-1303), and other additions were made by succeeding popes.

**Decretals, False**, otherwise called the **Pseu-do-Isido'rian Can'ons**, the name of one of the most remarkable literary forgeries of which we have any record. It designates a collection of papal letters, canons, etc., partly genuine, but mostly spurious. The name of the author is unknown, but they are ascribed in the preface to one Isidorus Mercator (or, according to some MSS., Peccator), and hence they were long believed to be the work of St. Isidore of Seville, who died Apr. 4, 636. Between Clement (died 100 [?] A. D.) and Siricius (384-398 A. D.) there are

one hundred forged decretals, with some interspersed later. The forgery was perpetrated by Autgar, archbishop of Mainz (826-847 A. D.). The cheat was demonstrated by the Magdeburg centuriators (1559-1574 A. D.). Their spuriousness was first established by German Protestant critics in the sixteenth century, and is now admitted by all Roman Catholic writers. It appears to have been the object of the author of this great fraud to assist in freeing the Church from secular domination. It is maintained by some Protestant historians that the primacy of the popes is mainly based upon the false decretals; but while it cannot be denied that certain popes used them freely for their own advantage, there is no evidence of intentional fraud on the part of the popes, for the decretals were generally received as genuine; and it is maintained by Roman Catholic writers that the influence of the false decretals was small.

**Decu'rio** [Lat. *decurio*], the leader of a *decuria*, or body of ten men, in the Roman cavalry. Three *decurie* constituted a *turma*, or body of thirty men, and the name *decurio* was afterwards given to the commander of the larger body. In Roman law it was the name given to senators in the colonial governments.

**Decussa'tion** [from the Lat. *decussis*, a Roman coin valued at ten *asses* (see AS), and represented by the letter X], in anatomy, a crossing of nervous filaments, so called from a fancied resemblance to the letter X. The innermost fibres of the anterior pyramids and lateral columns of the *medulla oblongata* decussate freely from side to side; so that disease in one side of the brain frequently leads to paralysis of the opposite side of the body. Another decussation occurs between the optic nerves; this is often called the *chiasma*, also from its resemblance to the letter X (the Greek *chi*). The crossing of rays of light, etc. is also called decussation.

**Dedham**, R. R. centre, capital of Norfolk co., Mass. (see map of Massachusetts, ref. 5-I, for location of county), is situated on Charles River, 10 miles S. W. of the State-house in Boston. It has a granite court-house, jail, house of correction, town-hall, large woollen-mills, extensive brush manufactory, a piano-forte manufactory, and a foundry. The town has a large Roman Catholic institution under the care of the Sisters of Charity, and a home for fallen women, which receives the assistance of the State and of many philanthropic people. In 1872 part of Dedham township was included in the new township of Norwood. Pop. of township in 1870, 7342; in 1880, 6233.

**Dedica'tion** [Lat. *dedicatio*, from *dedico*, *dedicatum*, to "dedicate"], a complimentary address to a particular person, prefixed by an author to his work. This custom was in use at a very early period. Horace, Virgil, Cicero, and Lucretius were among the number of those who practised it. At the period of the revival of letters in Europe few works were published without dedications. Many of these are remarkable for their elegance and purity of style, and, from the matter which they contain, are of more value than the treatises to which they are prefixed. But the practice became perverted, and many authors of the succeeding generations employ them chiefly with the view of securing the patronage of the great. Dedications were most abused in France under Louis XIV., and in England from 1670 to the accession of George III. Dryden was a great dedicator, and Johnson wrote dedications for money. Corneille got 1000 louis'd'ors for the dedication of "Cinna." Some of the most beautiful dedications are those prefixed to the different volumes of the "Spectator" by Addison, and in more recent times those with which each canto of Sir Walter Scott's "Marmion" is prefaced. A complete history of dedications would be of great value, as throwing light upon the history and character of many distinguished persons, which are now involved in obscurity.

**DEDICATION**, in law. See HEREDITAMENTS INCORPOREAL, by PROF. T. W. DWIGHT, LL.D.

**Deduc'tion** [from the Lat. *de*, "from," and *duco*, *ductum*, to "draw"] is the mental operation which consists in drawing a particular truth from a general principle already known. It is opposed to *induction*, which consists in rising from particular truths to the determination of a general principle. The syllogism is the form of deduction. (See SYLLOGISM.) Before we can deduce a particular truth we must be in possession of the general truth. The mathematical and metaphysical sciences are founded on deduction; the physical sciences rest on INDUCTION (which see).

**Dee**, a river of England, 80 miles long, drains parts of Merioneth, Denbigh, Flint, Salop, and Cheshire, and enters the Irish Sea through a tidal estuary 9 miles long and from 3 to 6 miles broad.

**Deed** [from the Ang.-Sax. *dæd*, "done," hence, as a noun, "something done" or "executed"], a writing on

paper or parchment, sealed and delivered. This is its most general signification. In a restricted sense it means an instrument for the conveyance of real estate. According to Lord Coke, it should possess the following requisites: writing, parchment or paper, a person able to contract, a sufficient name, a person able to be contracted with, a sufficient name, a thing to be contracted for, apt words required by law, sealing, and delivery. Deeds pursue a regular form—containing the premises, *habendum*, *tenendum*, *reddendum*, conditions, warranty, covenants, and conclusion. The premises express the names of the parties, the consideration to be paid for the conveyance, and a description of the property conveyed. This should be minute and accurate. The "*habendum*" expresses the interest which the grantee is to have, whether it be an estate in fee, for life, or an inferior estate. The "*tenendum*" refers to the tenure upon which the land is to be held, and is at present of no practical importance. The "*condition*," "*warranty*," and "*covenants*" are not found in all deeds. They may be inserted whenever required to carry out the intention of the parties. When a condition is resorted to, it may be either precedent or subsequent. (See *CONDITIONS*.) The covenants vary with the nature of the conveyance. In a conveyance in fee six covenants may be inserted (see *COVENANTS*); and in such case the instrument is called a deed with full covenants. In some instances the single covenant of warranty is introduced, when it is ordinarily termed a warranty deed. In many cases there are no covenants at all, the object of the transaction being only to convey whatever interest the grantor may have. It is a rule of the common law that some words in a conveyance used by a grantor will imply a covenant. This doctrine tends to mislead grantors who are not familiar with the rules of law, and it has been abrogated in some of the States—*e. g.* New York. There is, however, an important rule that a promise may be implied on the part of the grantee from his acceptance of an instrument containing words purporting to create a personal liability. Thus, if there are words to the effect that the grantee assumes the payment of a certain specified mortgage, he becomes liable by his acceptance, though he does not execute the instrument. Whether he is liable upon an implied *covenant*, or only upon a promise, is not clear upon the authorities.

A deed may be either an indenture or a deed poll. The leading distinction between these terms is, that an indenture purports to be the act of both parties, a deed poll of only one. An indenture commences with the third person, a deed poll with the first. In an indenture the date is found at the beginning of the instrument, in a deed poll at the end. An instrument in the form of a deed poll may be in substance an indenture if there be acts to be done by both parties. Between a strict deed poll and an indenture there is claimed to be an important difference in the construction of doubtful or ambiguous words. In the former these are interpreted against the grantor; the grantee may take the construction most favorable to himself if the words will reasonably bear it. To an indenture the rule has no application, and it is not regarded in any case with as much favor in modern law as formerly. In a country like our own, where many men not lawyers undertake to draw their own deeds, questions frequently arise as to the effect of omissions or insertions by mistake, or of alterations or erasures. These occur in many instances through mere inexperience, and without any evil intent. In the case of an omission or insertion of a clause by mutual mistake, an application may be made to a court of equity (see *EQUITY*) to rectify the conveyance and make it what the parties intended it should be. The case of an alteration by one of the parties creates more difficulty. One of the most perplexing questions presented is, whether the fact of an erasure or other alteration raises any presumption that it was made after execution, or whether the opposite view should be taken, that there can be no presumption which would lead to the conclusion that the grantee has committed a wrong. The better view would seem to be that the attendant circumstances should go to a jury, without any presumption either way, and should be passed upon as a matter of fact. A fraudulent alteration would in general vitiate the instrument, though it would not divest a title to land which had already become the property of the grantee. As to all instruments which did not confer an estate, but only created an easement or conferred a right of action, the alteration would be fatal. Conveyances in the U. S. are in general registered or recorded, their execution for that purpose being attended with prescribed formalities. (See *REGISTRATION AND RECORDING*.) The instrument is in general valid between the parties without registration, its object being to protect subsequent purchasers or incumbrances. The requisites and validity of a deed of land in any particular State depend upon the law of the place where the land is situated, though the question concerning

them be raised in the courts of another State. (See also *WARRANTY, QUIT CLAIM, COVENANT, BARGAIN AND SALE*.)

T. W. DWIGHT.

**Deems** (CHARLES FORCE), D. D., LL.D., born in Baltimore, Md., Dec. 4, 1820, graduated at Dickinson College, served in the Meth. ministry of the South several years, and has been professor in the University of North Carolina and in Randolph-Macon College, and president of Greensboro' and Centenary Colleges. He is now (1884) the successful pastor of the Church of the Strangers, New York City. He has been an abundant and able contributor to the "Southern Methodist Quarterly Review," and is the author of a volume of sermons, a "Life of Dr. Clark," "Devotional Melodies," "Home Atlas," a volume of poems entitled "Triumphs of Peace," and a "Life of Christ."

**Deem'ster, or Doomster**, formerly an officer in Scotland who read sentence of condemned persons in open court. Deemsters in the Isle of Man and Jersey are judges who give decisions without writings or process. In the former island the deemsters are the chief magistrates.

**Deep Bottom**, a point on the N. side of James River, in Henrico co., Va., about 12 miles by land and 20 miles by water below Richmond, opposite the peninsula of Jones' Neck, and between Three- and Four-Mile creeks, and near the battle-ground of Malvern Hill. It was occupied by part of the troops of Gen. B. F. Butler, June 20, 1864, and a pontoon bridge was thrown across the river. Near this point several important actions were fought during Aug. and Sept., 1864, the general result being favorable to the Union forces. Deep Bottom remained an important strategic point until after the fall of Richmond.

**Deep River** [Indian, *Sapponah*], a river of North Carolina, flows south-eastward through Randolph co., and nearly eastward through Chatham co., until it enters the Cape Fear River at Haywood. Coal abounds on its banks. Length, estimated at 120 miles.

**Deep River, Conn.** See APPENDIX.

**Deep River Coal-Beds**, a tract of coal-bearing lands in Chatham and Moore cos., N. C., in the valley of the Deep River, above noticed. They are probably of triassic, and certainly not of the true carboniferous, age. The area of the productive basin is over forty square miles, though the beds can be traced through Granville and Wake counties, in a southward and westward direction, almost across the State, and extending a few miles into South Carolina. Indeed, the Dan River coal-beds of Rockingham and Stokes counties are believed to be the same beds, though detached from the larger area. The quality of the coal is always good, though variable, some being an excellent and highly bituminous gas-coal, some good semibituminous coal, and some anthracite; while some is metamorphosed into graphite. The total amount of available coal in the Deep River field proper has been estimated at 240,000,000 tons. These coals have hardly been disturbed as yet, though they have been known for over 100 years. They have additional value from the fact that good iron and copper ores exist near them, the iron being often found in the same mines with the coal. By a system of slack-water navigation on the Deep and Cape Fear rivers the coal could be cheaply transported to Fayetteville, the present head of steamboat navigation on the latter river. With this point Wilmington, N. C., is connected by steamers; so that the Deep River beds might easily supply that city and her steam marine with excellent coal at a very low price.

The bituminous coal of this field is clean and does not soil the fingers. It is a caking coal, makes an excellent coke for manufacturing purposes, is free from sulphur, yields an abundant illuminating gas of good quality, and is useful for the blacksmith's forge, for the generation of steam, and for domestic uses.

**Deep-Sea Dredging.** The term "deep-sea" may be said to refer to depths greater than can be readily explored by ordinary efforts with simple means—in general, depths exceeding 100 or 200 fathoms. The term "deep-sea dredging," in its most comprehensive usage, as applied to organized deep-sea exploration, embraces all that class of operations wherein collections are made for the naturalist by dragging through the water, not only dredges, but other implements also, as dredges, trawls, rakes, and tangles for the bottom, tow-nets for the surface, and tow-nets and the gravitating trap for intermediate depths. In dragging the bed of the sea the implement is attached to a rope which passes over a pulley connected with an accumulator to relieve violent strains. The rope is paid out under frictional control, the vessel manœuvring, meanwhile, to plant the implement without fouling. Then more rope is paid out, that the implement may keep flat while dragging. Formerly only hemp rope was used for this purpose, but steel, possessing advantages as to strength, durability, compactness, etc., must supersede hemp in this,

as it has in deep-sea sounding. The first use of steel rope in dredging was in 1877, when, by the recommendation of Prof. Alexander Agassiz, it was adopted for use on board the U. S. Coast-Survey steamer *Blake*, the writer, at that time in command of the vessel, planning the mechanism for operating it; subsequently it has been used by the U. S. Fish Commission, by the Italians, and probably by others abroad, judging from the inquiries respecting the mechanism. For hauling in, a steam hoisting-engine is necessary. On passing from the engine the rope, if of hemp, is coiled on deck or on pins; if of wire, upon a reel. The bottom-material secured is carefully picked over, and, if necessary, washed in sieves to free the mud and expose small specimens, the best arrangement for this purpose being the table-sieve of the U. S. Fish Commission. Specimens are preserved in alcohol—if delicate, in bottles; otherwise, in tanks, being first wrapped in thin muslin.

The first systematic use of the naturalists' dredge was about 1750 by Otho Frederic Müller, a Danish zoologist. Müller's dredge had a square iron frame, each side bearing a flat iron scraper flaring outward. The frame formed the mouth-piece of a netting bag, and was connected with the dredge-rope by four iron rods proceeding from the corners. Dr. Robert Ball of Dublin modified Müller's dredge in 1838, chiefly by making the mouth-frame oblong, with scrapers only on the longer sides. Ball's dredge is the type on which nearly all subsequent improvements have been made, the most abrupt departures being the rake-dredge designed by Prof. A. E. Verrill for the U. S. Fish Commission in 1871, and the Sigsbee-Jacoby dredge, devised for the *Blake* in 1878 by Lieut. Jacoby, U. S. N., and the writer. Nearly all dredges are so arranged that in the event of serious fouling one arm breaks adrift from its connection with the dredge-rope, permitting the dredge to slew around and clear itself. Capt. Culver of the British man-of-war *Porcupine* first suggested the use of tangles; they are simply hempen swabs well frayed out, such as are used for cleaning ships' decks. These often gather a profusion of specimens when the dredge fails, and everything having spines, even fishes, are found entangled in them. They are usually trailed from an iron bar lashed transversely to the rear of the dredge, but sometimes an implement called the tangle-bar is used. The original tangle-bar, devised by Prof. Verrill in 1871, consists of a number of small chains trailing from a long iron bar, which is mounted axially at each end in a dumb wheel. Each chain bears several tangles separated by equal distances. A span from the axle connects with the dredge-rope. The rake-dredge is useful for procuring species of bivalves, annelids, holothurians, crustacea, etc., and can be used only on muddy or sandy bottoms. The mouth-piece for the bag is a rectangular frame of round iron, connected with another frame adapted to bear a double rake, which breaks up the ground in front of the dredge.

The *Blake* began her dredging-work with a Ball's dredge having canvas flaps or shields to protect the netting and a wisp of rattan to bear the tangles. It usually filled up with mud at once, and the mud did not wash out as desired. To meet this difficulty at first, the time of dragging was made shorter; but the difficulty disappeared with the use of the Sigsbee-Jacoby dredge. This implement, merely skimming the bottom, collects but little mud. Its frame is a rectangular skeleton box of bar-iron; to which is riveted two horizontally-placed—not flaring—scrapers. The netting bag is inside the frame, and has a trap like a trawl. A canvas shield covers the frame on the dragging-sides. This dredge is, in effect, a box open at both ends and having a netting bag inside. The use of the fisherman's trawl in great depths was begun by the *Challenger*. In its common form the frame consists of a beam of wood resting upon iron runners not unlike sledge-runners. The netting bag is long, conical, and roped around the mouth. Part of the roping is laced along the beam, while the remainder, being leaded, trails below on the ground. A second bag, having a small hole in the bottom, is so laced inside the main bag as to form a pocket or trap between the bottoms of the two bags. The trawl is dragged from a span fastened to the runners, and to be effective it must land upon the runners, which it sometimes fails to do. To prevent failure the bottoms of the runners are weighted, the best method being to suspend the weights by pendants. Prof. Alexander Agassiz, Lieut. S. M. Ackley, U. S. N., and the writer invented, jointly, a double-acting or reversible trawl, which was used by the *Blake* in 1878-79, and gave most satisfactory results. It is described in a work by the writer, the title of which is given at the end of this article.

The otter-trawl has been used on the work of the U. S. Fish Commission and by the Norwegian steamer *Vöringen*. It is chiefly successful with fish, and must be dragged rapidly. It consists of a netting bag having a very wide mouth, which is roped all around and flanked by two quad-

angular iron-shod pieces of wood called "otters." The roping between the otters is leaded along its lower part and strung with corks above. A span from the dredge-rope connects with the otters by "crows-feet," in such a way as to cause the otters to diverge when dragging. In "Nature" for Nov. 2, 1882, Prof. Milnes Marshall describes a dredging-implement used by him in dredging for *Funiculina quadrangularis*. This implement is an A-shaped frame, from the cross-piece of which depend lines armed with fish-hooks. The ends of the side-poles are weighted and the rope is attached at the apex of the A. In dragging, the machine is kept as nearly as possible at an angle of 30° with the sea-bottom. A similar machine used in the Philippine Islands is described by H. N. Mosely in his "Notes by a Naturalist of the Challenger," p. 407.

As commonly made, tow-nets are conical bags of Swiss muslin laced to a mouth-piece of stiff wire or wood. They are usually towed at the surface of the sea, but on the *Challenger* expedition they were towed at intermediate depths also by fastening them at intervals on the dredge-rope. Tow-nets used at intermediate depths are untrustworthy, because, being lowered and hauled back with the mouth open, the depth from which the enclosed specimens come is left in doubt. At the request of Prof. Agassiz the writer invented the gravitating-trap in 1880 to search intermediate depths. The machine is made to descend by gravity through any intermediate stratum that it may be desired to explore. During this descent it is open, but during the previous operation of lowering it into position, and the subsequent one of hauling it back, it remains closed. It was used with complete success from the *Blake* in 1880, and is described in the "Bulletin" of the Museum of Comparative Zoology at Harvard College (vol. vi., Nos. 8 and 9, Sept., 1880). Respecting its operation, Prof. Agassiz says: "The above experiments appear to prove conclusively that the surface fauna of the sea is really limited to a comparatively narrow belt in depth, and that there is no intermediate belt, so to speak, of animal life between those living at the bottom, or close to it, and the surface pelagic fauna."

The objects of deep-sea dredging are (1) the study of marine animals, their forms, the conditions under which they live, their geographical distribution, and their relations to other organisms, whether living or extinct; (2) the investigation of the nature of sea-bottoms in relation to geological questions. Nearly all knowledge of the deep sea and its inhabitants is the growth of a century, and, for the greater part, of the last twenty-five years. The first evidences of the existence of life at great depths were afforded by fortuitous discoveries, such as those of animals found clinging to sounding-lines, by the more legitimate revelations of the sounding-lead, and especially of the sounding-rod invented by Passed Midshipman J. M. Brooke, U. S. N., about 1854, to which should be added dredgings in various localities, but within 500 fathoms. The question was still undecided in 1867, in which year Mr. L. F. de Pourtales, as assistant in the U. S. Coast Survey, began a series of dredgings in the Gulf Stream between Florida and Cuba, the results of which were so important that the work was continued during the two following years, a depth of 700 fathoms being reached. The earliest success of Mr. de Pourtales probably led to the dredging expeditions of the British men-of-war *Lightning* and *Porcupine*. In 1868 the *Lightning*, under the scientific direction of Dr. Carpenter and Prof. Wyville Thomson, explored the sea between Scotland and the Faroe Islands, dredging to 550 fathoms. The sea-bed was found everywhere full of animal life, even to a high degree of organization. In the following year the *Porcupine*, Capt. Culver, R. N., commanding, made three successful cruises in the seas contiguous to the British Isles, the greatest depth dredged being 2435 fathoms, and the dredging-operations being successively under the direction of Dr. Gwyn-Jeffreys, Prof. Wyville Thomson, and Dr. Carpenter. In 1870 an English yachtsman, Mr. Marshall Hall, dredged from his yacht *Norna* off the coast of Portugal, and during the same year the Austrian man-of-war *Triest* dredged in the Adriatic. In 1871-72 dredgings were made in the Gulf of St. Lawrence by the Canadians, and in the Baltic by the German ship *Pomerania*. In 1871 the U. S. Fish Commission began, off the coast of New England, the important and extensive dredgings which it still continues. This work has been done under the direction of Prof. Spencer F. Baird, commissioner, with Prof. A. E. Verrill as chief assistant. The new steamer of the commission, the *Albatross*, Lieut.-Commander, Z. L. Tanner, U. S. N., commanding, is doubtless more fully equipped for deep-sea exploration than any other vessel afloat. In 1872, Dr. Stimson directed important dredging-operations in the Florida Straits with government vessels, and in that year the famous *Challenger*, under the command of Capt. G. S. Nares,

British navy, began her voyage of circumnavigation, which occupied three years and five months, the scientific staff being led by Prof. Wyville Thomson. Dredgings were made to 3875 fathoms, discovering abundant life at the greatest depths. In 1874 the German man-of-war *Gazelle* sailed on a similar expedition, and was gone two years. In 1875 the British steamer *Valoros* dredged in high Atlantic latitudes amidst the icebergs, finding in those regions no diminution of submarine life. From 1876 to 1878, inclusive, Norwegian expeditions, in the *Vöringen*, commanded by Capt. C. Wille, R. N., explored an extensive sea-tract off Norway, occupying three months in each year, under the scientific direction of Prof. H. Mohn, Prof. G. O. Sars, and Dr. Danielssen. During the winter of 1877-78 the U. S. Coast Survey steamer *Blake*, in command of the writer, was temporarily diverted from her work of physical examination, and assigned to dredging-operations in the Straits of Florida and the Gulf of Mexico, under the associate direction of Prof. Alexander Agassiz. On this cruise steel-wire rope was introduced, the machinery and appliances were improved, and the cruise led to the invention of the gravitating-trap. During the season of 1878-79 the *Blake*, under the command of Com. J. R. Bartlett, U. S. N., and with Prof. Agassiz as before, continued dredging-operations, this time in the Caribbean Sea, while further, but less extensive, operations were continued in 1880 in the North Atlantic, off the coast of the U. S. In 1880 the French frigate *Travailleur* explored the Bay of Biscay under a scientific commission with Prof. A. Milne-Edwards as its president. Since 1880 the Italian steamer *Washington*, Capt. Magnaghi, R. N., commanding, and with Prof. Henry H. Giglioli as naturalist, has dredged two or more seasons in the Mediterranean, paying special attention to the improvement of apparatus. In 1883 the French steamer *Talisman* dredged in the Mediterranean and in the Western Atlantic, and in that year the Russian frigate *Minneh* and the Swedish frigate *Vanadis* started on scientific voyages around the world.

*Literature.*—"Depths of the Sea," by C. WYVILLE THOMSON (London, 1873); "Voyage of the Challenger; The Atlantic," vols. i. and ii., by Sir WYVILLE THOMSON (London, 1877); "Notes by a Naturalist on the Challenger," by H. N. MOSLEY (London, 1879); "Reports" of the U. S. Commission of Fisheries; "Bulletins" of the Museum of Comparative Zoology at Harvard College (1878-79-80); "Deep-Sea Sounding and Dredging," by Lieut.-Comdr. C. D. SIGSBEE, U. S. N. (published by U. S. Coast and Geodetic Survey, 1880).

CHARLES D. SIGSBEE.

**Deep-Sea Soundings.** It is difficult to define precisely what is meant by "deep-sea soundings." There are places in the ocean very near to the most frequented shores, like the Gulf Stream off Cape Hatteras, where it was, until quite recently, found difficult, if not impracticable, to determine the depth of the water with certainty, owing to the rapidity of the current, combined with the great depth; or the same stream within a few miles of the N. shore of Cuba, where the depth of less than 1000 fathoms, combined with the strength of the current, for a long time baffled the skill of the best officers of the American navy in their efforts to obtain a section across the straits between Cuba and Key West. And on the other hand, there are areas extending hundreds of miles seaward from the coasts of continents, like the plateau off the coast of Ireland, where the depth hardly exceeds 500 fathoms, and soundings are so easily made that they would be classed in hydrographic work as "off-shore soundings." Other portions of the seabed, again, deepen gradually from the shores outward, and it would be difficult to say where off-shore soundings end and deep-sea soundings begin.

The precise definition is of little importance, however, at the present time; but it may be said that in the early attempts to determine depths of the ocean out of sight of land a depth of 1000 fathoms (or 6000 feet) was considered a deep-sea sounding. It is believed that there is no record of any successful effort having been made to determine depths greater than 1000 fathoms previous to that of Capt. James Ross in the year 1840. Up to that time navigators had been engrossed in geographical explorations, and had contented themselves with regarding the ocean as practically unfathomable beyond a very narrow belt along the shores of continents. Capt. James Ross of the English navy was the first explorer who dispelled this idea by a successful effort to sound in what was evidently very deep water. In the year 1840, while off the western coast of Africa, he prepared several miles of sounding-line upon a reel, and having attached a weight of 540 pounds to the end of the line, this weight was allowed to descend to the bottom of the sea. A sudden cessation of the descending motion indicated that the bottom was reached, and it was found that the length of line run out was 2877 fathoms. In a subsequent attempt during the same voyage 4000

fathoms of line were run out without finding bottom, and the line finally broke. The first sounding was doubtless as nearly correct as most of the soundings since made at the same depth by other explorers.

Another attempt made in 1843 by officers of the English navy, in the Southern Ocean, proved a failure, no bottom having been reached with 4000 fathoms of line out. In 1847 another sounding was made by Capt. Stanley, midway between the coasts of Africa and South America, bottom having been reported at 2600 fathoms, but the result was doubtful.

These are the only recorded soundings made by the English navy before the problem was taken up by the American navy. In 1843, Lieut.-Commander (now Admiral) Davis, who was then attached to the U. S. Coast Survey, made several successful soundings off Block Island, in water a little less than 2000 fathoms' depth. A cup for bringing up specimens of the bottom was attached to the lead, and for the first time a portion of the deep-sea mud was brought to light from these depths. Deep-sea explorations became from that time invested with a special interest, from the discovery of the existence of animal life or the remains of minute animals in every specimen of the bottom brought to the surface.

During a period of ten years subsequent to the explorations of Commander Davis, deep-sea soundings were continued off the Atlantic coast by officers of the U. S. navy under the direction of Prof. Bache, superintendent of the U. S. Coast Survey, in a series of sections run perpendicular to the coast, made with a view of tracing the form of the bottom along the course of the Gulf Stream. The temperature of the waters of the Gulf Stream, taken beneath the surface at various depths, indicated, by successive bands of cool and warm water, the probable existence of submarine ranges of mountains having courses coincident with these bands, and the sections determined seemed to confirm this idea wherever the depths could be ascertained; the recent explorations of the U. S. Coast and Geodetic Survey have, however, furnished new and more satisfactory data, and have to a great extent dispelled this idea. During the progress of these explorations the U. S. navy department, through the efforts of Lieut. Maury, undertook an extensive series of deep-sea soundings in various parts of the Atlantic, but as the observations were scattered and not confined to systematic lines, and were, moreover, made by a method which had in it great elements of uncertainty, the results, so far as the extension of exact knowledge in regard to the form of the ocean-bed was concerned, were very meagre. The explorations, however, served to prepare for this kind of service officers who subsequently did important work. Among these was Lieut. Berryman, who afterwards ran the first line of soundings across the Northern Atlantic Ocean. The invention of the apparatus for detaching the heavy lead at the bottom, thus enabling a small line to be used for bringing up specimens of the bottom, was also one of the fruits of these explorations. Brooke's lead, or detaching apparatus, became, both in the American and in foreign explorations, the most important feature of sounding-instruments.

The first lines of sounding which were carried across the Atlantic were run by Lieut. Berryman of the U. S. navy, for the purpose of ascertaining the practicability of laying a submarine cable. Upon the favorable report of his soundings it was determined definitely to undertake this work. Lieut. Berryman was followed in this field of exploration by Lieut. Dayman of the royal navy, whose results were confirmatory of those of Lieut. Berryman.

The depths obtained by both these officers appeared, however, to have large probable errors, and the small number of observations made for so long a line rendered it impossible to construct a profile of the bottom of positive accuracy. The actual laying of the telegraph cables furnished the only convincing and satisfactory evidence of the existence of the conditions favorable to such an enterprise.

After the laying of the Atlantic cable the English admiralty took up the question of deep-sea explorations in a thorough manner, while the more recent work under the auspices of the U. S. Government has been mostly confined to the explorations of the U. S. Coast and Geodetic Survey, and the U. S. Fish Commission off the coast of the U. S.

Under the English admiralty the Mediterranean Sea has been explored; several new lines have been run across the North Atlantic; the banks off the coast of Ireland have been mapped out; lines have been run and submarine telegraphs established eastward from the Red Sea to China; and more recently a line of soundings has been carried from the Cape of Good Hope through the midst of the Southern Atlantic northward to the English Channel.

All these results, however, constitute only a beginning of the work of deep-sea explorations. The deepest parts of the ocean have probably not been sounded, and there are



not yet sufficient results to determine with any degree of certainty the features of any considerable portion of the bottom of the sea. The general features, as thus far determined, seem to be as follows: The North Atlantic is a comparatively shallow basin, having, however, a deep valley or depression on the W. from Baffin's Bay southward, the 2500-fathom line following the general line of the coast at about 200 miles distant from beyond Cape Sable on the N. to the West Indies. On the E. side a deep valley is also found extending from the latitude of the British Channel to the tropics. Between these two great depressions the North Atlantic presents depths considerably less, and irregularities have been detected which indicate that the configuration of the bottom presents features corresponding to those of the surfaces of continents. The South Atlantic basin has not been explored.

In the Indian Ocean, along the lines of the telegraph across the Persian Gulf and Bay of Bengal, the depths increase gradually from the shores to a little over 2000 fathoms along both lines—one from the Malay Peninsula to Hindostan, and the other from Hindostan to the Red Sea.

In the vicinity of the equator, in the South Atlantic Ocean, Capt. Shortland found a plateau extending about 3000 miles in a N. and S. direction, on which are found the islands of St. Paul, Ascension, and the other well-known islands of this region. The depth on this plateau is about 1500 fathoms. Its E. and W. extent is not known. The Southern and Pacific oceans have not been explored. While great depths have been reached in recent explorations, there is yet only negative evidence that much greater, and almost unfathomable, depths may not exist in some parts of the ocean, although the inferences drawn from results already attained are rather against this assumption.

**Methods of Sounding.**—In ordinary depths the process of sounding is to attach a "lead" to the end of a small line, drop the lead into the sea, and allow it to sink to the bottom, the line being drawn down after the lead. If there is no current in the water nor drifting of the vessel or boat, and if the instant when the lead strikes the bottom can be distinctly noted, the length of line paid out will indicate the depth. As the depth increases, however, the friction of the line in the water becomes a strong resistance, requiring a very heavy lead to impart any considerable velocity to the descending plummet and line. This circumstance doubtless prevented the earlier attempts to sound from being successful.

Capt. Ross, in his first deep-sea sounding, employed a quarter of a ton weight as a sinker. A new difficulty, however, presented itself—namely, the difficulty of noting the instant when the weight struck bottom. In water nearly 3000 fathoms deep, whatever be the amount of the sinking weight, the downward motion became very slow, and it was only by noting the rate of descent by a watch that the instant the weight struck bottom was noted. It became customary afterwards, in all deep soundings, to note the time of running out of each successive 100 fathoms of line, and when the rate of descent became irregular or indeterminate it was taken for granted that the bottom was reached.

This practice introduced a delusive test of reaching bottom, which rendered useless many subsequent laborious and earnest efforts. It was not until Davis introduced the practice of bringing up specimens of the bottom, and Brooke invented his detaching apparatus, that any element of certainty attended deep-sea explorations.

There still remained two great difficulties to contend with—the drifting of the vessel from which soundings were taken, and the currents of the sea. Both of these occurrences rendered the measurements inaccurate, and in extreme cases, such as the rapid flow of the Gulf Stream along the coast of America, quite impracticable. The improved method of using steel wire for sounding—first attempted by Lieut. Walsh and Lieut. Wainwright, U. S. navy—enabled the U. S. Coast Survey to accomplish the extended soundings off the coast reported from 1881 to 1883.

Lieut. Walsh used small wires for sounding-lines as early as 1850, but, for want of proper appliances for paying out and reeling in the wire—since supplied—the use of wire was for a time abandoned. It was employed with complete success in the voyage of Her Majesty's ship *Challenger*, and that voyage of exploration may be said to have solved the problem of sounding-methods.

The great interest which was formerly concentrated on mere questions of depth has in recent years become overshadowed by the remarkable discoveries of animal life at the bottom of the sea brought to light by deep-sea dredging—an operation now accomplished at the greatest depths. When this special interest in the natural-history side of the problem shall have subsided, there will doubtless be a renewal of efforts at deep sounding in which the depth

alone is the object. It seems probable that the principal aim will then be to employ a process so economical in point of time required and the cost involved in each sounding that soundings may be multiplied to such an extent that the whole area of the sea-bottom may be mapped out with certainty. In connection with the scientific questions relating to the physics of the globe such a map would be of great value.

It is not improbable that electricity may be employed to facilitate soundings. It was long ago proposed to employ an electric sounding-apparatus consisting of a coil of fine insulated wire, the coil being in the form of a "bobbin," which, being carried down rapidly by a weight, would cause the wire to be reeled off in the descent, the end remaining attached to the vessel. By a suitable arrangement the impact of the weight with the bottom would cause an electric current to pass through the wire, which would give a signal at the surface corresponding to the instant that bottom is reached. The time of descent would give the measure of the depth. The wire, being small and of little value compared with the time and expense required to haul it in, would be abandoned at each sounding.

W. P. TROWBRIDGE.

**Deer** [etymologically related to the Gr. *thap*; Ger. *Thier*, a "beast"], the name given to ruminating quadrupeds with deciduous horns or antlers, which form the essential character of the Linnæan genus *Cervus*, to which all these animals belong. Deer are distinguished from other ruminants by the absence of a gall-bladder. The species of deer may be divided into two groups, of which one includes those with antlers more or less flattened; the other those with rounded antlers. The elk or moose (*Cervus alces*) is the most characteristic species of the first group, and forms the type of the genus *Alces* of modern systems. It sometimes exceeds the horse in bulk; has a short body, with a still shorter neck. In the lower jaw it has eight cutting teeth, none in the upper. The muzzle is long, broad, and overhangs the mouth like a square lapel; it is very muscular, and of service to the animal in gathering its food. The antlers of the full-grown elk will weigh about fifty pounds.

The European fallow-deer (*Dama vulgaris*), called by the ancients *Platyceros*, is a species of deer belonging to the flat-horned group. The male is known as a *buck*, the female as a *doe*, and the young as a *fawn*.

The red-deer (*Cervus elaphus*) and the roebuck (*Capreolus caprea*) are European species, of which the stem of the antler shows a rounded form in section. The *hart* and *hind* are the male and female of the red-deer.

The roebuck (*Capreolus caprea*) is the smallest species of European deer; the male is monogamous, and the female brings forth two fawns. This deer is found in Asia and wild parts of Europe, such as the Scottish mountains. The common American deer (*Caracus Virginianus*), called by the name of roebuck, jumping deer, etc., is about the size of the European fallow-deer, and resembles it in temper and character. Color, brown in summer, and gray-brown in winter; the fawns are spotted with white.

The mule-deer (*Cervus macrotis*) is between the common deer and the American elk in size. Its horns are round and twice forked; its ears long, giving its name from their resemblance to those of the mule. It is confined mostly to the eastern slope of the Rocky Mountains, from lat. 54° to 30°. The black-tailed deer (*Cervus Richardsonii*), somewhat larger than the common deer, but smaller than the mule-deer, is found in the Pacific States and Rocky Mountain region. The long-tailed deer (*Cervus leucurus*), so called on account of its long tail, which sometimes measures seventeen inches, is common on the Columbia River. The American elk or wapiti (*Cervus Canadensis*) is a large species resembling the European red-deer. It has tall branching horns, sometimes six feet high, which are shed in February or March. The animal is common in the North-western States. Its flesh is coarse, though the skins are much prized. Many other species of deer exist in South America, Africa, and especially in Asia and its islands. (See REINDEER, CARIBOO, and ELK.)

REVISED BY C. W. GREENE.

**Deerfield**, on R. R., Franklin co., Mass. (see map of Massachusetts, ref. 2-E, for location of county), 33 miles N. of Springfield. The township contains the important manufacturing village of South Deerfield. This township was the scene of several contests with the Indians in colonial times. Among these may be mentioned the "Bloody Brook massacre" (1675), and the burning of the village by the French and Indians under De Rouville (1703). Deerfield has many points of interest to the tourist: the North and South Sugar Loaf Mountains, the latter rising 500 feet from the plain, and affording from its summit a most beautiful view of Mounts Holyoke, Tom, and Mettawampe, with the fertile Connecticut Valley. Old Deerfield has a beau-

tiful soldiers' monument, and there is at South Deerfield a marble monument commemorative of the Bloody Brook disaster. Deerfield has a very fertile soil, an academy, and two high schools. Pop. of township in 1870, 3632; in 1880, 3543; in 1885, 3042.

**Deer Grass** (*Rhexia*), a genus of plants of the order Melastomaceæ. Eight species are natives of the U. S. They have brilliant rosy-purple flowers.

**Deer Lodge City**, capital of Deer Lodge co., Mon. (see map of Montana, ref. 3-C, for location of county), situated on R. R. and Deer Lodge River, in Deer Lodge Valley, is 45 miles N. of the Deer Lodge Pass. It has a graded school, a hospital in charge of the Sisters of Mercy, a Catholic and a Presbyterian church, and contains the Territorial penitentiary. Pop. in 1880, 941.

**Deer mouse**, or **Jumping Mouse** (*Meriones*), a genus of rodents allied to the mouse and jerboa families, are natives of America. One species, the Labrador jumping mouse, is found far N. The Canada jumping mouse (*Meriones Canadensis*) is an active and beautiful animal, having long, slender hind legs and a very long tail. It can leap to the distance of four yards. It remains dormant during the winter.

**De Facto**, a Latin legal phrase, signifies "in fact," "in reality," and is used to denote actual possession, however acquired. A person who usurps a throne to which he has no title is king *de facto*, but the legitimate claimant is king *de jure*, "of right." An officer *de facto* is one who performs the duties of an office with apparent rights and under claim and color of appointment to such office, but without being actually qualified by law to act as an officer.

**Defamation**. See **LIBEL**, by PROF. T. W. DWIGHT.

**Default**, in law, is, in a general sense, the omission of any act which a party ought to perform in order to entitle himself to a legal remedy. Such is, for example, non-appearance in court on a day assigned. If a plaintiff in an action make default, he is non-suited; if a defendant, judgment by default is passed against him. Judgment by default is not necessarily final.

**Default'er**, a person who fails to perform a public duty; an officeholder who embezzles public money or fails to account for money entrusted to his keeping. His offence is called *defalcation*.

**Defeas'ance**, in law, a collateral deed made at the same time with a deed of conveyance, containing conditions on the performance of which the estate thus created may be defeated; also a defeasance as to a bond or recognition is a condition contained in or endorsed on the instrument, which when performed defeats it.

**Defen'dant** [Fr. *défendeur*], in law, the party against whom a claim is made in an action or suit. The rule is now held to be that in personal actions *ex contractu* the action is to be brought against the person who either expressly or implicitly made the contract, in personal actions *ex delicto*, against the person who either actually committed the injury or aided in committing it.

**Defand, du** (MARIE DE VICHY-CHAMROUD), MARQUISE, a French literary lady, born in 1697. She was beautiful, witty, and accomplished, but was a skeptic and egotist. Her house in Paris was frequented by many eminent authors and statesmen. She corresponded with Voltaire, Horace Walpole, and D'Alembert, and wrote letters which are commended for style. Died Sept. 23, 1780.

**Defiance**, R. R. centre, capital of Defiance co., O. (see map of Ohio, ref. 2-C, for location of county), is situated on the Maumee River at the mouth of the Auglaize, 50 miles W. S. W. of Toledo. Pop. in 1870, 2750; in 1880, 5907.

**Defi'cient Num'ber**, in arithmetic, is one which exceeds the sum of its aliquot parts. Thus 8 is a deficient number, since the sum of its aliquot parts, 1, 2, 4, only amounts to 7.

**Definite Proportionals**, in chemistry. See **CHEMISTRY**, by PROF. G. F. BARKER, M. D.

**Definition** is a proposition explanatory of the meaning of a word; a setting forth of a thing by its properties. In logic, definition signifies "an expression which explains any term so as to separate it from everything else, as a boundary separates fields." (See **LOGIC**).

**Deflec'tion** [Lat. *deflexio*, from *de*, "from" or "down," and *flecto*, *flexum*, to "bend"], in architecture, the change of form produced in a beam when its upper surface becomes depressed below its original level line, whether caused by an extraneous weight or merely by that of the unsupported portion of the beam itself. The laws which regulate the deflection of beams have been thus stated by Coulomb: 1. The deflection below the natural level is pro-

portional to the weight; 2. The weight required to produce depression is proportional to the width of the bar, but in the ratio of the cube of the depth; 3. It is in the inverse ratio of the cube of the length.

**De Foe** (DANIEL), an English writer, born in London in 1661, was a son of James Foe, a butcher and non-conformist. In 1685 he joined the rebellion of the duke of Monmouth, after whose defeat he became a tradesman. He produced in 1701 "The True-born Englishman," a satirical poem designed to vindicate King William III., and was very successful. In 1702 he wrote an ironical pamphlet entitled "The Shortest Way with Dissenters," for which the House of Commons punished him with the pillory, a fine, and imprisonment for two years. He advocated the principles of the Whigs and dissenters in several political works. In 1706 the ministers employed him as one of the staff of commissioners sent to Scotland to promote the union of the two countries. He published a "History of the Union" (1709). In 1713 he was again fined and imprisoned for one of his political writings. His most popular work is "The Adventures of Robinson Crusoe" (1719). He wrote, besides numerous other works, a "Journal of the Plague" (1722), "The Adventures of Roxana" (1724), and "Memoirs of a Cavalier," all of which produce a vivid impression of reality. He died April 24, 1731. He was a pithy and vigorous writer, distinguished for his versatility of mind and fertility of invention. (See W. HAZLITT, "Memoirs of De Foe," 1843; Sir WALTER SCOTT, "Life of De Foe," prefixed to De Foe's works; WILLIAM LEE, "Life of Daniel Defoe," 3 vols., 1869.)

**De Forest** (JOHN WILLIAM), an American author, born in Seymour, then part of Derby, Conn., Mar. 31, 1826. In his early life he spent two years in travelling in the Levant and four years in Europe. He is the author of "Oriental Sketches" and "European Acquaintances," light sketches of travels, and "Seacliff," "Miss Ravenel," "Overland," "Kate Beaumont," and "The Wetherel Affair," all novels. In the civil war he was three years in active service as captain of volunteers, was brevetted major, and commanded a Freedman's Bureau district three years more, and afterwards resided in New Haven.

**Def'ter-Dar** (literally, "bookkeeper"), the title given by the Turks to the minister of finance, who sits in the divan and disposes of all the public money. The title is of Persian origin, and is conferred upon certain officials in that country.

**De'ger** (ERNST), born at Bockenheim, Hesse-Cassel, Apr. 15, 1809, studied painting at Düsseldorf, and was by the influence of Steinla and Overbeck led to concentrate all his energies on religious subjects. His principal works are his frescos in the church of St. Apollinaris at Remen on the Rhine, and in the castle of Stolzenfels. But he also produced a great number of oil-paintings representing biblical scenes, and which are common in prints.

**Deg'gendorf**, a town of Lower Bavaria, on the Danube, 28 miles N. W. of Passau. The town has a considerable trade in wood, etc. Pop. in 1880, 6226.

**Degree'** [from the Lat. *de*, "intensive," and *gradus*, a "step" or "degree"], the 360th part of the circumference of a circle. (See below, **DEGREE IN TRIGONOMETRY**.)

**DEGREE IN ALGEBRA**, the magnitude of the greatest sum that can be formed by adding together the exponents of the facients or variables which occur in any single term of an equation or expression. The terms *degree* and *order* are frequently used synonymously in algebra, but have distinct meanings when applied to differential equations.

**DEGREE IN TRIGONOMETRY** is the angle subtended at the centre of any circle by an arc equal to the 360th part of its circumference; it is the 90th part of a right angle. A degree is subdivided into sixty minutes, and each minute into sixty seconds. The notation employed for an angle of six degrees fifty-two minutes and sixteen seconds is  $6^{\circ} 52' 16''$ . The above division of the circle is of very remote origin. It is not certainly known what gave occasion to the adoption of the arbitrary number 360, but it probably had reference to the space described by the sun in one day in performing his annual revolution in the ecliptic, the number 360 being taken instead of 365, as being more convenient for arithmetical operations on account of its containing a great number of divisors. The Chinese divide the circle into 365 $\frac{1}{4}$  equal parts, so that the sun describes daily an arc of one Chinese degree. An attempt was made by the French philosophers, at the period of the Revolution, to introduce into works of science a division of the circle better adapted to our decimal arithmetic (the quadrant or right angle being divided into 100 degrees, the degrees into 100 minutes, etc.); but though the system was adopted by some writers of the first order of merit (as by Laplace in the "Mécanique Céleste"), and extensive tables were com-

puted for the purposes of astronomical calculations, it never came into general use. A division of this sort was recommended long ago by some of the most eminent mathematicians. (See F. A. P. BARNARD, "Metric System," 1872, pp. 84-86.)

**DEGREE, AS A SCHOLASTIC DISTINCTION**, is the grade or rank to which scholars are admitted, in recognition of their attainments, by a college or university. Collegiate degrees, *in course*, are given, or should be given, only upon examination. *Honorary* degrees are sometimes conferred without examination. The pope and the archbishop of Canterbury also confer scholastic degrees, especially the doctorate. (See **ARTS, DEGREES IN.**)

**DEGREE IN MUSIC**, one of the small intervals of which the concords or harmonical intervals are composed; the difference of position or elevation of the notes on the lines and spaces. When notes are on the same line or space, they are on the same degree, even though one of the notes should be raised by a sharp or lowered by a flat.

**Degrees of Latitude and Longitude.** The distance from the equator to the poles, along a meridian, is called *latitude*, or width; the distance from an assumed prime meridian, along a parallel, in the direction of the earth's rotation, is called *longitude*, or length. These expressions have been handed down to us by the ancients, who used them because the world known to them was really more extensive, or long, from east to west, than wide, from north to south. The degrees of latitude are counted from the equator as zero, both north and south, making ninety degrees each way to the poles. It would be most desirable that all civilized nations should also agree on a prime meridian from which the degrees of longitude should be uniformly counted; but it is not so. The English count 180 degrees east and 180 degrees west from the meridian passing through their national observatory at Greenwich, near London; the French start from the meridian of their observatory at Paris; the Germans often take the meridian of Ferro, the most western of the Canary Islands, because it leaves all the lands of the Old World to the east, and those of the New World to the west; the Americans often use the meridian of the National Observatory at Washington. Therefore, when the longitude of a place is mentioned, the prime meridian from which it is reckoned must be indicated. The seafaring nations mostly use Greenwich longitude; the nations on the continent of Europe, Paris and Ferro.

The relative position of these prime meridians is such that, Paris being zero, Greenwich is  $2^{\circ} 20' 22''$  W., and Ferro is assumed to be  $20^{\circ}$  W. from the Paris meridian. Washington is  $79^{\circ} 23' 28''$  W. from Paris, and  $77^{\circ} 3' 6''$  from Greenwich. The latitude and longitude of a point being known, it is evident that its true position on the surface of the globe is fully determined.

The meridians being all great circles, the length of their degrees, or of the degrees of latitude, is about uniform; they only show slight elongation towards the poles, due to the polar compression. But the degrees of the parallels which mark the longitudes are rapidly decreasing with the circumference of the circles from the equator to the poles, as shown in the following table:

*Length of Degrees of Longitude in Different Latitudes, in English Miles.*

Degrees of latitude.	Length of degrees.	Circumf. of parallel.	Degrees of latitude.	Length of degrees.	Circumf. of parallel.
Equator.....	69.16.....	24,899	50.....	45.55.....	16,037
5.....	68.90.....	24,805	55.....	39.76.....	14,314
10.....	68.12.....	24,523	60.....	34.67.....	12,482
15.....	66.82.....	24,056	65.....	29.81.....	10,553
20.....	65.02.....	23,407	70.....	23.73.....	8,542
25.....	62.72.....	22,580	75.....	17.96.....	6,466
30.....	59.95.....	21,581	80.....	12.05.....	4,339
35.....	56.72.....	20,419	85.....	6.84.....	2,464
40.....	53.06.....	19,101	90.....	0.00.....	Pole.
45.....	48.99.....	17,596			

The length of a minute of a degree of the equator is called a *geographical mile*, of which, therefore, there are sixty in one degree. This is the same as the nautical mile, used by all mariners in computing distances at sea. One degree of the equator contains 69.16 English statute miles.

**Finding the Difference of Longitude between Two Places.**—As the earth revolves on its axis, each meridian is carried over 360 degrees in twenty-four hours, or 1440 minutes, and over one degree in four minutes, whatever be the length of the degree. The difference in longitude of two places can therefore be expressed by the difference in time of their meridians. That difference of four minutes for each degree is uniformly the same in all latitudes. A traveller going westward one degree of longitude with a good watch, will find it four minutes ahead of the time of the place; when travelling eastward, four minutes behind. When leaving New York, for example, and arriving at

London, if we find the watch to be four hours and fifty-six minutes, or 296 minutes, behind the London—or, rather, the Greenwich—time, we conclude that the difference of longitude between the two places is  $\frac{296}{4}$ , or 74 degrees. Leaving New York for the Pacific coast, if we find that the time-keeper, which brings the true time of that place, marks 3h. 14m. p. m. when it is noon at San Francisco, we again conclude that the difference of longitude between the two places is 194 minutes of time, which, divided by 4, makes  $48^{\circ} 30'$  W. of New York, and  $122^{\circ} 30'$  W. from Greenwich.

ARNOLD GUYOT.

**De Grey, EARL.** See RIFON, MARQUIS OF.

**De Haas** (MAURICE F. H.), born at Rotterdam, in the Netherlands, about 1830, was a pupil of Louis Meyer and other eminent artists. He gave much attention to marine painting, in which he early acquired distinction. In 1857 he was appointed artist to the Dutch navy. In 1859 he came to New York, where he occupied a high position as a painter. Most of his earlier pictures are from the British Channel and French coast, and are marked by vigorous and effective drawing and by fidelity to nature. His "Farragut passing the Forts" is his best-known American work. Died at Fayal July 16, 1880.

**De Ha'ven** (EDWIN J.), an American naval officer, born in Philadelphia in 1819. He conducted an expedition sent from New York in search of Sir John Franklin in 1850. Died in Philadelphia May 9, 1865.

**De'i Grat'ia**, a Latin formula, signifying "by the grace (or favor) of God," originally used by the clergy, but afterwards inserted in the ceremonial description of the title of a sovereign.

**De'ists** [from the Lat. *Deus*, "God"], a name assumed in France and Italy about the middle of the sixteenth century by those who acknowledged the existence of a God; but rejected the Bible. They believed in the existence of a personal God, and they believed that he created the world; but in further defining the relations between the Creator and the creation, God and the universe, they not only completely separated the idea of God from that of the world, but they placed God outside of the universe and indifferent to its concerns. They represented what is called natural religion, in opposition to revealed or positive religion. Such ideas as the divinity of Christ or the incarnation, the inspiration of Scripture or the revelation, etc., they absolutely rejected. Some of them half ignored the Scriptures, considering them merely as a helpful book; others directly attacked them, trying to impugn their divine character and their infallibility. Among the earliest advocates of these opinions in England was Lord Herbert of Chesham, whose work, "De Veritate," was published at Paris in 1624. Hobbes, Blount, Bolingbroke, Shaftesbury, Hume, Toland, and Anthony Collins are among the principal English deistical writers. Lord Herbert, who is generally called "the Father of Deism," laid down the principal outline of the deistical system, but never entered upon a direct criticism of the Christian revelation. That form English deism first assumed under the hands of Blount, who adopted and expanded Hobbes's arguments against the Mosaic authority of the Pentateuch and developed Lord Herbert's examination of the miracles of Apollinaris of Tyana, evidently with a side-glance at those of Christ. As several of the early deists (including Bolingbroke) were men of more than doubtful moral character, the word came to be used in an unfavorable sense, not implied in the etymology of the word (signifying simply a "believer in God"), and a sense which does not attach to the term *theist*, which originally meant the same. (See LECHLER, "Geschichte des Englischen Deismus," 1841.) In France deistical views were advocated by many of the prominent free-thinkers, and in Germany by a large number of rationalists. The term *theist*, which etymologically means the same, has now an entirely different meaning. (See FREE-THINKERS, by REV. O. B. FROTHINGHAM.)

**Dejani'ra, or Deianeira** [Gr. *Δηιάναρα* or *Δηιάναρα*], in Greek mythology, a daughter of Æneus, king of Ætolia, was the wife of Hercules. She preserved some blood of the centaur Nessus as a love-charm, and saturated with it a tunic of Hercules, who was poisoned by it.

**Dejazet** (PAULINE VIRGINIE), born in Paris Aug. 30, 1797, died there Dec. 1, 1875. She made her *début* on the stage as "Fanchon toute seule" when she was five years old, and was still playing "Bonaparte à Brienne" when she was seventy-five. Her best impersonations were those of boys and young men. In 1859 she bought the Théâtre des Folies Nouvelles, which, after her, is called "Théâtre Dejazet."

**De Jure**, "of right." See DE FACTO.

**De Kalb**, city, on R. R., De Kalb co., Ill. (see map of Illinois, ref. 2-E, for location of county), 58 miles W. of

Chicago. It has a graded school and an artesian well. Pop. in 1880, 1598.

**De Kalb**, capital of Kemper co., Miss. (see map of Mississippi, ref. 6-H, for location of county). Pop. not in census of 1880.

**De Kalb** (JOHN), BARON, a German general, born in Bavaria June 29, 1721, served first in the French army. He came to the U. S. with La Fayette in 1777, and was appointed a major-general by Congress in the same year. He served under Washington in Pennsylvania and New Jersey until the spring of 1780, and then became the second in command in the army of Gen. Gates. He was mortally wounded at the battle of Camden, S. C., and died Aug. 19, 1780. (See KAPP, "Leben des Amerikan. Generals, Joh. Kalb," 1862.) A bronze statue of De Kalb was unveiled at Annapolis, Md., Aug. 16, 1886.

**De Kay** (JAMES E.), M. D., an eminent zoologist, born in New York in 1792, published 5 vols. 4to on the existing fauna in the "Report of the New York State Survey" (1842), etc. Died Nov. 21, 1851.

**De Koven** (JAMES). See APPENDIX.

**Del** (*Artocarpus pubescens*), a tree of the same genus as the bread-fruit, is indigenous in the forests of Ceylon, and is valuable for its timber, which is used as a material for houses and for ships.

**De la Beche** (Sir HENRY THOMAS), F. R. S., an English geologist, born near London in 1796. Among his works are a "Geological Manual" (1832) and the "Geological Observer" (1851). Died April 13, 1855.

**Delacroix** (FERDINAND VICTOR EUGÈNE), born at Charenton, near Paris, April 26, 1799, died in Paris Aug. 13, 1863. He was a pupil of Guérin, in whose studio he worked together with Ary Scheffer; but he did not adopt the classical taste of Guérin, and Scheffer was his antagonist throughout life. In 1822 his "Dante and Virgil," and in 1824 his "Massacre of Seio," actually took the public by storm, though both the old masters and the more sedate critics treated him almost with scorn. He soon became recognized as the chief of the romantic school, and the boldness of his conceptions, no less than the dash of the execution, often created the most brilliant effects. Among his best works are "Mephistopheles appearing to Faust" (1827), "The Death of Sardanapalus" (1827), "The Women of Algiers" (1834), "The Prisoner of Chillon" (1835), "Medea" (1838), "The Death of Marcus Aurelius" (1845), and "The Farewell of Romeo and Juliet" (1846). In 1845 he was employed to decorate the library of the Luxembourg, and in 1847 that of the Chamber of Deputies. In 1849 he painted the ceiling of the gallery of Apollo in the Louvre, and in 1853 that of the Salon de la Paix in the hôtel de ville. (Théo. Sylvestre, "Histoire des Artistes Vivants," Paris, 1856; "Catalogue raisonné de l'œuvre d'Eugène Delacroix," par M. A. Moreau, Paris, 1873.)

**Delafield** (EDWARD). See APPENDIX.

**Delafield** (FRANCIS), M. D. See APPENDIX.

**Delafield** (RICHARD), an American officer, born Sept. 1, 1798, in New York City, graduated at West Point in 1818, chief of engineers April 22, 1864, with the rank of brigadier-general. He served on the northern boundary survey of the U. S. under the treaty of Ghent 1818; in building fortifications, improvement of rivers and harbors, constructing roads and canals, 1819-38 and 1846-64; as superintendent of the Military Academy 1838-45 and 1856-61; as member of boards of engineers 1845-64; as president of military commission to the Crimea and theatre of war in Europe 1854-56 (report thereon published by Congress 1860); on the staff of Gov. Morgan of New York to reorganize and equip State forces for service in the civil war 1861-63; in command of corps of engineers and in charge of engineer bureau, Washington, D. C., 1864-66; as inspector of Military Academy 1864-66; as member of lighthouse board and of commission for the improvement of Boston harbor 1864-70; and as regent of Smithsonian Institution 1865-70. Brevet major-general U. S. A. Mar. 13, 1865, for faithful, meritorious, and distinguished service in the engineer department; and retired from active service Aug. 8, 1866. Died Nov. 5, 1873.

GEORGE W. CULLUM.

**Delago'a Bay** (i. e. "lagoon bay"), an inlet of the Indian Ocean, in South-eastern Africa, is 55 miles long and about 20 miles wide. It is about lat. 26° S. and lon. 33° E. The shores are flat, marshy, and unhealthy, but the bay is commodious and safe. It was discovered by Vasco de Gama in 1498, and shortly after the Portuguese founded the factory of Lorenzo Marques. It seemed, however, as if the Portuguese exercised no jurisdiction in the country, and, in 1822, Capt. Owen hoisted the English flag and ap-

propriated the territory. But on his return, next year, he found the Portuguese governor in possession of the country, and strife began. The question attracted no attention, however, until, in 1868, the Transvaal republic, the boers having made a settlement there in 1835, incorporated the country. The case was then laid before the president of the French republic for arbitration, and on Apr. 19, 1875, Marshal MacMahon declared in favor of the Portuguese claim. In 1878 it was sold by Portugal to Great Britain, and a splendid harbor is now being built here.

**Delambre** (JEAN BAPTIST JOSEPH), a French astronomer, born at Amiens Sept. 29, 1749, studied under Lalande. He produced "Tables of the Orbit of Uranus" in 1790, and in 1792 "Tables of Jupiter's Satellites." In the service of the government, Delambre and Méchain spent about seven years (1792-99) in the measurement of the arc of the meridian from Dunkirk to Barcelona. Delambre published the result of this operation in his "Base du Système Métrique Décimal" (1806-10). He was admitted into the Institute in 1795, became perpetual secretary of the Academy of Sciences in 1803, and professor of astronomy in the College of France in 1807. Among his numerous and able works are "Theoretical and Practical Astronomy" (1814), a "History of Ancient Astronomy" (1817), a "History of Mediæval Astronomy" (1819), and a "History of Modern Astronomy" (1821). Died Aug. 19, 1822. (See FOURNIER, "Eloge de Delambre.")

**De Lan'cey** (JAMES), an American jurist, born in New York in 1703, was the son of a Huguenot from Normandy. He was educated at Cambridge, England, returned to New York in 1729, became a justice in the supreme court of the province, and in 1733 its chief-justice. He was one of the founders of King's (now Columbia) College, and was lieutenant-governor for several years. Died Aug. 2, 1760. He was a man of great talents, wealth, and learning, but is said to have been unprincipled and intriguing. Several members of the De Lan'cey family were prominent and bitter Tories during the Revolutionary war, but they were generally men of remarkable talents.

**De Lancey** (WILLIAM HEATHCOTE), D. D., LL.D., D. C. L. OXON., a Protestant Episcopalian bishop, born at Mamaroneck, N. Y., Oct. 8, 1797, graduated at Yale in 1817, was ordained deacon in 1819, priest in 1822, was provost of the University of Pa. (1825-30), and was consecrated bishop of Western N. Y. in 1839. Died April 5, 1865.

**De Land**, Fla. See APPENDIX.

**De la'ney** (PATRICK), an Anglican theologian, born in Ireland in 1686, was educated at Dublin University. He published (1732-36) a work entitled "Revelation Examined with Candor," a treatise which is still highly valued. Some of his other works, among which is a "Life of David" (1740), exhibit learning and ingenuity, without great excellence in other respects. Died in 1768.

**Delangle** (CLAUDE ALPHONSE), a French statesman, born at Varzy April 6, 1797, was advocate-general at the court of cassation from 1840 to 1846. In Dec., 1852, he became first president of the imperial court of justice, later was made a senator, was minister of the interior in 1858, minister of justice (1859 to 1863), and became in 1863 vice-president of the senate. Died in Paris Dec. 26, 1869.

**Delano** (COLUMBUS), an American lawyer, born in Shoreham, Vt., in 1809, removed in his early youth to Ohio. He practised law with distinction, and was chosen a member of Congress in 1844. Having joined the Republican party, he was again elected to Congress in 1864. He became commissioner of internal revenue in Mar., 1869, and secretary of the interior in the cabinet of General Grant in Oct., 1870.

**Delaroche** (PAUL), a French historical painter, the chief of the modern eclectic school, was born in Paris July 17, 1797. He was a pupil of Baron Gros, and adopted a style by which he endeavored to unite the dignity of the classic with the picturesqueness of the romantic school. In 1824 he exhibited "Joan of Arc Interrogated in Prison." His reputation was increased by the "Death of Queen Elizabeth" (1827) and "The Children of Edward IV. in the Tower of London" (1831). He was admitted into the Institute in 1832, and married a daughter of Horace Vernet. Among his masterpieces are "Cromwell Gazing on the Corpse of Charles I." (1832), "Napoleon at Saint-Bernard" (1850), and "The Girondists in Prison" (1855). He adorned the semicircular saloon of the Palais des Beaux-Arts with an admirable composition, which represents the artists of all ages, and contains about seventy figures. Died Nov. 4, 1856.

**De la Rue** (WARREN), PH. D., F. R. S., an English physicist and inventor, born about 1815, was educated in Paris, and afterwards followed his father's employment as wholesale stationer and manufacturer of card-paper. He

has invented processes for photographing the heavenly bodies, improvements in color-printing, in envelope-folding machines, in oil-refining, etc., and has published important reports of original observations in chemistry, astronomy, and physics.

**Delator** (plu. **Delatores**), [from the Lat. *defero*, *delatum*, to "carry off"], a Latin word, literally meaning "carrier," came to be applied to the carriers of evil reports, informers, or public spies. Under the Roman emperors the delatores were a class of men who gained their living by informing against their fellow-citizens. They constantly brought false charges forward to gratify the jealousy or avarice of the different emperors, and were generally paid according to the apparent consequence of the information they gave, although in some cases the law specified the sums which were to be given to informers. Thus, if a murder had been committed in a family, and any slaves ran away before inquest (*questio*) had been made, whoever apprehended such slaves received for each one so apprehended five pieces of gold from the estate of the deceased, or, if the estate could not pay it, the government gave the reward. At various times attempts were made to regulate the pay of public spies and informers, who at last became so numerous, and gave rise to so much trouble in society, that the emperors were obliged to expel and variously punish great numbers of them.

**Delaunay** (CHARLES EUGÈNE), F. R. S. L., a French mathematician and astronomer, born April 9, 1816, was educated at the Polytechnic School, where he graduated in 1836 with the highest honors. He was subsequently appointed principal engineer of mines of the first class, and professor of mechanics in the Polytechnic School and in the Faculty of Sciences. He was also an officer of the Legion of Honor, a member of the Institute, and was the recipient of numerous native and foreign honors and distinctions. He became a member of the Academy in 1855, of the bureau of longitude in 1862, and director of the Parisian Observatory in 1870. He has written, among other works, "*Traité de Mécanique Rationnelle*" (3d ed. 1862), "*Théorie de la Lune*" (1866), "*Rapport sur le Progrès de l'Astronomie*" (1867). He was drowned at Cherbourg Aug. 5, 1872.

**Del'avan**, R. R. junction, Tazewell co., Ill. (see map of Illinois, ref. 5-D, for location of county), 157 miles S. W. of Chicago. It has a library, manufactures, a park, and a high school. Pop. in 1880, 1340.

**Delavan**, Walworth co., Wis. (see map of Wisconsin, ref. 7-E, for location of county), on R. R. and Turtle Creek, 58 miles S. W. of Milwaukee. It has the State institution for the deaf and dumb, a foundry, a cheese-factory, and one graded school. Pop. in 1880, 1798; in 1885, 1730.

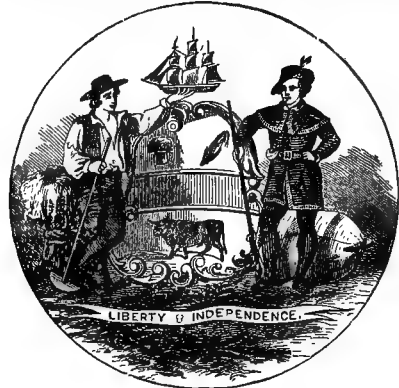
**Delavan** (EDWARD C.), an American temperance reformer, born in Schenectady co., N. Y., in 1793, accumulated by industry and economy a large amount of property at Albany, N. Y. Here he erected the "Delavan House," which was for a long time a famous temperance hotel. He became a distinguished editor and speaker upon temperance, and expended a large amount of money in the cause. Died Jan. 15, 1871, after losing a large part of his property.

**Delavigne** (JEAN FRANÇOIS CASMIR), a French dramatist, was born April 4, 1793, at Havre. After the Restoration he wrote a series of patriotic lyrics called "*Mes-sénienes*," which were received with favor. The dramas "*The Sicilian Vespers*" (1819), "*The Comedians*" (1820), and "*The Pariah*" (1821) increased his fame. In 1830 he wrote "*La Parisienne*" and other revolutionary songs. Delavigne occupies an intermediate position between the classical and romantic school. There are more piquancy and realistic sentences in his delineations of characters than in those of Voltaire, but less passion and fire of imagination than in those of Victor Hugo. He died Dec. 11, 1843.—His brother, GERMAIN DELAVIGNE (born 1790), wrote with Casimir the words to Halévy's opera of "*Charles VI.*" and in collaboration with Seribe "*Le Vieux Garçon*" and other vaudevilles. Died in 1868.

**Delaware** [named in honor of Lord Delaware, second governor of Virginia], a river of the U. S., rises in New York, and is formed by the Coquago and the Popacon, which unite at Hancock on the boundary between New York and Pennsylvania. It flows south-eastward to Port Jervis on the Erie R. R., and reaches the northern extremity of New Jersey. Below this point it forms the boundary between Pennsylvania and New Jersey, and runs south-westward to the Delaware Water Gap, where the river passes through a picturesque gorge in the Kittatinny Mountain. Thence it flows southward to the northern extremity of Bucks county, and south-eastward to Trenton, where it meets tide-water. Below Bordentown it flows south-westward until it enters Delaware Bay, about 40 miles below Philadelphia. Its whole length is about 300 miles. It is

navigable for steamboats to Trenton, and ships of the largest size can ascend to Philadelphia, where it is nearly one mile wide. It is connected with the Hudson River by the Morris Canal and the Delaware and Hudson Canal. Large numbers of shad are caught in the Delaware.

**Delaware**, one of the Middle Atlantic States, and one of the original thirteen. It is situated between 38° 28' and 39° 50' N. lat. and 75° and 75° 46' W. lon. It is 96 miles



Delaware Seal.

long from N. to S., and from 9 to 37 miles wide. Bounded on the N. and N. W. by Pennsylvania, E. by Delaware River and Bay and the Atlantic, S. and W. by Maryland. Area, 2050 square miles, or 1,312,000 acres.

Delaware, by census of 1880, ranked 37 among the States in population, 35 in value of agricultural products, and 28 in value of manufactures.

**Topography.**—The peninsula bounded by Chesapeake and Delaware bays and the Atlantic, of which Delaware forms the N. E. portion, is generally nearly level, and, except on Delaware River and Bay, sandy. There are no mountains, but some rolling lands with hills and valleys in the N.; but below New Castle a sandy and somewhat marshy ridge only relieves the eye from gazing on a dead level. This ridge is nowhere above 70 feet in height, runs near the W. boundary of Delaware, and forms the backbone of the peninsula. The affluents of the Delaware River in the E., and of the five or six streams falling into Chesapeake Bay, all have their sources in this low ridge. There are three shallow bays or sounds, landlocked by spits of sand, below Cape Henlopen—viz. Rehoboth Bay, Indian River Bay, and the N. portion of St. Martin's Bay. Most of the larger streams and bays are navigable for vessels of light draught, but only the Delaware River and Bay and Christiana Creek are navigable for large ships and steamers. Rehoboth Bay admits vessels drawing six feet of water. Delaware Bay is a fine body of water, with a deep though tortuous channel, having from 35 to 75 feet of water. The only good harbors in the State are those of Wilmington on Christiana Creek, New Castle, and Lewes.

**Minerals.**—Bog-iron ore, found in all the swamps, shell marl, in the greensand region, and kaolin or porcelain clay are abundant.

**Zoology.**—There are few wild animals in the State, but no lack of formidable reptiles in the swamps. The shores of Delaware Bay are frequented by immense flocks of ducks and teal as well as by wild geese; the other birds of the State are those common to the Middle Atlantic States.

**Soil and Vegetation.**—In the swamps there are extensive forests of cypress and other evergreen trees and shrubs of a semi-tropical character, as well as bog-oak, hackmatack, etc. Elsewhere in the State there are no extensive forests, the land being almost wholly under cultivation. The soil for 8 or 10 miles inward from Delaware Bay is for the most part a rich clayey loam, but W. of this it is sandy and requires constant fertilization to yield heavy crops. The swamp lands, when reclaimed, are very rich.

The climate is mild and favorable for farming; healthy in the N. and centre; some remittent and intermittent fevers in the swampy region in the S.

**Agricultural Products.**—Delaware is eminently a fruit-growing State. Peaches, apples, and small fruits raised here are in demand in the New York and Philadelphia markets, and, in connection with New Jersey and Maryland, she supplies certainly seven-tenths of the entire demand for these products. In 1880 she reported 8749 farms, of which 6745—more than three-quarters—were of 50 acres or more; of the whole number 3708 (about three-sevenths) were rented, and two-thirds of these were rented for pay







in kind (generally fruit). Farms occupy about ten-thirtieths of the entire area. By the census of 1880, Delaware produced 3,894,264 bushels of Indian corn, 1,175,272 bushels of wheat, 378,508 bushels of oats, 5953 bushels of rye, 5857 bushels of buckwheat, 49,632 tons of hay, 283,864 bushels of Irish potatoes, 195,937 bushels of sweet potatoes. Value of orchard products, \$846,692. 1,876,275 pounds of butter were reported in census of 1880. The live stock of the State, by census of 1880, was 21,933 horses, 3931 mules and asses, 5818 working oxen, 27,284 milch cows, 20,450 other cattle, 21,967 sheep, and 48,186 swine. The peach crop varies in favorable years from 3,300,000 to 4,000,000 baskets or crates. The apples, pears, quinces, and small fruits are together worth more than the peaches.

**Manufactures.**—Delaware has extensive manufactures, Wilmington being the centre of some important interests; the principal are iron, mostly rolled, flour and meal, morocco and leather; shipbuilding, iron and wood; machinery, car-wheels, etc.; R. R. and horse cars; cotton goods, paper, powder and chemicals, carriages and wagons; canned provisions, vegetables, and fruits; tobacco, cigars, cigarettes, and snuff; woollen goods, boots, shoes, and findings. By the census of 1880 there were 746 manufactories; total product, \$20,514,438.

**Railroads.**—There were in 1881 about 290 miles of R. R. in operation in Delaware. These R. R. penetrate each county, and are of great local advantage. Trunk roads to Baltimore, Washington, and the South pass through N. part of State.

**Finances.**—State debt, 1880: State proper, \$880,750; county, \$44,000; school districts, \$4222; city and town, \$1,417,613; total, \$2,346,585. Assessed valuation in 1880: Real estate, \$50,302,739; personal, \$9,648,904; both, \$59,951,643; true valuation, \$103,759,295; assessed valuation of Wilmington, \$23,200,000. The State annual revenue, as well as that of Wilmington, exceeds the expenditure. Taxation: State, none; local, \$604,257.

**Commerce.**—Though the foreign commerce of Delaware is conducted mostly through Philadelphia and Baltimore, yet the Delaware district, of which Wilmington was the port, had \$270,309 of exports and \$7773 imports in 1880. Wilmington had in 1880 a line of steamers plying regularly to New York, and steam and sailing vessels of lighter draught ran to various ports in the State. Delaware had 182 vessels of all sorts registered, enrolled, and licensed in 1880, with a tonnage of 16,287.

**Banks, etc.**—Delaware had, in Nov., 1881, 14 national banks in operation, with a capital of \$1,743,985, and \$1,804,200 U. S. bonds on deposit; the outstanding circulation was \$1,580,500. There were also, in 1881, 8 State banks, savings-banks, and private banking-houses, having an aggregate capital of \$675,689; deposits, \$2,127,426, of which \$20,000 were invested in U. S. bonds. There were also 4 fire insurance companies and 1 mutual life insurance company in the State, none of them large.

**Newspapers and Libraries.**—There are 26 newspapers in the State, 5 daily, 20 weekly, 1 monthly; total circulation per issue, 18,625. There are also 18 public libraries, having an aggregate of 50,000 volumes.

**Churches and Education.**—The number of churches of all denominations is about 300; the Methodists (Episcopal and Protestant) lead, and are followed in their order by Presbyterians, Episcopalians, Baptists, Roman Catholics, Friends, Lutherans, and five or six minor denominations. Delaware has 35,649 children of school age (31,849 white and 3800 colored), of whom 26,652 are enrolled in the schools; number of schools, 460 (404 white, 56 colored); average duration of schools, 7½ months; value of school property, about \$550,000. There are 402 teachers (233 men, 169 women) for the white schools; total receipts for these schools, \$216,540; total expenditure, \$221,731. The city schools of Wilmington are excellent. There is normal instruction, but no distinct normal school; 10 teachers' institutes held. One State college at Newark, with scientific and normal departments, and 37 students; a female college at Wilmington, with 86 students; no professional schools; 13 academies, seminaries, or high schools.

**Population.**—In 1790, 99,094; in 1830, 76,748; in 1870, 125,015, of whom 102,221 were whites, 22,794 colored; in 1880, 146,608 (white 120,160, 26,448 colored, including 1 Chinese and 5 Indians).

COUNTIES.	*Ref.	Pop. 1870.	Pop. 1880.	COUNTY TOWNS.	Pop. 1880.
Kent.....	3-H	29,804	32,874	Dover.....	2,811
New Castle.....	2-H	63,515	77,716	Wilmington.....	42,478
Sussex.....	4-H	81,696	96,018	Georgetown.....	695
Total.....		125,015	146,608		

**Principal Towns and Population 1880.**—Wilmington,

\* Reference for location of counties. See map of Delaware.

largest city, 42,478; Dover (capital), 2811; New Castle, 3700, and Smyrna, 2423. North Milford, Seaford, Lewes, Laurel, Delaware City, South Milford, Georgetown, and Newark are important towns.

**Government.**—Governor elected for four years, senate (9 members) for four years, house of representatives (21 members) for two years. There are the usual courts; punishment of minor offences, public whipping.

**History.**—Named from the bay and river; first settlement by Dutch under De Vries, 1630, near Lewes; colony destroyed by Indians. In 1637, Swedes and Finns bought the land from Cape Henlopen to Christiana Creek, and built a fort at the mouth of the creek, calling the country New Sweden; the Dutch at New Amsterdam built a fort at New Castle, 5 miles below; after some difficulties the Dutch captured New Sweden in 1655, and expelled those who would not swear allegiance to Holland. In 1664, when the New Netherlands were conquered by the English, the duke of York claimed Delaware as belonging to him; Lord Baltimore also claimed it; William Penn purchased it in 1683, and it was called "the territories," and regarded as a part of Pennsylvania for twenty years. In 1703 it had a distinct legislature, but until 1776 was under the Pennsylvania government, and the Penn family were proprietaries. Became independent in 1776, and in the Revolutionary war, as in previous wars, the "Blue Hen's chickens" (so called from their flag) were as brave and efficient soldiers as any. Constitution adopted Sept. 20, 1776, and a second in 1792; ratified the Constitution of the U. S. Dec. 7, 1787. The State has been quiet, but prosperous; it has lacked in enterprise and in educational development. It held a few slaves till the civil war, and, though it sent about 10,000 men into the army in the war, there was a large minority who then and afterward did not sympathize with the Union; but better counsels now prevail, and a better feeling is manifested.

**Governors of the State.**—From 1776 to 1787, two governors of Pennsylvania, John Dickinson and Thomas McKean, were presidents of Delaware, but in 1789 the first governor of Delaware was elected, and the succession has since been:

Joshua Clayton.....	1789-96	Caleb P. Bennett.....	1833-37
Gunning Bedford.....	1796-97	Cornelius P. Comegys.....	1837-40
Daniel Rogers.....	1797-98	William B. Cooper.....	1840-44
Richard Bassett.....	1798-1801	Thomas Stockton.....	1844-46
James Sykes (acting).....	1801-02	Joseph Maul (acting).....	1846
David Hall.....	1802-05	William Temple.....	1846
Nathaniel Mitchell.....	1805-08	William Thorp.....	1846-51
George Truett.....	1808-11	William H. Ross.....	1851-55
Joseph Haslett.....	1811-14	Peter F. Cansey.....	1855-59
Daniel Rodney.....	1814-17	William Burton.....	1859-63
John Clarke.....	1817-20	William Cannon.....	1863-65
Jacob Stout (acting).....	1820-21	Gove Saulsbury.....	1865-69
John Collins.....	1821-22	James Ponder.....	1869-75
Caleb Rodney (acting).....	1822-23	John P. Cochran.....	1875-79
Joseph Haslett.....	1823-24	John W. Hall.....	1879-83
Samuel Paynter.....	1824-27	Charles C. Stockley.....	1883-87
George Poindexter.....	1827-30		
David Hazzard.....	1830-33		

L. P. BROCKETT.

**Delaware**, a city and R. R. centre, capital of Delaware co., O. (see map of Ohio, ref. 4-E, for location of county), on the Olentangy River, 24 miles N. of Columbus. It is the seat of Ohio Wesleyan University and Ohio Wesleyan Female College. It has good schools, large railroad repair-shops, two foundries, two flouring mills and one oil mill, a woollen-factory, and manufactures of bagging, chairs, iron fences, carriages, lumber, beer, etc. It is handsomely situated and well built. There are valuable medicinal springs in Delaware and vicinity. Pop. in 1870, 5641; in 1880, 6894.

**Delaware**, or more correctly, **Delawarr** (THOMAS West), LORD, the twelfth baron of that title, the second governor and first captain-general of Virginia, was a descendant by the female line of an old and noble family, which derived its name, according to some authorities, from an estate called La Warre (or Warwick) in Gloucestershire, England. He took his title in 1602. He was named captain-general of Virginia (which comprehended nearly all the present eastern coast of the U. S.) in a charter dated May 23, 1609. He visited the colony in 1610, and returned in the following year to England. He expended large sums of money in establishing the colony of Virginia. He died at sea, "not without suspicion of poison," June 7, 1618, while on his second voyage to America. He appears to have been a noble and philanthropic man.

**Delaware Bay**, a wide estuary between the mouth of the Delaware River and the Atlantic Ocean, separates the State of Delaware from the southern part of New Jersey. The entrance between Capes May and Henlopen is 13 miles wide; the greatest breadth of the bay is about 25 miles. A safe and capacious harbor has been formed in this bay by the construction of a BREAKWATER (which see, by GEN. J. G. BARNARD, U. S. Army) near Lewes. This structure is in lat. 38° 59' 07" N., lon. 75° 6' 9" W.

The western part of the bay is generally shallow, but it has a deep though not very direct channel for shipping.

**Delaware City**, New Castle co., Del. (see map of Delaware, ref. 3-H, for location of county), on the Delaware River, about 40 miles below Philadelphia. It is the eastern terminus of the Chesapeake and Delaware Canal. Pop. in 1870, 1059; in 1880, 1085.

**Delaware Indians**, a tribe belonging to the Algonquin family, called in their own language *LENNI-LENAPE*, lived originally on the banks of the Delaware and Schuylkill, but are now mostly found in the Indian Territory, in the valley of the Verdigris. They claimed to have come from the West together with the Minquas, and to be the source of all the Algonquins; for which reason they were styled the "grandfathers." When the Europeans first met them, they were dwelling in detached bands, under separate sachems, along the banks of the Delaware, comprising three powerful families—the Minseys, the Munsees, and the Delawares proper, or, according to their own totemic distinctions, the Turtles, the Turkeys, and the Wolves. They entered into friendly relations with the Dutch in 1613, and traded with them until 1632, when they fell upon the Dutch settlement of Swanendael and destroyed it. With the Swedes they also lived in peaceful communication for some time. They were, according to tradition, a bold and powerful race, but were overcome by the Iroquois, who compelled them in 1754 to leave their original settlement. Some of them removed to Ohio about 1780. They were friendly towards the U. S., and formed several treaties with them. They next crossed the Mississippi and settled in Kansas, where their number in 1869 was 1005. They were in 1870 for the most part removed to their new lands in the Indian Territory, and in part incorporated with the Cherokees. They were visited by Moravian missionaries before the middle of the eighteenth century, and small churches of Indian converts were formed near Bethlehem and Nazareth, on the Lehigh. Though the Christian Delawares separated themselves from the pagans, so far as they never accompanied them on the warpath, neither the French nor the English respected the distinction, but plundered and ravaged both divisions with equal eagerness. At present they have a few schools, and carry on farming and cattle-raising to some extent, but their chief occupation is hunting and fishing.

**Delaware Water Gap**, a summer resort of Monroe co., Pa., on the Delaware River where it passes through the Kittatinny Mountain, and on the Delaware Lackawanna and Western R. R., 108 miles N. of Philadelphia and 92 miles W. of New York. The river here flows through a narrow gorge between steep rocky banks, which rise nearly 1200 feet above the water.

**De la Warr**, EARLS, and Viscounts Cantalupe (Great Britain, 1761), Barons de la Warr (1209), Barons West (1343), Barons de la Warr (England, 1579, by patent).—CHARLES RICHARD SACKVILLE WEST, sixth earl, major-general, born Nov. 13, 1815, succeeded his father Feb. 23, 1869.

**Del Cred'ere** [from the It. *credere*, to "trust" or "credit"] **Commission**, in mercantile law, signifies an additional premium charged by a factor or commission-merchant on the price of goods consigned to him when he guarantees the solvency of the purchaser who buys them on credit. Thus, if the percentage for effecting the sale is 2½, he might charge 2½ per cent. more for the guarantee.

**Delescluze** (LOUIS CHARLES), a French politician, born Oct. 2, 1809, took part in 1830 in the republican movement, was, after the revolution of 1848, for a short time commissioner-general in the departments Du Nord and Pas de Calais, published then several ultra-radical papers in Paris, was in 1857 deported to Cayenne. During the reign of the Commune, of which he was the leading spirit, he was at the head of the war commission with almost unlimited powers. His fall, on the 28th of May, 1871, on the barricade in the Rue d'Angoulême, ended the resistance of the Commune to the troops of the government. He was accused unjustly of having issued the incendiary orders.

**Delia'co** (MELCHIOR), an Italian political economist, born in the Abruzzo Aug. 1, 1744. He became councillor of state at Naples in 1806. Among his works are an "Essay in Favor of Free Trade" and "Thoughts on the Uncertainty and Inutility of History" (1806). Died at Teramo June 21, 1835.

**Delft**, a town of the Netherlands, province of South Holland, is on the railway from Rotterdam to The Hague, 4 miles S. E. of the latter. It is well built of brick, and clean, and is intersected by a number of canals. It has a richly-adorned town-hall, and a Gothic church containing a magnificent monument to William prince of Orange, who was assassinated here in 1584. Delft was formerly noted

for glazed earthenware, which throughout Holland came to have the name of *delft-ware*. The same kind of pottery, now mostly made in England, is still called *delft*. Here are manufactures of carpets, woollen cloths, soap, etc. Pop. 26,028.

**Delfts'haven**, the port of the above place, is on the river Meuse, 2 miles S. W. of Rotterdam. It has a handsome church. The inhabitants are partly employed in shipbuilding, iron-foundries, and distilleries. Pop. 7288.

**Delf'zijl**, a fortified seaport in the Netherlands, in the province of Groningen, on the Dollart, is the key of Groningen and Friesland. Pop. 5873.

**Delga'da**, or **Ponta Delgada**, a city of the Azores, is on the S. side of the island of St. Michael, and is the capital of that island and of St. Mary; lat. 37° 45' N., lon. 25° 40' W. It has considerable trade in fruit, grain, and orehil. The government is here constructing a break-water and docks for shipping. Pop. 15,885.

**Del'hi**, a district of India, includes a small portion of the former province of Delhi. Area, 4057 square miles. The southern part is rocky and barren; the northern and north-western parts are watered by the Jumna, and are more fertile. Delhi is one of the administrative divisions of the North-west Provinces. Capital, Delhi. Pop. 1,920,912.

**Delhi** [Sanskrit, *Indraprastha*], a celebrated city of Hindostan, called by the Mohammedans **Shahjehan-âbâd**, is situated on the Jumna, about 790 miles N. W. of Calcutta; lat. 28° 40' N., lon. 77° 18' E. It was formerly the capital of the Mogul empire, and was the largest city of Hindostan, having a population of 2,000,000. An extensive tract, covered with the ruins of palaces, pavilions, baths, and mausoleums, marks the dimensions of the ancient metropolis of the Mogul empire. The modern city, which was founded by Shah Jehan in 1631, has a circumference of seven miles, and is surrounded by walls of red sandstone thirty feet high. It has seven colossal arched gates, defended by round bulwarks. The streets are mostly narrow, but one of the main avenues is 120 feet wide. The palace of the Great Mogul, built by Shah Jehan, is the most magnificent in India. Its stupendous towers, surmounted by elegant pavilions, its marble domes and gilded minarets, present a very imposing appearance. Among the other remarkable edifices is the Jamma mosque, a splendid structure in the Byzantine style, built of white marble and red sandstone. Delhi has about forty mosques, many of which have lofty minarets and gilded domes. Here is Delhi College, which was founded in 1792, and has a separate department for each of these languages—Arabic, English, Persian, and Sanskrit. The goldsmiths of Delhi are famous for the beauty of their work. Many Cashmere shawls are here embroidered with silk and gold. The city, which has been frequently captured by hostile armies, was taken by the British general Lord Lake in 1803, and it has continued under British domination ever since that time. In May, 1857, Delhi was occupied by the mutinous Sepoys, who here murdered a number of English people. A British army commenced the siege of this place in June, and took it by assault, after a severe fight of seven days, in Sept., 1857. Pop. 160,553.

**Delhi**, on R. R., Delaware co., Ia. (see map of Iowa, ref. 4-J, for location of county), near the Maquoketa River, about 40 miles W. of Dubuque. It has several fine stone-quarries, two flouring-mills, a fine school building, several nurseries, etc. Pop. in 1870, 413; in 1880, 524.

**Delhi**, capital of Delaware co., N. Y. (see map of New York, ref. 6-H, for location of county), on R. R. and the N. bank of the Delaware River (W. branch). It has an academy and a woollen mill. Pop. in 1870, 1223; in 1880, 1384.

**Deligny** (EDOUARD JEAN ETIENNE), born at Ballan, in the department of Indre, Dec. 12, 1815, entered the army as sous-lieutenant in 1835, served with great distinction in Algeria, and was made a captain in 1844, brigadier-general in 1853, and commander of the camp at Chalons in 1869. In the Franco-Prussian war he commanded a division of the Army of Metz, and was sent to Munster after the capitulation. While there he wrote and published in Brussels his pamphlet "*Armée de Metz*" (1870), which contained some of the severest criticism of Bazaine. After the close of the war he commanded the Fourth Army Corps at Mons until 1879, when he was appointed inspector-general.

**Delille** (JACQUES), L'ABBÉ, a French didactic poet, born at Aigueperse, in Auvergne, June 22, 1738. He was educated at a college in Paris, and became professor of humanities at Amiens. His reputation was established by a translation of Virgil's "*Georgics*" (1769). In 1780 he published "*Les Jardins*." He translated into French verse Virgil's "*Æneid*" (1804) and Milton's "*Paradise Lost*."

(1805). His version of the "Æneid" is considered the best in the language. Among his works is a poem entitled "Imagination" (1806), which is highly commended. Died May 1, 1813. (See CAMPENON, "Éloge de Delille.")

**Delir'ium** [Lat. from *deliro*, to "be insane," which is said by some to be from *de*, "from," and *lira*, a "ridge," or "furrow;"] thus an insane person was likened to one ploughing out of the proper line), a condition in which the ideas of a sick person are in a confused, wild, or wandering state. It differs from insanity in being a symptom of acute disease, like fever, while insanity is an evidence of chronic disease.

**Delir'ium Tremens** (i. e. "trembling delirium"), a morbid affection caused by the action of alcoholic drinks, and often afflicting hard drinkers after severe accidents or attacks of acute disease. Delirium, trembling and subsultus of the muscles and tendons, wakefulness, and rapid pulse, are characteristic symptoms. The patient sometimes suffers extremely from the most frightful apprehensions, and frequently thinks he sees grotesque and horrible objects. The tongue has a thick furry coat, the skin is generally cool and covered with sweat, and the patient gives forth a characteristic saccharine odor. The blood and fluids of the brain are loaded with alcohol, and often (especially in old patients) there are abundant degenerative changes in the brain, lungs, liver, etc. Death occurs in about one-sixth of the cases. The mortality appears to have been formerly much greater than at present. The treatment is various. Sleep may be induced by the use of chloral or bromide of potassium, and in long-continued cases opiates may be cautiously administered with the happiest results. Patients nearly always call for alcohol in some form, but this desire should not, as a general rule, be gratified. The strength should be kept up by beef-tea, milk, raw eggs, etc.

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**Delisle** (GUILLAUME), an eminent French geographer, born in Paris Feb. 28, 1675. He reformed the system of geography, and published in 1700 a map of the world and celestial and terrestrial globes. He wrote several memoirs on geography, and produced maps of ancient and modern countries. Died Jan. 25, 1726.—His brother, JOSEPH NICHOLAS DELISLE (born April 4, 1688), founded a school of astronomy at St. Petersburg, and wrote an account of the Russian search for a passage from the South Sea to the north of America. In Delisle's thermometer, used in Russia, the boiling-point of water is zero, and the freezing-point is 150°. Died Sept. 11, 1768.

**De'litzsch**, a town of Prussian Saxony, the capital of a circle, is on the river Lober, and on a railway, 15 miles N. of Leipzig. It has three churches, a castle, and manufactures of woollen hosiery and gloves. Pop. 8112.

**Delitzsch** (FRANZ), a German theologian, was born at Leipzig Feb. 23, 1813, of Jewish parents, and was educated at Leipzig. In 1846 he became professor of theology at Rostock, in 1850 at Erlangen, and in 1867 at Leipzig. He is a master of biblical exegesis and of the immense Jewish literature. He has published numerous devotional and theological works, among which are "The House of God" (1848), "History of Jewish Poetry" (1836), "Biblico-Prophetic Theology" (1845), "Biblical Psychology" (1855), "Christian Apologetics" (1869), "A Day in Capernaum" (1871), and many valuable commentaries.

**De'lius** (NIKOLAUS), a German scholar well known as a writer on Shakspeare, was born at Bremen in 1813, became in 1855 professor of Sanscrit and of the Romance and English literature at Bonn. He has published a critical edition of the works of Shakspeare (2d ed. 1863-64; supplement 1865), the "Mythus of William Shakspeare" (1851), "Shakspeare Lexicon" (1852), "The English Theatre in Shakspeare's Time" (1852), and works on Provençal and Prærit literature.

**Del'la Crus'ca** (i. e. "of the bran,"\* so called because its chief aim or principal office was the boulding or purifying of the national language), the name of a celebrated academy founded at Florence in 1582 for the purpose of establishing a standard of the Italian tongue. This academy published a dictionary, which became a great authority in relation to classical purity of language. The Della Cruscan Academy was afterwards incorporated with the FLORENTINE ACADEMY (which see).

**Del'la Cruscan School**, a name derived from the celebrated academy Della Crusca of Florence (see preceding article), and applied to certain affected English writers residing at Florence in 1785. Gifford satirized their ab-

surdities with scathing severity in his "Baviad" and "Mæviad," and "completely killed this school." Among the Della Cruscans were Bertie Greathead, Robert Merry, Mrs. Thrale Piozzi, and William Parsons.

**Dellet** (JAMES) was born in South Carolina, but settled at Claiborne, Ala. He was returned to the first legislature under the State government in 1819, and to Congress in 1837. He died in 1849.

**Dell Rapids**, Minnehaha co., Dak. (see map of Dakota, ref. 7-G, for location of county), on R. R. and the Big Sioux River. Pop. in 1880, 260.

**Delmar** (ALEXANDER), a political economist of Spanish extraction, was born in New York City Aug. 9, 1836. He was editor of the "Social Science Review" (1864-66), organized the U. S. bureau of statistics (1866), and was its director (1867-68). He has published, besides other works, "Gold Money and Paper Money" (1862), "Essays on Political Economy" (1865), the "International Almanac" (1866), "What is Free Trade?" (1865), "Letter on the Finances" (1868), and "History of Money" (1885).

**Del Norte**, city, on R. R., capital of Rio Grande co., Col. (see map of Colorado, ref. 5-C, for location of county), beautifully situated on the right bank of the Rio Grande, 230 miles by R. R. S. W. of Denver. It is an important dépôt of supplies for the San Luis Valley and the San Juan mines. Pop. in 1880, 729; in 1885, 934.

**De Long** (GEORGE WASHINGTON), born in New York Aug. 22, 1844, perished on an expedition to the north pole in October, 1881. He entered the U. S. Naval Academy in 1861, was graduated in 1865, and served in the Juniata on her trip to Greenland in 1873 in search of the Polaris. From that time it was his great desire to be placed at the head of an expedition of Arctic exploration, and he was undoubtedly eminently fit for the task. In 1877 he proposed to Mr. James Gordon Bennett to fit out such an expedition, and the latter was willing. The Jeannette was bought and splendidly equipped at the expense of Mr. Bennett. It was then placed under the authority and protection of the U. S. naval department, and on July 8, 1879, De Long sailed from San Francisco, through Behring's Strait, in search of the north pole. On June 13, 1881, the Jeannette sunk, crushed by the ice, in lat. 77° 15' N., lon. 155° 50' E., and De Long, with a number of the party, perished on the banks of the delta of the Lena, in Siberia. (See "The Voyage of the Jeannette," by Mrs. EMMA DE LONG, Boston, 1884, 2 vols.) S. B. LUCE.

**Delorme** (PHILIBERT), a French architect, born at Lyons in 1515, studied at Rome. He planned the Tuileries, begun in 1564 for Catharine de Medici, and built the Château de Meudon. He wrote "Nouvelles Inventions pour bien bâtir" and a treatise on architecture. Died in 1577.

**De'los** [Gr. Δῆλος], also called **Orty'gia**, a small island in the Ægean Sea, belonging to the group of Cyclades, was celebrated in ancient times as the birthplace of Apollo and Diana. According to tradition, it was originally a floating island, and was rendered immovable by Jupiter, in order that it might be a place of refuge for Latona. It was the site of a famous temple and oracle of Apollo, and was the centre of a great periodical festival in honor of him. In 426 B. C., Delos was purified by the Athenians, who removed all the tombs, and enacted a law to prevent it from being polluted by births or deaths. It was reputed one of the holiest places in Hellas. On the formation of the confederacy in 477 B. C. for the purpose of resisting the Persian invaders, Delos was chosen as the common treasury of the Greek allies. After the fall of Corinth (146 B. C.), Delos, which had a good harbor, was the centre of an extensive commerce. Here was a town of the same name, which is now a mass of ruins. Shiploads of columns and other remains have been carried away to Venice and Constantinople. The island has an area of 32 square miles, and is at present not inhabited.

**Del'phi** [Gr. Δελφοί], an ancient town of Phœcis, and one of the most celebrated places in the Hellenic world, on account of its oracle of Apollo. It was situated at the southern base of Mount Parnassus, in the narrow vale of the Pleistus, amidst sublime and beautiful scenery. It occupied the central area of a great natural theatre or semi-circular recess, partly enclosed by stupendous rocky barriers. The original or proper name of the oracle was *Pytho*. The name Delphi does not occur in the poems of Homer, who mentions that Agamemnon consulted the oracle at Pytho. The Pythian games were celebrated here every four years, the first celebration occurring in 586 B. C. Delphi became an opulent city and independent state, deriving its riches and importance from its oracle, which was the most famous of all the oracles. In the eighth century B. C. its reputation extended not only throughout Hellas, but also among foreign nations. Croesus, king of Lydia,

\* Hallam calls attention to the fact that the Italian academies of that period were remarkable for "names humorously quaint." One (that of Viterbo) was called the academy of "the Obstinate," another (that of Sienna), of "the Blockheads."



gave rich presents to the Pythian Apollo. The oracles were uttered by a female called Pythia, who sat on a tripod placed over the mouth of a cavern. She is said to have breathed an intoxicating exhalation of vapor which issued from this cavern or chasm, and was supposed to inspire her with the gift of prophecy. The fountain of Castalia, issuing near the base of Parnassus, supplied holy water for the temple of Apollo, which was one of the largest and most beautiful in Greece, and had a front of Parian marble. In 480 B. C., Xerxes sent a detachment of his army to plunder this temple, which contained a large amount of treasure. As the Persians were climbing up the rugged path to the shrine, on a sudden thunder was heard to roll, the war-shout sounded from the temple of Athena, and two huge crags rolled down the mountain, crushing many to death. The surviving Persians were seized with a panic, and retreated without having effected their object. In 357 B. C. the Phocians seized the temple, and thus provoked the Sacred war, during which a portion of the treasures was expended in paying the troops of Phocis. Delphi was attacked in 279 B. C. by Brennus and an army of Gauls, who, it is said, were repulsed by the same supernatural agency as the Persians. The Delphic oracle was finally silenced by the emperor Theodosius. The site of Delphi is occupied by the modern town of Castri or Kastri. Pop. about 600.

**Delphi**, city and R. R. junction, capital of Carroll co., Ind. (see map of Indiana, ref. 4-D, for location of county), on Wabash River, has a fine court-house, paper-mills, planing-mills, excellent water-power, and is on the Wabash and Erie Canal. Pop. in 1870, 1614; in 1880, 2040.

**Delphin Classics**, an edition of the principal Latin classics for use of dauphin of France, son of Louis XIV. (*in usum delphini*), at the suggestion of his tutor, the duke de Montausier, and under superintendence of Bossuet and Huet, preceptors to the dauphin. The series comprised ultimately forty authors or titles (HALLAM, "Lit. Eur.," 3, p. 247; BAILLET, "Jugemens de Savans," vol. 2, p. 278).

**Delphinium** [so called from the resemblance of the nectary to the form of the dolphin], the name of a genus of poisonous herbs of the natural order Ranunculaceæ, commonly called larkspurs. The seeds of *Delphinium Staphisagria* and *Delphinium consolida* have powerful cathartic properties, and the alkaloid (*delphinia*) is recommended for paralysis and rheumatism. Both the annual and perennial kinds are favorite garden flowers; the double rocket larkspurs are especially rich and varied in color, and resemble hyacinths in their regular clusters. The genus *Delphinium* is closely allied to the aconites. Several species are natives of Europe, the U. S., and Mexico.

**Delphinus** [the Lat. term for dolphin], the name of one of the constellations of the northern hemisphere.

**Delphinus**, in zoology, a term limited to the species of Cetacea, having teeth simple and almost all conical in both jaws. They live in communities, and are the most carnivorous of the whole order. The Linnæan genus *Delphinus* is subdivided into *Delphinus* proper, *Phocæna*, the common porpoise, *Delphinapterus*, represented by the Beluga, and *Hyperoodon*, of which the bottle-nosed dolphin is the type. (See DOLPHIN.)

**Delphos**, R. R. junction, Allen and Van Wert cos., O. (see map of Ohio, ref. 3-C, for location of counties), on the Miami Extension Canal, 45 miles E. of Fort Wayne. It has good water-power, while numerous smokestacks attest its industrial importance. Pop. in 1870, 1667; in 1880, 3814.

**Del'ta** [so named from their resemblance in form to the fourth letter (Δ) of the Greek alphabet], the triangular expanses of alluvial deposit formed at the mouths of certain rivers. They commence at the point where waters laden with mud first meet the sea, and from the constant mud-deposits gradually widen, until some, like the deltas of the Mississippi and the Nile, advance many miles beyond the coast-line. Deltas occur not only in the sea where fresh water meets the salt and is checked by the tides, but also in lakes, the accumulation projecting in the form of a tongue beyond the point at which the river enters the lake. For the formation of a delta depends as much upon the presence or the absence of currents in the sea at the mouth of the river as upon the quantity of sediment held in suspension by the river when it reaches the sea. In inland lakes, therefore, in the quiet estuaries of the almost tideless Mediterranean, and in the sheltered bays and gulfs of other seas, deltas are of almost invariable occurrence; while, on the other hand, strong tides and powerful oceanic currents carry off the detritus into the sea. The delta of the Ganges is the largest in the world. It is estimated that its head commences 220 miles from the sea, and its base-line measures about 200 miles.

**Delta**, Col. See APPENDIX.

**Delta**, former cap. of Madison parish, La. (see map of Louisiana, ref. 7-E, for location), on R. R. and Mississippi River opposite Vicksburg, Miss. Pop. in 1880, 399.

**Deluc** (JEAN ANDRÉ), F. R. S., a Swiss geologist and natural philosopher, born at Geneva Feb. 8, 1727. He invented a portable barometer, and published in 1772 "Researches on the Modifications of the Atmosphere." Soon after that date he removed to England, was chosen a fellow of the Royal Society, and became reader to the queen. He published in 1778 "Letters, Physical and Moral, on the History of the Earth and Man," in which he defended the cosmogony of the Bible, and ascribed the formation of the present continents to a great and violent revolution which occurred about 4500 years ago. He wrote several other works in French. He became a professor in Göttingen in 1798, but subsequently returned to England, and died at Windsor Nov. 8, 1817.

**Deluge** [Lat. *diluvium*, from *di* (for *dis*), "apart," and *luo*, to "wash"], an inundation or overflow of land by water, a term especially applied to the flood in the time of Noah, an account of which is given in Genesis vi., vii., and viii. It is often estimated to have occurred B. C. 2516, but its date may have been much earlier. The Jewish narrative seems to have been drawn from a double source—an Elohistic document extending the duration of the Flood to a whole solar year, and alluding to the legal distinction between clean and unclean, and a Jehovistic—but both sources agree in ascribing the Flood to the depravity of mankind, in the description of the rescue of Noah, and in the promise that a deluge shall never again take place. Traditions of the Flood occur in many countries. Among the more important of these is the Chaldean account preserved in a fragment of Berosus, and somewhat resembling that given in the Bible. In many of its details it completely coincides with the biblical narrative; thus, in the triple letting-out of the birds. Otherwise it seems founded on cuneiform sources. Mr. George Smith has published (1872), from the cuneiform inscriptions, a very remarkable account of the Flood, corresponding in many particulars with those of Moses and Berosus. It was found in the library of King Assurbanipal, and dates from about 660 B. C. Sisit (Hasisadra), an old Chaldean king, takes the place of the Xisuthros of Berosus and the Noah of Genesis. He describes the godlessness of the world, the divine command to build an ark, the coming of the Flood, etc. Bunsen states that no trace of Noah's deluge is found in the Chinese traditions, but missionaries, both Protestant and Roman Catholic, assert that the Chinese have a story remarkably like that contained in the Bible. The Mahābhārata of the Hindoos contains still another tradition of the same event. The ancient Mexicans and many other tribes of American Indians have similar accounts. The same is true of the ancient Phœnicians, Greeks, and many other nations, ancient and modern. The Egyptian monuments appear to have no account of a general flood.

It is now generally held by Christian scholars that the flood recorded in the Bible was local, and not universal. The language of the original account does not necessarily imply more than this.

**Delusion**. See INSANITY.

**Del'vino**, a fortified town of European Turkey, in Albania, is situated on a hillside covered with olive and orange groves, 47 miles W. N. W. of Yánina. It has a trade in olive oil. Pop. about 10,000.

**Dema'des** [Gr. Δημάδης], an Athenian orator and demagogue, who was a violent opponent of Demosthenes. He was witty, eloquent, and profligate, and acquired great political influence. He fought against Philip of Macedon at Chæronea, 338 B. C., but afterwards took a bribe from that king, and favored the interest of Philip and his son Alexander. He was put to death by order of Antipater (or Cassander) in 318 B. C.

**Demand and Supply**. See POLITICAL ECONOMY.

**Demarca'tion**, or **Demarkation**, a line or boundary by which one object is separated or marked off from another; a limit ascertained and marked, or the act of ascertaining and marking a limit; the "dead line" between two armies. The "line of demarcation" is a name given especially to an imaginary N. and S. line drawn by Pope Alexander VI., 360 miles W. of the Azores, all newly-discovered lands to the eastward being granted by him to Portugal, and all westward to Spain (1494).

**Demavend'**, a volcanic mountain of Persia, about 45 miles N. E. of Teherân, is the highest peak of the Elburz chain, which separates the low shores of the Caspian Sea from the high table-land of Persia. It has a conical form and a crater-shaped summit, which is covered with a large

deposit of sulphur. Its height is about 21,000 feet, as recently determined by the Russian survey. An Englishman (William T. Thompson) ascended to the top of Demavend in 1837. As it is a conspicuous object from the great trade-route between India and Western Asia, it is connected with the early Persian legends as Etna with those of the Greeks. It is classed among extinct volcanoes.

**Dem'bea**, or **Tzana**, a lake of Abyssinia, in lat. 12° N. and lon. 37° 15' E., is 40 miles long, and has an average width of 25 miles. It occupies part of a fertile plain, and is 6108 feet above the level of the sea. A branch of the Blue Niles issues from this lake.

**Dembin'ski** (HENRY), a Polish general, born in the palatinate of Cracow Jan. 16, 1791. He fought against Russia in the revolution of 1830, and made a masterly retreat from Lithuania in July, 1831. He afterwards passed many years in exile, and was appointed commander-in-chief of the Hungarian army by Kossuth in Feb., 1849. His success was hindered by the enmity of Görgei, who refused to serve under him. Dembinski soon resigned the command, and fled to Turkey. Died June 13, 1864, and left memoirs on the campaigns in Lithuania and Hungary.

**Demen'tia** [from the Lat. *de*, priv., and *mens*, "mind"], a form of insanity characterized by gradual extinction of all the mental powers. It is one of the most hopeless forms of mental disease.

**Demera'ra**, a small river of South America, in British Guiana, flows northward, and enters the Atlantic Ocean near lat. 6° 50' N. and lon. 58° 20' W.

**Demerara** is also the name of a county in British Guiana, intersected by the above river. Its inhabitants are Europeans, Indians, Hindoo and Chinese coolies, and negroes. Capital, Georgetown. Pop. about 80,000.

**Demesne**, *de-mēn'*, or **Demain**, in law, originally that portion of the lands belonging to a lord which was held in his own occupation or reserved for his immediate use. Hence it is sometimes used to denote those parts of a manor which the lord has in his own hands. In the present day it may be defined as the right which the owner in possession of lands in fee simple has in his estate.

**Demeter.** See CERES.

**Deme'trias** [Gr. *Δημητριάς*], a city of Thessaly, at the head of the Pagasæan Gulf, founded about 290 B. C. by Demetrius Poliorcetes, became a favorite residence of the Macedonian kings. Its remains are still visible.

**Deme'trius**, an architect who is said to have completed, in conjunction with Pæonius the Ephesian, the temple of Diana at Ephesus. His period and country are not certainly known.

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**Deme'trius**, probably of Alopecce in Attica, a statuary who flourished, according to Sillig in his "Dictionary of Artists," about B. C. 440. He imitated nature so closely in his works that he reproduced imperfections as well as beauties, for which he is censured by Quintilian. Among his productions are a statue of Lysimache, priestess of Minerva, one of Minerva *Musica*, so called from the serpents of the Gorgon on it emitting a musical sound when struck, and an equestrian statue of Simon, the first writer on horsemanship.

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**Deme'trius**, a silversmith of Ephesus, who made silver shrines for Diana. When Saint Paul was in Ephesus, gaining many, both Jews and Greeks, to the true faith, this man excited a tumult against him among his fellow-craftsmen.

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**Deme'trius** [Russian, *Dmitri*], czar of Russia, usually called the FALSE DEMETRIUS. He pretended to be a son of Ivan IV., who at his death in 1584 left two sons, Feodor and Demetrius. The latter probably died in 1591. The subject of this article raised an army of Poles in 1603, invaded Russia, and defeated Boris in battle. He began to reign in Moscow in 1605, but his partiality to the Poles offended the Russians, who revolted and killed him May 28, 1606. He was succeeded by Basil III., or Shuisky.

**Deme'trius Phale'reus**, an eminent Grecian orator and philosopher, born at Phalerum in Attica about 345 B. C. He was a disciple of Theophrastus the philosopher. He was appointed governor of Athens by Cassander in 317 B. C., and held that office ten years. His administration was so prosperous and popular that the Athenians erected to him, it is said, 360 statues. He escaped to Egypt when Athens was taken by Demetrius Poliorcetes in the year 306. He was the author of many historical and philosophical works, which, with the exception of fragments, are not extant. Died in Egypt about 284 B. C.

**Demetrius Poliorce'tes** [Gr. *Δημήτριος Πολιορκητής* (i. e. "Demetrius the besieger of cities")], a king of Macedon, born about 335 B. C., was a son of Antigonus, king

of Asia. He was surnamed Poliorcetes, "besieger of cities," on account of his success as a general. He fought for his father against Ptolemy of Egypt in Syria. In 306 B. C. he captured Athens from Cassander, and defeated Ptolemy in a naval battle near Cyprus. He gave proof of superior military skill in a long siege of Rhodes, but he failed to take that city. After the death of Antigonus (299 B. C.) he formed an alliance with Seleucus. He usurped the throne of Macedon in 294, but was driven out by Pyrrhus and Lysimachus. Died about 283 B. C. (See PLUTARCH, "Life of Demetrius.")

**Demetrius of Byzan'tium**, a Peripatetic philosopher—probably the same, Westermann thinks, with the Demetrius who sought to dissuade Cato from suicide at Utica. Athenæus quotes a work of his by the title "*περί ποιητῶν*," and sometimes by that of "*περί ποιημάτων*," but they are no doubt the same work. Some fragments of this writer have been found in manuscripts discovered at Herculaneum.

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**Demetrius of Su'nium**, a distinguished Cynic philosopher, enjoyed a high reputation for correctness of life and firmness of principle. He lived at Rome under the emperors from Caligula to Domitian, and was the friend of Thræsaus Pætus and of Seneca. Living with the greatest strictness himself, he did not hesitate to censure even those in high position, for which freedom of speech he was banished. He is probably the same philosopher as the Demetrius of Corinth mentioned by Philostratus, according to Ritter, who gives a summary of his doctrines in his "History of Philosophy," vol. iv., p. 168, English translation. He left no writings.

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**Demetrius of Sceps'is**, a Greek grammarian, flourished about 210 B. C. From Strabo and Athenæus we learn that he composed an extensive work in at least twenty-six books, full of historical and geographical information about the places mentioned in the catalogue of ships in the second book of the "Iliad" ("*Τρωϊκὴν διάσκεψιν*"). The fragments are indicated in MÜLLER'S "Fragm. Hist. Græc.," vol. iv., p. 382.

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**Deme'trius So'ter** [Gr. *Δημήτριος Σωτήρ* (i. e. "Demetrius the Preserver"), so called by the Babylonians because he freed them from their tyrants], a king of Syria, born about 185 B. C., was a son of Seleucus Philopator. He was a hostage at Rome when his father died in 175 B. C., and his uncle, Antiochus Epiphanes, obtained the throne. Having escaped from Rome in 161, he was proclaimed king by the Syrians. He waged war against the Maccæes. Syria was invaded by Alexander Balas, by whose army Demetrius was defeated and killed in 150 B. C. His son, Demetrius Nicator, eventually became king of Syria.

**Demetrius the [SECOND] False**, another pretender to the throne of Russia, began to urge his claim in 1607. He affirmed that he was Demetrius, the son of Ivan IV., and was supported by many partisans. He was killed by a Tartar chief in 1610.

**Deme'trius Triclin'ius**, a Greek scholiast who flourished in the fifteenth century. He is known for a recension of the text of Sophocles, which long served as a basis of subsequent revisions. He also composed scholia on Sophocles, first published by Turnebus in his edition, and two other works on the same poet, the one on the metres (*περί μέτρων*), the other on the figures (*περί σχημάτων*), which, however, are of no great value. He compiled scholia also on Hesiod, Pindar, and Aristophanes.

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**Deme'trius Ze'nus**, of Zacynthus, about 1530 A. D. translated the "*Batrachomyomachia*" into modern Greek in the so-called *στίχοι πολιτικοί* (popular verses). This is printed in Igen's edition of the "Homeric Hymns," pp. 123-139, with a Latin translation by M. Crusius. The best edition is that of Müllach, Berlin, 1837. He composed a poem in the same measure on Alexander the Great, printed at Venice, 1829.

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**Demetz** (FRÉDÉRIC AUGUSTE), a French philanthropist and judge, born May 12, 1796. He visited the U. S. in 1836, for the purpose of examining the prisons. About 1840 he founded at Mettray, near Tours, an institution for the reformation of juvenile offenders, which was successful. His system has been adopted in England. Died Nov., 1873.

**Dem'i**, a prefix derived through the French from the Lat. *dimidium*, "half" (from *di*, "through," and *medium*, the "middle"), denoting a division into two parts; thus a demi-lune is a half moon; a demi-god is a half-divine being, etc.

**Dem'i-Bast'ion**, in fortification, a half bastion, which frequently terminates the branches of a crown-work or horn-work, and is occasionally used in other places.

**Demi-god** [Gr. *ἡμίθεος*; Lat. *semideus*; Fr. *demi-dieu*;

Ger. *Halbgott*], literally, "half-god," the name given to certain fabulous heroes of the Greek and Roman mythologies. They were sometimes deified heroes, and sometimes the offspring of a divinity and a mortal.

**Demi-Lune** [a Fr. term signifying "half-moon," so called because it is somewhat crescent-shaped], in fortification, is a work constructed to cover or defend the curtain or wall of a place and the shoulders of the adjoining bastions. It is composed of two faces, forming a salient angle towards the outside.

**Demi-Monde** [Fr.], the "half-world," a name applied originally to those classes in large cities who, with neither wealth, rank, nor culture, adopt a fashionable mode of living. Of late it designates that class of Parisian women who, while they are leaders of fashion, are excluded from the best society on account of their doubtful reputation.

**Deming**, N. M. See APPENDIX.

**Dem'ing** (HENRY C.), born at Middle Haddam, Conn., in 1815, graduated at Yale in 1836 and at Harvard Law School in 1838. He translated some of Eugene Sue's novels, but was better known as an able lawyer and Democratic politician of Hartford, Conn. He held many prominent State offices. In 1861 he became colonel of the Twelfth Connecticut Volunteers, serving in Louisiana, and was mayor of New Orleans (1862-63). He was a Republican member of Congress from Connecticut (1864-68). Died at Hartford, Conn., Oct. 9, 1872.

**Demir-Hissar** ("iron castle"), a town of European Turkey, on the river Struma, 13 miles N. N. W. of Seres. It is defended by an old castle. Pop. about 8000.

**Dem'ur'gus**, or **Dem'ur'ge** [from the Gr. *δημιουργός*, "working for the people," from *δῆμος*, the "people," and *ἔργον*, "work"], a word originally applied to an artisan or workman, afterwards used by Plato, and especially by the Neo-Platonists and the Gnostics, to designate the Creator of the world, who was conceived by the Gnostics to be a being inferior to the Supreme Deity. In their fantastic elaboration of the doctrine of emanation the demiurge generally denotes the principle which, by entering chaos, produced the world. The name was also given to the highest magistrate in some of the Grecian cities.

**Demmin'**, a town of Prussia, in Pomerania, on the river Peene, about 75 miles W. N. W. of Stettin. It is very old and was formerly fortified, but its fortifications have been demolished. It has manufactures of hats, woollen and linen fabrics, hosiery, etc. Pop. 10,507.

**Democ'e'des** [Gr. *Δημοκρίτης*], an eminent Greek physician of Crotona, was born about 550 B. C. He was taken prisoner by the Persians, and carried to the court of Darius I., to whom he gave medical advice. The queen Atossa, whose favor Democedes had gained, persuaded Darius to send him to Greece with a small party of Persians on a secret mission. Democedes escaped from them and returned to Crotona.

**Democh'ares** [Gr. *Δημοχάρης*], an Athenian orator, a nephew of Demosthenes, was a leader of the anti-Macedonian party. He was banished about 295 B. C., but returned in 287 or 286, after which he rendered important service as minister of finance. Died after 280 B. C.

**De'mocles** (*Δημοκλῆς*), an Attic orator trained in the school of Theophrastus, was a contemporary and opponent of DEMOCHARES (which see). He is believed to have left written orations, since Dionysius of Halicarnassus attributes to him an oration previously ascribed to Dinarchus. Dionysius and Suidas call him Democleides.

**Democ'racy** [Gr. *δημοκρατία*, from *δῆμος*, "the people," and *κρατέω*, to "rule"]. A state in which the people at large possess the whole sovereignty is rightly denominated a democracy. At most, there are but three clearly distinguishable methods of government—the monarchical, the aristocratic, and the democratic; that is to say, the rule of one, of a number, or of the whole. The first two are of like nature, and might properly be treated as one; the last is altogether antagonistic to both of the others. The prefixes despotic, hereditary, and elective merely describe varieties of the first; an oligarchy is only a particular kind of the second; and such terms as republic and commonwealth import little that is distinctive as to political structure. Statesmen and philosophical writers apply them indiscriminately to states which differ greatly in the principles of their respective governments.

Of sovereignty in other forms there has been ample experience, but governments based exclusively upon the democratic principle, without any admixture of other elements, have not been known until a recent period on any considerable scale. Consequently, the true nature and tendency of that principle form an interesting theme.

A pure or simple democracy may conveniently regulate a prescribed portion of the civil authority within a subor-

dinate district; and perhaps it is competent to the exercise of supreme power in an independent state of slight extent; opinions concur in denouncing it as impracticable in a large one. Deciding questions of policy by direct vote is a practice of this nature, but when performed by ballot it is subject to serious objections. If the entire elective body could meet at the same time and place, and in such a way as to admit of deliberate conference and consultation, the judgment of a majority might be esteemed valid. This, however, is not possible; nor can its place be supplied by discussion in partial assemblies, much less by the essays of a various press, each addressing its own narrow circle, and mainly unread beyond.

The representative form may therefore be regarded as the only practicable method of administering government on the democratic principle. Consistently with it political power may be denied to some members of the state, who are nevertheless entitled to protection and such privileges as are suitable to their condition. Age, sex, or ascertained unfitness may form grounds of exclusion; so in respect to a distinct race very inferior in numbers, as, for instance, the whites of Hayti. The right to exclude criminals after their guilt has been ascertained is indispensable to the preservation of social order—and, practically, it may be aimed against a class, as in the known instance of certain polygamists—but it should never operate otherwise than upon the offending individual as a consequence of his personal delinquency. Even in this case, pernicious opinions cannot properly be held to impair the citizen-right, though foreigners known to entertain them may be denied naturalization or hospitality in any form. With this qualification, it may be broadly asserted that democracy, as a principle, entitles each citizen, in common with every other, to an equal interest in the state. A government based upon it can acknowledge no conflicting interests among the people to be favored or opposed. All its legitimate ends are accomplished when public safety and individual liberty are maintained. Restraining the turbulent and disorderly by a just administration of general laws, and perhaps making due provision for the impotent, it should leave all others in the quiet enjoyment of such social conditions as they may have created for themselves or derived from the ordinary incidents of life. In the main, it should be unfelt and unseen, or at least unperceived; the citizen should have no more vivid consciousness of the power which guards his civil rights than of the agencies whence flow his physical health or content of mind. Where the voice of the people is actually sovereign this must ever be the fact, for it is an irresistible deduction of reason that the supreme will never can intentionally enact a law which is not required, or, in other words, lay upon its own freedom any needless restraint. Hence the axiom, that in a democracy every positive regulation, not actually indispensable to the public and general welfare, which restrains, or even indirectly tends to restrain, individual liberty in any degree, however slight, so far violates the spirit of the constitution. It is an infraction of popular rights, and may justly be denounced as the offspring of unlawful force or of fraud. These agencies cannot be wholly expelled from any sphere; but it is the office of democracy to restrain their influence on official action within the narrowest limits. A contrast with its rivals will afford the best means of illustrating its tendency and usefulness.

The investiture of individuals with permanent political power by a title derived from personal descent is the primary element in monarchical and aristocratic states, as the absence of any such practice is the distinguishing feature of a democracy. An inequality of civil or political rights among those who were alike in all other respects could never have been deduced from the ancestry of individuals but for the assumed sacredness of office. At the outset the monarch could have been no more than the first officer of the state; the incipient aristocracy must have been composed of his subordinates; and it was not until offices became hereditary that the state was divided into two permanent classes, the rulers and the ruled. The existence of these two classes is the very essence of monarchy. Their interests are necessarily adverse—a circumstance enforcing upon the former a general activity in support of their pre-eminence. In states actually or approximately despotic standing armies and frequent wars are the forces for this purpose; where a nominal place is assigned to the democratic principle, permanent political parties might serve in lieu of the soldier to uphold the political machinery, but, in general, they only supplement him. The measure of governmental activity in monarchical states has varied from the grinding tyranny prefigured by Nimrod the man-hunter down to that modern crown which is a mere bauble, absolutely inert, save so far as it involves expense and a consequent burden upon labor. From the earliest times wars have been found necessary, not only to give employment to the state

officers—i. e. the king and his nobles—but also to color the pretence of their usefulness, and through military discipline to organize in their hands a power adequate to support their authority. Thus, in great monarchies the so-styled common people have always been oppressed by enormous establishments, military or naval, or both. These are easily justified to unreflecting observers on the score of necessity, for aggressive wars by monarchs in furtherance of ambitious designs being of constant recurrence, armed organization for defence seems a requisite. War, with its inherent rapine and cruelty, is not, indeed, due to the crimes of any one monarch; but the fact remains patent that it is an evil founded in the principle of monarchy, and inseparable from it. The active and enterprising spirits of every clime and age have found seductive occupation in these war-establishments, and through their agency large portions of society have always been withdrawn from useful employments to feed upon the labor of the rest. The desolation produced by foreign wars, and the internal oppression resulting in time of peace from war-establishments and their adjuncts, are both due to the vices of the ruling classes. In this self-evident proposition effectual reforms must long since have taken root but for the natural tendency to accuse our neighbors instead of correcting our own faults, and the difficulty of the latter task in any one of many neighboring independent states.

The annals of government are consequently little else than a recital of the devices by which from the beginning every civil society has been preyed upon by its own official corps. This is easily effected wherever monarchy or aristocracy prevails. Democracy, being based upon absolute equality, admits of no governing class, nor of any interest adverse to the people in those who conduct the public business. But by artifice and irregular methods the latter may become a class, may grasp powers incompatible with the nature of the government, and may involve their country in all the evils incident to hereditary rule. Persecution for moral non-conformity, so grateful to the ill-regulated mind, may be from time to time practised until resistance is provoked and a color afforded for war. To this condition the grandly patriotic spirit engendered by free institutions gives great force and breadth; the entire people at once rush to arms, and public debt is incurred at a pace twenty-fold more rapid than would be tolerated under the cautiously regulated corruption of monarchies. These are abuses, and are deviations from the democratic principle. Their prevention is the duty of every good citizen.

Unmixed democracy is the principle of government recognized in Switzerland and in various portions of the American continent. In the U. S. of America it nominally exists, and upon the grandest scale. They therefore present the best practical illustration of what it is in its present stage of development. Any shortcomings in practice there discernible may serve to indicate the advisable line of progress in endeavoring to perfect its machinery; and what many other nations seem inclined to imitate ought to be freed, if possible, from existing defects.

The founders of the American Union recognized not only the ineptitude of monarchy and aristocracy, but the necessity of repressing in the newly conceived system their most conspicuous abuses. Standing armies were denounced as dangerous to liberty; wars for the extension of territory were regarded as unjust, foreign alliances as inexpedient, and public debt as mischievous; but, strangely enough, no barriers whatever were instituted against any of these practices. On the contrary, powers to introduce and foster the most dangerous of them were expressly delegated, in the name of the people, to their public agents. The natural ill-effects were foreseen; but they were deemed susceptible of being kept within endurable bounds. Monarchy and aristocracy were indeed effectually repudiated for the time. Neither could long exist without hereditary distinctions, nor could these be upheld where commerce in land was free, and inheritances were equally partible by compulsion or from social habit; so primogeniture and the accustomed contrivances for rendering estates permanently inalienable were extirpated. This was effected by laws harmonizing so perfectly with the common instincts of humanity as to seem proof against repeal. In view of these things, and of the advances attained in civilization and power of thought, the most despondent do not anticipate that distinct ranks in society can ever be re-established. Americans therefore regard monarchy and aristocracy as utterly and irrevocably banished from their country, and consequently suppose that in the U. S., and for those countries which may reconstruct their political fabrics upon the American model, democracy has fulfilled its mission. Yet perhaps this great and just principle has not yet accomplished more than a modification of the social evils initiated, nurtured, and brought to maturity in the Old World by its opposites, monarchy and aristocracy.

In framing every government hitherto instituted amongst men, one of the aims was to enable the rulers—by which is meant the office-holders—to gratify their ambition or their avarice, or both, at the expense of the ruled—that is to say, the mass of the people. The former, as military or political leaders, have always laid the foundations, and have anticipated, at the least, employment in superintending the structure. Purity of motive may be admitted in many cases, so far as individual consciousness is concerned; but self-love is both inherent and blind. The founder, while conscious of no object but the public good, has always had an eye to his own gratification, and his work has invariably been in some respects accommodated to that end. This infirmity tainted the most ancient political structures, and has in some degree affected all their successors. Organizing places and public employments has ever received an attention not measured by necessity, or, in other words, by the interests of the people. We have seen, accordingly, that whilst ostracising monarchy the founders of the American Union invested it with most of the powers by which the few had oppressed the many in all previous times.

The State governments were framed in the same way. The powers of government in common use, originally designed by the office-holding aristocracy to create or uphold their own interests against the governed mass, were all sanctioned. Under the vicious and unjust systems previously existing they were no doubt indispensable; they were therefore assumed to be necessary, even in a representative democracy. Conceding all these functions to be thus inseparable from regular government in any of its forms was the error of that day. Assuming this, the manifest and undeniable tendency to abuse furnished no support to any useful argument. It only led to further error. It was thought to prove the necessity of devising various new artificial checks. And in compliance with this reasoning there was generated, in the councils of a simple and frugal people, a government which, though based upon a single principle, and that of the simplest nature, was without a parallel in the multitude of its offices, in the multifariousness of its forms, and in its general complexity. As the checks and balances of the mixed system existing in England had developed the best administration then known, it was thought that, monarchy and all hereditary distinctions being excluded, complexity would afford adequate preventives of official malversation. The same example induced a reliance upon the free action of political parties as a motive-power to keep the official counter-checks in healthy action. Obvious distinctions between the old and the new governments seem to have been overlooked. In the former permanently antagonistical interests were legalized, and so commingled in the political constitution as to induce and necessitate continual conflict as a duty. Each of the three estates was there obliged to maintain a constant contention with the others, in order to protect its own peculiar and rightful privileges; whilst in the U. S. there were to be no classes, no separate estates, and no peculiar privileges. Everything was reduced to the dead level of absolute equality; there was nothing fundamental that needed a check or requiring to be balanced; peace and tranquillity were the spirit and nature of the government adopted. The practicability of a government amongst frail mortals with objects and leading to results so grandly beneficent was, however, an untried experiment. Those who inaugurated it did well; their achievements were creditable, even though perfection may not have been attained. Progress in modes of enforcing the principle instituted was, doubtless, the patriotic expectation of those who, while dreading the powers created, found themselves unable, from want of apposite precedents or experience, to construct at that time a more perfect system. Oppression by a permanently privileged class had theretofore been the grievance of nations. Such a contradiction in terms, and apparently in fact, as oppression of the people by themselves was not anticipated; to their virtue and intelligence it was therefore committed to carry the experiment to its full fruition, with an admonitory warning that perpetual vigilance was the price of liberty. The extent to which popular vigilance could be kept in beneficial action was then a problem; in some respects it is still so.

In a great and prosperous state the private interests of business or pleasure afford engrossing employments. Minds fully occupied with such subjects cannot be at the same time employed on large conceptions of governmental policy and in devising plans for their execution. This is more especially true in respect to that portion of the citizens who are most favored by fortune or have enjoyed the highest advantages of education and culture. It is eminently true of those in affluence. An active attention to great political interests by the latter is a rare phenomenon. The wealthy who are unsatisfied and still thirsting for

more are equally regardless of governmental action, unless led to seek aid for their private enterprises through official favoritism. The necessary, and of course quite excusable, pre-occupation of the citizens in their private affairs, not lack of judgment or intelligence, will be found, on a careful scrutiny, to be the great impediment to wise and just administration in representative democracies. There is much injustice on both sides in the mutual eliminations which disfigured the early debates of parties in America on this topic. It was never a fact that one party distrusted the popular judgment, or that the other relied upon it. All the leaders well knew that, as the political system was arranged, the people could never act directly on public affairs, and those leaders failed to devise an effectual method of securing in permanence the choice of desirable legislators. It is a delusion to suppose that in a representative democracy popular attention can be kept riveted on public affairs by the contentions of party. In mixed governments this may be possible. There antagonistic parties are supposed to be founded on conflicting ideas or principles expressed in intelligible maxims, and the original faith of each party, together with the social and political condition in which it originated, is consequently perpetuated in the same lines from generation to generation. It may thus acquire a fixed place in the mind and heart, and may become an active moral sentiment. In a representative democracy there is no legitimate basis for just and honorable antagonisms of this permanent character. During the brief period of unsettled opinion whilst the constitution is being constructed and put into operation there may be aliment for such parties, but fundamental differences of political sentiment must soon disappear. The citizens then find themselves blended together as one class, and occupying without distinction the same unalterable plane of absolute equality. Honest and intelligent political contention in the true sense of the expression must then cease. Thenceforth democrats are the only legitimate party; if any other can be supposed to exist, its members are foes to the constitution. It was only prior to and during the first decade of their constitutional union, if ever, that a monarchical party existed in the American States. During that brief period pure and honorable minds might have hoped for the re-establishment of ancient principles. When that hope perished a great change commenced. As in the nature of things was inevitable, the so-called political parties have ever since been gradually losing their hold upon distinctive opinions, and tending to a unity of views and purposes in which principles have little part. With such a unity parties can be nothing more than bands of rival leaders, keeping on foot, and employed as their respective forces, bodies of traders in the business or occupation of manipulating the masses, the ballots, or the returns. A government carried on by such agencies must at last attain a worse perfection than any which could exist under monarchical forms. According to these, the king and his nobles, as ruling officers, have a permanent interest in the state descendible to their heirs. For the protection of that inheritance and for the benefit of their posterity they will take some care of the state. In a representative democracy the office-holders of the hour are the rulers of the hour; their term is brief, and if corrupt they will, like the similarly situated pashas of Turkey, make haste to grow rich, for their positions are soon to be surrendered to others.

It is not through parties contending for control of the government that the benefits of democracy can be realized. The principle itself must be placed beyond the power of such parties. Permanent barriers, like those devised against monarchy, must be introduced, which shall absolutely restrain governmental agents—that is to say, the office-holders—from any action not indispensably necessary to the common weal. Public offices and employments must be thus rendered undesirable to the indolent and the avaricious. If this can be effected under any form, it is possible in a representative democracy. The other principles are directly opposed to it, and wholly incompatible with it. Its practicability in the former depends upon the question whether a persistently active and capable supervision of the ruling office-holder can be established among those who neither hold nor expect office—that is to say, among the burden-bearing multitude who support the official corps. The last requisite is thus pointedly defined for the purpose of excluding from reliance in their assumed office as “sentinels on the watch-tower of liberty” the organized class of office-seekers, constituting, in partisan phraseology, the opposition. In effect, and quite consciously too during advanced stages of political degradation, these will actually become allies of the party in power. Their function is to perpetuate among the people a delusive reliance upon that pretended but unreal conflict concerning principles which traders in politics always affect.

Through the ordinary revolutions of the political lottery such contestants divide between themselves, and alternately enjoy, all that through the forms of law can be wrung from the multitude. They have been known to concert in perfect harmony before elections the means of accomplishing a prearranged result.

Democracy, regarded as a principle, plainly indicates the means of instituting this useful supervision. On public emergencies the heroic virtues do indeed exhibit themselves in acts of great disinterestedness, but there is very little of this spirit displayed whilst nations are in their normal condition. In an exceedingly small or greatly impoverished country the vices natural to rulers may, indeed, be without opportunities; but in a great and prosperous state there is no possible safeguard against robbery by those who control the machinery of government, if the machinery be, in itself, adequate to effect that object when pushed to its utmost capacity. Those who enact the laws and administer them will always promote their private interests at the public cost if vested with sufficient power. Such is human nature, no matter what form or name the government may adopt. Democracy accepts this as an indisputable truth, and, distrusting all rulers, it gives to none of them any power that can safely be withheld. The policy of instituting checks upon power unavoidably granted, though not to be absolutely repudiated, is of little value. Appointing one set of official persons to watch another is a bootless contrivance. The remedy really aggravates the disease; it fosters the primary evil of government—a multiplication of public agents. The watcher and the watched soon learn to co-operate for joint benefit in the work of deluding the mass, whom it is the interest of both to circumvent. The judiciary may form an exception. The ancient practice of assigning reasons for the judgment pronounced still exists, and the duty is regarded as unavoidable. This, with the institution of review on appeal, does afford a protection of some strength. Besides, for the honor of our common nature let it be said, as it is true, that the habitual study of justice tends to create a sincere love of it.

The inherent vice of all governments is a tendency amongst the official rulers to devour the people's substance, and the only remedy is in a strict application of the democratic principle. All powers which can be dispensed with should be withheld from the government, and numerous vicious methods now in the highest favor should be suppressed. Permitting revenue or the means of defraying public expenditures to be drawn from duties, imposts, excises, loans, or any source whatever other than immediate taxation, enables those who control the administration to conceal their waste of the people's wealth, and protects them from any effective supervision. Compelling them to procure all revenue from the last-named source would obviate both of these evils.

This assertion may require proof. It has been shown that the whole electoral body cannot directly govern. Even were the electors composed only of the most learned and enlightened of the non-office-holders, they could afford neither the time nor leisure to govern directly by their own act, or to watch the machinery of government in its varied details, and by that sort of guardianship prevent abuse. They could not even study, in this extended sphere, the character and capacity of their representatives. To hope for any of these things were idle and visionary. There is just one thing tending to secure good government, and one only that the mass can do. Each citizen can for himself—and if suitably spurred to the duty he will—give attention to preventing exactions from his own private purse, made directly before his eyes by government officials. From this tendency of the human mind a supervisory spirit among the tax-paying electors may be evoked. In great emergencies patriotic zeal may be relied upon, but the needs of every-day life can be supplied in no other way than by thus appealing to the common and constantly active impulses of mere individual self-interest. The difficulty of inducing the citizen to pay taxes directly must be admitted. The very quality of mind which is relied upon for thus utilizing public expenditure, and consequent taxation, creates an aversion to this duty. The evil art of the politician who calls himself a statesman consists in perceiving and acting upon the absurd preference for being robbed extensively through the secret and unfelt instrumentality of duties, excises, and the like, rather than paying directly moderate exactions in the form of taxes. This weakness of the citizen forms the strength of those evil counsellors who misgovern the state. It must be corrected, or intolerable evils will ensue. In the action of Congress, of the State legislatures, and of the municipalities official extravagance has been fostered to a shocking extent by allowing these unfelt methods of raising revenue, borrowing money for long terms on the public credit being the most promi-



ment. Unless the numerous governments intertwined in the American system can be checked in this career, the system itself must ere long perish. This cannot be accomplished otherwise than by absolutely forbidding all methods of obtaining revenue or funds for outlay other than immediate taxation. The use of those other methods is the root of every avoidable governmental abuse that exists in the U. S., or that, in the nature of things, can exist in any country blessed with a democratic constitution. If taxes form the only allowed sources of expenditure, frugality will ensue, and under the shadow of frugality serious mischiefs can scarcely prevail. Though labor may ultimately sustain it, simple taxation must always be paid, in the first instance, by those who possess property. A policy which would draw directly at the moment of need, and from the pockets of this class, through the immediate agency of the tax-gatherer, the whole supply for public expenditure, would keep its members, from a regard to their own private interests, under the pressure of a constant and potent stimulus to restrain injudicious enterprises in war or peace. Such a policy would induce effective attention to the election of inexpensive legislators. It would form a double goad, prompting the constituent to vigilance on this one point in the choice of his representative, and coercing the latter to frugality. A more extensive sphere than this will never be acted on by any beneficial vigilance of the elector: the unalterable constitution of human nature forbids it.

Perhaps the class referred to will never consent to place themselves under this incitement to diligence. If so, the great North American republic should not be adopted as a model by revolutionists, for ere long, in closing its career as a democracy, it may extinguish the last hope of good government, and confirm views expressed by a philosophical historian two thousand years ago. "From the despotism," says he, "in which it naturally begins, every human society passes through a succession of governments, each more liberal than its immediate predecessor, but each in its turn decaying from internal abuses, until at last, having reached the loosest or most liberal form attainable, a refuge from intolerable evils is found by completing the circuit and returning to that arbitrary rule under which it commenced. Thus it has ever been and ever will be with human governments." This prediction may not be verified if the Americans will expunge from their fundamental law the powers which are foreign to its nature and fatal to its usefulness. The changes needed are not organic except in form; they involve no departure from any principles adopted or sanctioned by the fathers; they only remove the seeds of decay inadvertently sown by copying administrative rules from monarchical precedents. The most important of these changes has been stated; some further illustration may be proper.

The creation of public debt diminishes present drafts upon the people, as duties, excises, and the like expedients conceal them. Both, consequently, facilitate wars and needless public works. War delights inconsiderate youth by its excitements and grasping age by its tender of the most desirable investments. Thus, the greatest of evils is hailed as a blessing, and profligate expenditure for purposes civil and military made easy. If, on the contrary, every governmental outlay were immediately defrayed by the taxpayers, very different results would ensue. The most wary and influential of the citizens, instead of being tempted to foster expense, would find in the shadow of the approaching tax-gatherer a potent stimulus to labor for its prevention. The consequent diminution of government jobs would relieve from public employ the multitudes whom corrupt officials now drive to the polls as cattle to the shambles. Free trade would follow as an inevitable consequence, and the enormous patronage of the custom-house would cease, together with a multitude of connected abuses and oppressions. The rapine and favoritism displayed in taxing all others for the means to confer a bounty upon manufacturers would likewise disappear. The prevalent weakness before adverted to is exhibited in advocating a tariff reduced to the revenue standard. Obtaining revenue in this secret or unfelt method, independently of its keeping up a costly and vicious establishment, is in itself a positive evil. A sensibly felt pressure, in the form of taxation, is an indispensable provocation to that vigilance among the tax-paying electors which cannot be dispensed with. Indeed the only political evil to be apprehended from the extensive reforms suggested in this article is that the expenses of government might become so reduced that taxation to defray them would cease to be felt, and consequently cease to spur the elector to care in the choice of his representatives.

Government should possess no authority to coin its own bullion or metals, or to issue any currency of commerce or paper for circulation as money. No revenue or income should be derived from the public domain, nor should any gifts be

made therefrom, unless in limited portions and for the encouragement of actual settlers.

By means of general laws admitting of no favoritism or partiality all requisite facilities, through corporate forms or otherwise, should be afforded to individuals for conducting every description of lawful business. This should include banking, insurance, establishing roads, canals, docks, fairs, or markets, and furnishing supplies of every description, and like objects. Under this head there is the greatest room for progress in effectively applying the democratic principle, so as to prevent any needless action by the government, or the employment of its officers in any affairs that experience might show could be safely committed to individuals as a business. Regulation by general laws being sufficient for all useful ends in that connection, no power should exist to create, repeal, or alter any private corporation. Monopolies and fraudulent or extortionate rivalries in trade should be alike prohibited, as well as all power of enacting private laws. A general structural law for each kind of civil division, say counties, towns, cities, and villages, should be adopted, subject to alteration only by amendments likewise general in their application. This would at once reduce the volume of statute law, simplify its form, conduce to its intelligibility, diminish litigation, and restrain corrupt practices. Under a system of which this affords a specimen, laws might become few, simple, and easily understood. We should not behold in one single State of the Union a legislative body sitting for four months of each year, surrounded by a hired lobby, and engaged in confounding the courts and the people with two thousand pages of additional legislation, most of it hurriedly passed during the last week of the session in such confusion and disorder that the clerks, if disposed, can make alterations in bills after their passage and before their formal engrossment or authentication as laws.

The power to declare and wage war cannot be withheld, but it should be as much restricted as possible. Perhaps withholding power to borrow money is alone sufficient for this purpose. Some ingenuity might be required in framing inhibitions of other devices for the creation of public debt, but absolute prevention is not impossible, and is imperatively necessary. The power to borrow money, if it exist at all, cannot be limited or duly guarded. In a great and populous state, separated by a wide ocean from any powerful rival or enemy, armies, navies, forts, arsenals, military schools, and standing armies or navies of any description, however slight, might safely be dispensed with. Until a period quite recent, agriculture, manufactures, and commerce were degrading employments; no occupation was honorable except that of a soldier. This distinction might ere long be precisely reversed, and military service, as the adopted pursuit of a lifetime, be entirely unknown. Even before the telegraphic current had traversed the ocean the diplomatic corps was useless; it should be abolished. These alterations, besides reducing the cost of government, would leave unemployed a large amount of public property which might be judiciously applied to the reduction of existing debts. Dispensing with all preparation for public defence, and trusting for the safety of the state in every emergency to the means which might then be brought together, would not be hazardous. The history of our race affords abundant proof that in populous countries the spirit which rejoices in any opportunity to make war has always exceeded the necessity for its employment. Loyalty might imagine a danger to government from lack of power to suppress rebellion, but the policy suggested would render formidable rebellions impossible. Besides, wars are becoming disfavored even in monarchical states. The light of sound morality is penetrating even the dark jungle of hereditary domination, and creating a general repugnance to this mischief.

Little progress has been made in practically applying the democratic principle since its adoption. Few of the steps hitherto taken or as yet proposed by parties with that professed object are of a beneficial tendency. It might excusably have been imagined, though quite false in fact, that in the great exemplar of Americans, the aristocratic *quasi* republic of Great Britain, election by ballot would be a boon to the miserable mine-laborer or cottier. In free, fertile, and prosperous America it was wholly needless; its acceptance was a reproach to the poorer citizen and a scandalous acknowledgment of timidity in the rich. It opened the door to frauds innumerable. Its inutility to the dependent poor has been demonstrated. The governing faction of a city that employs in public works one-tenth of its electoral body has sent its workman to the poll in charge of a whipper-in, who, when near the ballot-box, furnished him with the favored ticket, and thence until its delivery to the official receiver watched the hand in which it had been placed. After the ballot there came, by degrees, direct election to a very great multitude of offices. This

folly has reached its climax. In New York, the greatest of the States, not one of the best-informed, most active-minded, and experienced citizens has within a quarter of a century exercised an intelligent choice in selecting the numerous ballots required at an annual election. The thing is absolutely impossible, unless submitting to the dictation of a caucus composed of politicians by trade can be deemed an intelligent act of the will and judgment. Knowledge as to the capacity or fitness of the nominees for the various stations to be filled could not exist in any instance, and consequently there could not be an enlightened choice. No people can ever sustain the burden of directly choosing numerous administrative officers. The popular voice should not be called into action except in selecting a very moderate number of officers, say the chief executive and the legislature. The fallacy of presidential electors should of course be abolished. The existing embarrassments under this head are about to be carried to the last measure of complication which perverse ingenuity is supposed to be capable of devising. The conception called cumulative voting is susceptible of being embodied in forms of innumerable variety. It demands a measure of skill, intelligence, care, and attention in the ordinary citizen which Newton or La Place could scarcely have commanded and brought into efficient action under the pressure of such disturbing influences as are necessarily attendant upon a popular election of the horde annually chosen. Indeed, the pursuits of the gambler would afford the best apprenticeship for the elector under such a system. In respect to all three of these devices, the ballot, the direct choice of administrative officers, and cumulative voting, candid and thoughtful minds can hardly differ. The tendency of each and all of them is undeniably to establish on a permanent basis the trade of politics.

The unsound conceptions which gave rise to the ballot are precisely paralleled in the recent laws limiting the hours of labor on public works. That law indicates among Americans a preparedness for servile dependence. A freeman should submit to no law on such a subject; his own voluntary contract should alone control.

Ancestral memories amongst Americans have consecrated religious liberty, and it has hitherto been maintained; but reformatory progress threatens to extinguish it by a political recognition of dogmas in Christian theology. The citizens who are not Christians, and at least one-fifth of those who are, would thus be rendered non-conformists, and might be made liable to disabilities, if not to pains and penalties, for their disloyalty to the orthodox constitution. The advocates of this measure may not be very powerful as yet, but among them are persons of high position and wide influence. This same pernicious conception may ultimately prevail in another form. The revolting sons of the early colonists were without adequate means of educating the young. Many of the race born in the city of New York during the present century attained full age without learning to read. A State school system was deemed judicious, and doubtless was so. Medicine is properly applied by charity or bounty to remove disease. This system, wherever applied, had, in its early stages, a beneficial effect. It dispelled that low grade of ignorance which was the only evil under this head demanding strong measures. But in process of time the trading politician seized upon State education, and rendered it, to a considerable extent, another foster-parent of the jobbery and electioneering abuses incident to a loose administration. It is in some places enormously expensive, a means of official patronage, and a football to be tossed to and fro in factious contentions. It seems a favorite design of many to render the education of children under State regulations compulsory upon their parents, notwithstanding that those regulations should require the use of particular religious books, and the consequent inculcation of theological opinions which may be disbelieved by the latter and not sought by the former. This would be a plain infraction of religious liberty. Religion can exist only as a conviction deeply seated in the individual mind, and it is believed to be essential in forming good citizens; yet from the variety of its forms non-interference with it by government is a fixed democratic dogma. Theoretically, there seems an inconsistency in these propositions, but practically they are found to harmonize. Religious convictions bring into full action the voluntary principle, and divine worship is nowhere more amply provided for than in the U.S. The differences of opinion constituting what is called sectarianism, apart from which religion is unknown, form the precise objection to governmental interference with religious worship hitherto relied upon. The education of youth in a method which should studiously exclude religious, or what, as has been seen, is the same thing, sectarian ideas, would be pernicious, as tending necessarily to form bad citizens. This would seem to show conclusively that in the present advanced state of

American social life education of the young, like religious worship for the mature, should be left to the voluntary principle. To perfect the policy which from the first forbade governments to interfere with the latter, they should now be commanded to withdraw from control of the former. Religious thought or observance and charitable ministration, of which gratuitous teaching forms a part, embody a circle of duties too pure for the mere statesman's touch. His assumed aid to either if it do not begin in actual obstruction is sure to end there.

There is room for the introduction of many real reforms. Short terms and frequent elections are no doubt necessary as to the chief executive and the legislative bodies. Due responsibility to the real sovereignty—i. e. the people—cannot otherwise be maintained; but as to all other officers removals should be for cause only—that is to say, fault or incapacity. Rotation in respect to public agents of any kind is a mistake in doctrine. Faithful service and proved capacity are singular grounds of disqualification. It must be admitted, however, that no absolute right of the citizen is invaded by introducing certain limits to eligibility; and expediency may require it in respect to one office. Indeed, it can hardly be doubted that a long quarantine should be required between exercising military command and aspiring to the chief magistracy.

To guard against fraud, registry laws are expedient in densely-peopled districts. A considerable period should elapse between the registry and the vote, without allowing exceptions on account of intermediate changes in residence. The more fixed and permanent the elector's habits, the better his duties will be performed. No public interest is subserved by a multitudinous or floating constituency; it is enough if the electoral body be sufficiently large to secure efficient supervision in the choice of representatives. It would be expedient to exclude from the elective franchise all officers and employes receiving pay from the public. Vast benefits would result from this measure, and also from denouncing severe penalties against compelling this class to contribute towards the expense of elections.

The Federal government was designed as an organ of limited powers, yet it has exhibited ample capacity to crush or modify at will not only State institutions, but the States themselves. Practically considered, the latter exist merely by sufferance, holding, as it respects the essentials of political power, no higher relation to the central authority than towns or counties do to the States in which they are situated. As bulwarks of liberty or constitutional rights they are nearly if not entirely powerless. But while thus superannuated and rendered ineffectual for the high purposes of the founders, they exercise a power which tends to serious mischiefs. Through their conflicting legislation, enforced by independent judiciaries, they may ultimately derange the laws concerning trade, contracts, and some other subjects of general concern. By the identity of their language, moral ideas, and social habits, and by their essential proximity effected through railroads and telegraphs, Americans have become commercially and socially one nation. Conflicting laws and a jarring jurisprudence amongst them should be prevented, if prevention be practicable. A court of ultimate appeal, as well from the State as from the Federal tribunals, composed of judges selected by the States, and neither subject to official interference nor possessing coercive machinery of its own, might preserve this desirable unity of jurisprudence throughout the whole country, and might also defend the autonomy of the States. Of course there should be no power to forbid, defeat, or trammel appeals to its justice by increasing its numbers or by any device whatever. The want of such an institution has been keenly felt by the confederate cantons of Switzerland. A precedent may be found in that modern tribunal at Lübeck which reviewed the judicial action of four perfectly independent republics. Probably the Amphictyonic Council of ancient times had its origin in similar objects.

The course of reform suggested would eventually mature the democratic system by securing to all citizens the utmost measure of freedom, affording material progress every aid to its most perfect development which an equal and impartial government can bestow, and terminating official misrule. Its aim is to break the sceptre of the trading politician, and thus, at last, to establish liberty on the only reliable basis—a popular censorship on democratic principles, perpetually stimulated to its duty by the simple operation of intelligent self-interest. CHARLES O'CONNOR.

**Democ'rates** (*Δημοκράτης*), a supposed Pythagorean philosopher (of whose personal life no notice has come down to us) under whose name a collection of moral sayings called the "Golden Maxims" (*γνώμαι χρυσαί*) has come down to our time. These are written in the Ionic dialect, and are remarkable for their simple and correct character, which highly recommends them even to a modern reader. The author is otherwise unknown, and the age of the col-

lection is not determined. They are printed along with the collection of DEMOPHILUS (which see).

HENRY DRISLER.

**Democrates**, an Attic orator of the time of Demosthenes, was an opponent of the Macedonian party. He is mentioned in the Decrees in the oration of Demosthenes, "De Corona," as serving with Demosthenes on two embassies—the one to Philip to receive the oaths, the other to the Thebans to enlist them on the side of Athens against Philip.

HENRY DRISLER.

**Democritus** [Gr. Δημόκριτος], a celebrated and profound Greek philosopher, born at Abdera, in Thrace, about 460, or, some say, 469 B. C. He is supposed to have been a disciple of Leucippus, and to have received lessons from some Chaldean magi. He inherited, it is said, from his father, a fortune of one hundred talents. In early life he travelled in pursuit of knowledge in Egypt, Greece, Persia, and India, and continued his travels until he had spent nearly all his patrimony. Having returned to Abdera, he declined political honors and employment, preferring to pass his life in study and retirement. He had a high reputation for virtue as well as learning. He appears to have been versed in geometry, physics, natural history, and ethics, on which subjects he wrote numerous works, but none of them are now extant. According to the later biographers he was called the "laughing philosopher," from his habit of laughing at the follies of mankind. He was a man of noble, pure, and diligent life. It appears that he admitted the existence of law in nature, but not that of design. He died 357 B. C. His system of philosophy is known as the atomic system. He taught that matter is eternal, and that the universe is composed of empty space and indivisible atoms which are infinite in number. To these atoms he attributes a primary motion, which brings them into contact and forms innumerable combinations, the result of which is seen in the multifarious productions and phenomena of nature. He imagined that the soul or thought is produced by the motion of round fiery atoms. Many of his ideas and theories were adopted by Epicurus, and explained by Lucretius in his poem "De Rerum Naturâ." Of his works only the smallest fragments have been preserved. (See G. H. LEWES, "Biographical History of Philosophy;" RITTER, "History of Philosophy.")

**Democritus** (Δημόκριτος), a statuary of Sicily (whence his name appears also in the Doric form Damocritus), flourished B. C. 380. Pliny says that he made statues of several philosophers, and Pausanias assigns to him statues of victors in the games.

HENRY DRISLER.

**Demodocus** (Δημόδοκος), the celebrated bard of the Phæacians, who is represented in the "Odyssey" as singing at the banquet of Alcinoüs the battles and the fate of the Greeks who went to Troy, with the conquest and destruction of that city, and also the loves of Mars and Venus. Later writers, who regarded him as an historical personage, represent him as an old and blind musician and poet of Coreyra, who composed a poem on the destruction of Troy (Ἰλίου ἄλωσις), and another on the loves of Mars and Venus.

HENRY DRISLER.

**Demogorgon** [from the Gr. δαίμων, a "divinity," and γοργός, "terrible"], a dreadful and mysterious being alluded to by some of the later classical writers, and by Boccaccio, Ariosto, Spenser, Milton, Shelley, and others. In Shelley's "Prometheus Unbound" he is the conqueror of Jupiter. The ancients dreaded the very mention of his name.

**Demoiselle** [a French word signifying "young lady"], the name of a genus of birds (*Anthropoidea*) belonging to the family Gruidæ, remarkable for their grace and symmetry of form. (See CRANE.) None of them occur in North America.

**Demoivre** (ABRAHAM), mathematician, b. at Vitry, France, May 26, 1667, became a member of the Royal Society of London, and afterward of Academies of Berlin and Paris; wrote "Doctrine of Chances, or Method of Calculating the Probability of Events at Play," etc. D. Nov. 27, 1754.

**De'mon, or Dæ'mon** [Gr. δαίμων or δαιμόνιον; Lat. *dæmon*], a term of Greek origin, used in classical writers primarily for the Supreme Divinity, sometimes as a synonym for θεός, a "god;" and later more especially as a tutelary or guardian divinity which was supposed to attend upon men. Thus, Socrates is commonly said to have been attended by a beneficent dæmon. It may well be doubted, however, whether such an idea is justified by the language of Xenophon (see "Memorabilia," I., 2 *et seq.*) or Plato ("Apol. Socr."). Socrates appears to have meant simply that a divine influence or intimation of some kind within him, a sign or voice (σημείον, φωνή, in Plato), controlled his actions. (See SOCRATES.) According to Plato, "Every dæ-

mon is a middle being between God and man." "Intercourse between gods and men is carried on by dæmons." He further says, "The poets speak excellently when they say that when good men die . . . they become dæmons." These ideas were greatly amplified by the Neo-Platonists, who divided the dæmons into good and bad. The dread of evil dæmons became so great that in time the word came to be almost always used in a bad sense. In the Greek New Testament evil spirits are often called dæmons (δαίμονα, commonly translated "devils"), and Beelzebub is spoken of as the prince of dæmons (ὁ ἀρχὼν τῶν δαιμονίων).

**Demon** (Δήμων), a Greek writer, author of an "Atthis," or "History of Attica," flourished about 280 B. C. His writings were regarded as of no great authority. He is also the author, according to Schneidewin and Müller, of a work on proverbs (περὶ παροιμιῶν). Of both these works some fragments still exist. Those of the proverbs have been inserted in the "Paræmigraphi Græci" of Schneidewin and Leutsch, and all the extant remains have been collected by Siebelis, "Phanodemi, Demonis, etc. Ἀνθίστων Fragm.," Leipsic, 1802, and by Müller, "Hist. Græc. Fragm.," vol. I., pp. 378-383.

HENRY DRISLER.

**Demonax** [Δημόναξ], a celebrated Cynic philosopher who lived and taught at Athens in the second century A. D. His claim to distinction, however, is not so much that of a teacher of philosophy as of a model Cynic, and in this character he is depicted in Lucian's treatise called after his name. Though a native of Cyprus, he passed most of his life in Athens, where he was greatly honored while living, and when dead he was buried by the public with great magnificence. An outline of his doctrines will be found in RITTER's "History of Philosophy" (English translation), vol. iv., p. 169, and several of his apothegms are given in ORELLI's "Opuscula Græc. vet. Sententiosa," vol. ii., pp. 144 *seq.*

HENRY DRISLER.

**Demoniac** [Gr. δαιμονιάζόμενος; Lat. *dæmoniācus*], a person possessed of or controlled by evil spirits. The New Testament abounds in narratives of demoniacal possession, and various opinions are entertained in regard to the character of this affliction.

**Demonology** [from the Gr. δαίμων, a "dæmon," and λόγος, a "treatise"], a treatise upon evil spirits; also the doctrine or science treating of the nature or character of evil spirits. Many works have been written on this subject. One of the most popular is Sir Walter Scott's "Lectures on Demonology and Witchcraft."

**Demonstration** [Lat. *demonstratio*, from *de*, intensive, and *monstro*, *monstratum*, to "show"], in mathematics, is an indubitable proof of a proposition. The term was used by old writers to signify any manner of showing either the connection of a conclusion with its premises or that of a phenomenon with its asserted cause; but it now signifies in philosophical language only that process by which a result is shown to be a necessary consequence of the premises from which it is asserted to follow.

**DEMONSTRATION**, in military operations, is a movement or manœuvre, the chief object of which is to deceive the enemy, and to induce him to divide his force or divert his attention from the real point of attack.

**DEMONSTRATION**, in common language or in every-day speech, signifies an exhibition or display, generally of an oppositional character; and very often the word is applied in such a manner as to involve a slight censure or disapprobation.

**Demoph'ilius** [Δημόφιλος], a philosopher of the new Pythagorean school, whose age is not certainly known. He was the author of a work entitled βίου θεραπεία, from which there is still extant a collection of moral precepts entitled γνωμικά δαιμόνια, which are edited, along with the "Golden Maxims" of Democrates, by SCHIER, Leipsic, 1754, and which are printed also in ORELLI's "Opuscula Græco. vet. Sententiosa," vol. i., p. 1 *seq.* HENRY DRISLER.

**Demoph'oön, or Dem'ophon** [Δημοφῶν, or Δημοφών], in Grecian mythology, a king of Athens, son of Theseus and Phædra, who is said to have accompanied the Greeks on their expedition against Troy, whence he rescued his grandmother Æthra. When Diomed, on his return from Troy with his Argives, ran in by night to the coast of Attica, and began to plunder it, Demophon attacked him and carried off the Palladium. Demophon is said also to have assisted the Heraclidæ against Eurystheus, who was slain in the battle that took place, and to have received Orestes when, after his mother's murder, he sought refuge at Athens.

HENRY DRISLER.

**Demop'olis**, Marengo co., Ala. (see map of Alabama, ref. 5-B, for location of county), on R. R. and the Tombigbee River just below the mouth of the Black Warrior. It has a cotton and woollen factory and an active trade in cotton. Pop. in 1870, 1539; in 1880, 1389.

**De Mor'gan** (Augustus), an English mathematician, born in the isle of Madura, near Java, in June, 1806, was educated at Cambridge. He was for many years professor of mathematics in University College, London. He wrote numerous works, among which are "Elements of Algebra" (1835), an "Essay on Probabilities" (1838), and "Formal Logic, or the Calculus of Inference, Necessary and Probable" (1847), and contributed largely to the "Penny Cyclopædia." Died Mar. 18, 1871.

**De'mos** [Gr. δῆμος, the "people"], the name given to the smaller divisions of the Attic tribes, somewhat similar to the townships into which counties are divided. When Clisthenes broke up the four old Attic tribes into ten new ones, Herodotus states that he subdivided these into 100 demes, but as there is no other authority for such statement, and the number of demes was actually 173 or 174, different explanations have been attempted of the passage in Herodotus. The demes were local divisions, in the registers of which the citizens had to enrol their names for political and other purposes. These demes were named sometimes after places, sometimes after persons, and those of the same tribe were not always adjacent, but might be in quite different parts of Attica. They had each its own presiding officer (δημαρχος), treasurer, and other officers, and its own assembly, in which the business of the deme was transacted. Lists of the names of the demes under their proper tribes are given by K. F. HERMANN, "Griech. Alterth., Anhang iv., by LEAKE, in his "Demes of Attica," and by MÜLLER, "Hist. Græc. Fragm.," vol. ii., pp. 357-359.

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**Demos'thenes** [Gr. Δημοσθένης], the most eminent orator of antiquity, and probably the greatest of whom history gives any account, was born in Attica, in the demes of Pæania, near Athens, about 382, or, according to some authorities, in 385 B. C. His father (also named Demosthenes) was a cutler and maker of furniture. He died when his son was seven years of age, leaving fifteen talents (more than \$15,000) to be divided between the young Demosthenes and his sister. The guardians converted a large part of this money to their own use. Demosthenes studied rhetoric with Isæus, and philosophy, according to some authorities, with Plato. Cicero states that he was instructed in oratory by Isocrates, but the fact is not established. Demosthenes, when about eighteen years old, prosecuted his guardians, pleading his own cause, but though the case was decided in his favor, he received only a part of his dues. Before this time it is said that he had resolved to devote his whole attention to oratory, from witnessing the forensic triumphs of Callistratus. But his health was feeble, his manners ungraceful, his breath short, and voice stammering and indistinct. In order to remedy these defects we are told that he adopted the practice of speaking with pebbles in his mouth; that he was wont to declaim upon the sea-shore, so as to be able to be heard in the tumult of popular assemblies; and that he often practised before a mirror, so as to observe and rectify any awkwardness of gesture. Nevertheless, his first appearance before a popular assembly was, according to Plutarch, a failure, exciting only the laughter of the multitude. But encouraged by Satyrus, an actor, who gave him useful instruction, he devoted himself with the utmost diligence to his task. We are told that he shaved one side of his head, that it might be absolutely impossible for him to go into society. He made the writings of Thucydides his model for style, and it is said that he transcribed the writings of that historian no less than eight times. In 355 B. C. he delivered his oration against Leptines, with complete success. Soon after this he entered upon his great though unsuccessful life-work, the defence of Grecian liberty against the designs of Philip of Macedon. Between the years 352 and 340 B. C. he pronounced eleven or perhaps twelve orations against Philip. Four of these are especially denominated "Philipics." He took part in 338 B. C. in the disastrous battle of Chæronea. It having been proposed by Ctesiphon that the Athenian state should bestow upon Demosthenes a golden crown as reward for his services, there followed a contest of several years with his rival Æschines, which was triumphantly closed in 330 B. C. by the delivery of Demosthenes' celebrated oration "On the Crown," which is generally regarded as his finest effort. Demosthenes was afterwards accused of having received a bribe from the Macedonians, and though, in the opinion of the best historians, the accusation was entirely unjust, he was sentenced to pay a heavy fine, and left the country. He returned after the death of Alexander, but having been condemned to death by Antipater, he took poison and died in 322 B. C. Sixty extant orations and many fragments are ascribed to Demosthenes, but several of these are regarded as spurious.

Demosthenes appears to have been extremely averse to extemporaneous speaking, although we are told that his

unpremeditated speeches were superior to his more elaborate efforts. The success of his oratory was due in a very great degree to the steadfastness with which he kept the attention of his hearers riveted on the one great object in view. Nothing superfluous, nothing which did not contribute to that object, was admitted into his discourse. "He uses language," says Fénelon, "as a modest man uses his dress—simply to cover him. We think not of his words; we think only of the things which he says. He lightens, he thunders, he is a torrent which sweeps everything before it. We can neither criticise nor admire, because we have not the command of our own faculties." "His style," observes Hume, "is rapid harmony exactly adjusted to the sense; it is vehement reasoning without any appearance of art; it is disdain, anger, boldness, freedom, involved in a continued stream of argument; and of all human productions his orations present the models which approach the nearest to perfection." "Such was the first of orators," says Lord Brougham: "at the head of all the mighty masters of speech, the adoration of ages has consecrated his place, and the loss of the noble instrument [the Greek language] with which he forged and launched his thunders is sure to maintain it unapproachable for ever." (See GROTE, "History of Greece," vol. xi., ch. lxxxvii.; THIRLWALL, "History of Greece," BROUGHAM, "Dissertation on the Eloquence of the Ancients;" SCHÄFER, "Demosthenes und seine Zeit," 3 vols., 1856-58.) One of the best editions of his works is that of W. Dindorf, with copious notes and the Greek scholia, Oxford, 1846-51, 9 vols. 8vo. REVISED BY J. THOMAS.

**Demos'thenes**, an Athenian general who acted a prominent part in the Peloponnesian war. He and Eurymedon jointly commanded an army sent in 413 B. C. to reinforce Nicias at Syracuse. After the Athenians had been defeated he surrendered, and was put to death by the victors in 413 B. C.

**Demot'ica** (anc. *Didymotichos*), a town of European Turkey, in Room-Elee, on the river Maritza, 25 miles S. of Adrianople. It is defended by a citadel or castle, and has several Greek churches; also manufactures of silk and woolen goods and pottery. Here Charles XII. of Sweden lived as a prisoner about 1712. Pop. about 8000.

**Demotic Characters.** See ENCHORIAL WRITING.

**Dempster, Dak.** See APPENDIX.

**Demp'ster** (JOHN), D. D., an eminent Methodist preacher, born at Florida, N. Y., Jan. 2, 1794, was the son of the Rev. James Dempster, a Scottish Presbyterian, who had been a Wesleyan preacher. The younger Dempster entered the itinerant ministry in 1816, and became a master of pulpit oratory. From 1836 to 1841 he was a missionary in Buenos Ayres. From 1845 to 1863 he was a professor in the biblical institutes at Newbury, Vt., Concord, N. H., and Evanston, Ill. The success of these schools was largely owing to his energetic labors. Died at Chicago Nov. 28, 1863. (See STEVENS, "History of the Methodist Episcopal Church," vol. iii.)

**Dempster** (THOMAS), a learned Scottish writer, born at Muirsk Aug. 23, 1579. He studied at Cambridge, went to France to finish his education, and became regent of a college in Paris. He had a quarrelsome temper, which involved him in violent brawls. He was afterwards professor at Pisa and Bologna. He wrote "Historia Gentis Scotorum," reprinted in 1829. Died at Bologna Sept. 6, 1625.

**Demul'cent** [Lat. *demulcens*, present participle of *demulceo*, to "soothe," to "soften"], a name applied to medicines of a mucilaginous or oily consistency, such as starch, gum, etc., which are given for the purpose of soothing irritation of the mucous membrane and promoting the increase of the secretions. They are also used as poultices, etc.

**Demur'rage**, in mercantile law, is an allowance made to the master or owners of a ship by the merchant or freighter when he detains the ship in port beyond the time specified in the charter-party. It is usually stipulated in the charter-party or agreement that if delay occurs in loading or unloading the vessel, the merchant who charts and freights her shall pay a certain sum per diem for the extra time. The rule is, that during the loading and unloading the merchant runs all the risk of interruptions, even from necessary and accidental causes. But no demurrage can be claimed for the delay caused by the detention of a ship by a public enemy, or for delay caused by the fault of the master, owners, or crew. The word *demurrage* is also employed to mean the delay itself.

**Demur'rer**, in law, is a suspension of action in a cause until the determination of some point by the court. In a pleading in equity, as well as at law, it raises a question as to the sufficiency in law of the case as stated by the opposite party. There may also be a demurrer to evidence, on

the ground that the testimony offered by a party in a cause is insufficient to maintain or overthrow the issue.

**Denain**, a town of France, department of Nord, on the Scheldt, and on a railway, 5 miles W. of Valenciennes. It is in an extensive coal-field, and has iron-works and manufactures of beet-root sugar. Pop. 17,202.

**Dena'rius** [a Lat. term, from *deni*, "ten"], a Roman silver coin, originally equal to ten asses, was first coined 269 B. C. Its weight varied at different periods, and its value was afterwards equivalent to sixteen asses, or about 8d. of English money.

**Den'high**, a county of North Wales, bounded on the N. by the Irish Sea and on the W. by the river Conway. Area, 603 square miles. The surface is mostly rugged and mountainous, but fertile and beautiful valleys occur. Coal, copper, iron, lead, limestone, and slate are found in this county. The chief towns are Denbigh, Wrexham, Abergele, Llangollen, and Ruthin. Pop. in 1881, 108,931.

**Denbigh**, a town of Wales, the capital of the above county, is in the Vale of Clwyd, 22 miles W. of Chester. It stands on the sides and at the base of a steep limestone hill, crowned by the imposing ruins of a castle built in 1284, and has many handsome antique houses, an old parish church, an ancient chapel, etc. Pop. in 1881, 6491.

**Denbigh**, EARLS OF (1622), Viscounts and Barons Fielding (1620), Barons St. Liz (England, 1664), earls of Desmond (1622), Viscounts Callan and Barons Fielding (Ireland, 1619).—RUDOLPH WILLIAM BASIL FIELDING, eighth earl, M. A., born April 9, 1823, succeeded his father June 25, 1865.

**Den'derah** (anc. *Tentyra*, probably taken from *Tei n Athor*, "abode of Athor"), a town of Upper Egypt, near the left bank of the Nile, in lat. 26° 13' N., lon. 32° 40' E., and opposite Kenh. Here are the ruins of a celebrated temple, one of the most imposing and best-preserved of the ancient monuments of Egypt. It is 220 feet long, and has a portico supported by twenty-four columns. The columns and wall are covered with carved figures and hieroglyphics. On the ceiling of the portico of this temple is one of the famous zodiacs discovered by the French in 1799. On the exterior wall are figures of Cleopatra and her son, probably meant for portraits.

**Dendermon'de**, or **Termon'de**, a fortified town of Belgium, in East Flanders, is at the confluence of the Dender and the Scheldt, and on the railway from Mechlin to Ostend, 16 miles E. of Ghent. It has a town-house, and a very old church called Notre Dame; also manufactures of lace, cotton yarn, and woollen goods. Pop. 8300.

**Den'drite** [perhaps a corruption of *dendrolite*, from the Gr. *δένδρον*, a "tree," and *λίθος*, a "stone"], the name of a peculiar mineral, containing internally, or having its surface covered with, filamentary forms resembling moss, ferns, trees, etc. Moss agate and Mocha stone are examples.

**Dendro'bium** [from *δένδρον*, a "tree," and *βίωω*, to "live," so called because they live on trees], a genus of epiphytic orchids, mostly natives of the tropical parts of Asia and Australia. They have flowers of great beauty and fragrance, sometimes also remarkable for grotesqueness of form.

**Den'drolites** [from the Gr. *δένδρον*, a "tree," and *λίθος*, a "stone"], the name given to petrifications found in secondary and coal formations. They consist of plants and fragments of trees, having, generally, nothing in common with those now growing in the same regions. They are mostly eyecads, tree-ferns, conifers, etc.

**Den'drophis** [from the Gr. *δένδρον*, a "tree," and *ὄφις*, a "serpent"], a genus of serpents belonging to the Colubridæ. They are distinguished for their brilliant colors and very slender forms, live among branches of trees, feed upon insects, and have large and prominent eyes. They are natives of the warm parts of Asia, America, etc., none being found in Europe.

**Dengue**, \* *deng'gá*, a disease known by the names of *dunga*, *dandy*, *breakbone fever*, etc., an epidemic, seldom fatal, which has prevailed at different times in the southern parts of the U. S. and in the East and West Indies. Its symptoms are headache, fever, pain and swelling of the smaller joints, an eruption of the skin, and gouty pains which often cause lameness for a considerable time. It appears to be of a rheumatic character.

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**Den'ham** (Col. Dixon), an English traveller, born in London Jan. 1, 1786. He accompanied Clapperton and Oudney on an expedition to Timbuctoo in 1821. They pro-

ceeded to Kooka on Lake Tchad in 1823, and there Denham parted from his companions. He afterwards visited Mandara, and returned to England in June, 1825. He published a narrative of his journey. Having been appointed vice-governor of Sierra Leone, he died there May 9, 1828.

**Denham** (Sir JOHN), an English poet, born in Dublin in 1615. He graduated at Trinity College, Cambridge, in 1634, and studied law. He wrote "Sophy" (1641), a tragedy, and a poem entitled "Cooper's Hill" (1643). He was a royalist in the civil war, and fled to France in 1648, but returned in 1652. Died Mar. 10, 1668. "Denham," says Dr. Johnson, "is deservedly considered as one of the fathers of English poetry."

**Deni'na** (GIACOMMARIA CARLO), an Italian historian, born at Revello, in Piedmont, Feb. 28, 1731. He published "The Vicissitudes of Literature" ("Vicende della Letteratura," 1760). His principal work is a "History of the Revolutions of Italy" ("Istoria delle Rivoluzioni d'Italia," 3 vols., 1769-70). Having been invited by Frederick the Great, he removed to Berlin in 1782. In 1804 he was appointed by Napoleon imperial librarian at Paris. Among his works is a "History of Western Italy" (1809). Died in Paris Dec. 5, 1813. (See CARLO G. REINA, "Vita di C. Denina," 1820.)

**Deni'o** (HIRAM), an American jurist, born in Rome, N. Y., May 21, 1799, began the practice of law in 1821, was circuit judge (1834-38), judge of the court of appeals (1853-66), and author of several important legal works. Died at Utica, N. Y., Nov. 5, 1871.

**Denis** (JAMES FERDINAND), a French traveller, born Aug. 13, 1798, has published multitudinous books, the fruits of journeys in South America, Spain, and the East.

**Denis**, SAINT [Lat. *Dionysius*], the patron saint of France and first bishop of Paris. According to Gregory of Tours (540-594 A. D.), he was one of seven missionaries sent from Rome about 250 A. D. to preach the gospel to the Gauls, and after he had converted great multitudes suffered martyrdom probably in 272 under Valerian. His festival is on Oct. 9. The identity of Saint Denis and Dionysius the Areopagite was for a long time claimed and accepted in France as an article of creed, and the fable, first doubted by Abelard, was not exploded until the seventeenth century.

**Denison**, capital of Crawford co., Ia. (see map of Iowa, ref. 5-D, for location of county), on R. R. and Boyer River, 64 miles N. N. E. of Council Bluffs. Pop. in 1870, 326; in 1880, 1441.

**Denison** (REV. CHARLES WHEELER), born in New London co., Conn., in 1809, has been a large contributor to periodical literature, and has published a volume of poems, several works of fiction, etc. He was an early abolitionist and a temperance writer, and was editorially connected with the "Emancipator" and the "Olive Branch," both in their time widely-known journals. He has resided in England, and was for a time an editor in London. He has been a U. S. consul in British Guiana, and wrote a popular life of Gen. U. S. Grant.

**Denison** (JOHN EVELYN), LORD OSSINGTON, an English statesman, born in 1800, was elected a member of Parliament in 1823, and acted with the Liberal party. He was chosen Speaker of the House of Commons in 1857, in 1859, in 1866, and in 1868, and became Viscount Ossington in 1872. Died Mar. 8, 1873.

**Denison** (MARY ANDREWS), wife of Rev. C. W. Denison, was born in 1826 in Cambridge, Mass. She is the author of numerous works, chiefly tales of a domestic character and designed for the young. These books have been quite successful.

**Denison City**, R. R. junction, Grayson co., Tex. (see map of Texas, ref. 2-I, for location of county), 275 miles S. of Parsons City, Kan. Pop. in 1880, 3975.

**Denison University**, formerly GRANVILLE COLLEGE, at Granville, Licking co., O., was established and located at Granville by a vote of the Ohio Baptist Education Society May, 1831. It was at first intended for a manual-labor school, and hence located on a 200-acre farm, a mile and a half W. of the town. As a manual-labor school it was, like most others of the time, a failure—as a school of instruction, a success. It was incorporated by the Ohio legislature Feb. 3, 1832, under the name of the "Granville Literary and Theological Institution." The name was changed in 1845 to "Granville College," and this again under the general law of Ohio was changed, June, 1856, to the name it now bears. Instruction was commenced in Dec., 1831, the principal and sole teacher being Prof. John Pratt, who brought to the position the reputation of an enthusiastic and accomplished teacher, and fully sustained it.

\* *Dengue* is the Spanish for "dandy" or "fop," and is applied to this disease on account of the remarkable stiffness of the patient's motions.



It had alternations of prosperity and decline. The buildings are four, containing dormitories and study-rooms for 178 students, besides a fine chapel, natural history room, two society halls and libraries, college library (with over 14,000 volumes), lecture-rooms, recitation-rooms, etc. The fourth building is for the library, and is called Doane Hall. It was the gift of W. H. Doane, Esq., of Cincinnati, and was completed in 1879.

The university is a proper college, furnishing the regular four years' course in classical, scientific, and philosophical studies, similar to the best American colleges; embracing also, under the same government, a preparatory department, classical, with a three years' course as a feeder to the regular course, and English, to fit for business, school-teaching, or the scientific course. The philosophical course embraces the studies of the classical, except the Greek, and a portion of the Latin; for these, modern languages are substituted. Those who complete this course receive the degree of B. Ph. The scientific embraces most of the studies of the regular college course, except the Latin and Greek languages, but in the mathematics and the natural sciences it is more extensive. Those who complete this course are entitled to a diploma and the degree of bachelor of sciences.

The board of instruction, as now constituted, consists of eight professors (including the president), one principal of the preparatory department, and two tutors—eleven in all; and all the eleven fully employed in the business of instruction. There have been seven presidents. The name and time of entering upon office of each are as follows: Rev. John Pratt, A. M., 1831; Rev. Jonathan Going, D. D., 1837; Rev. Silas Bailey, D. D., 1847; Rev. Jeremiah Hall, D. D., 1853; Rev. Samson Talbot, D. D., 1863. Dr. Going died in Nov., 1844, after which there was a vacancy of over two years. Dr. Talbot died June 29, 1873; his successor was Rev. E. Benjamin Andrews, A. M., who entered upon the office in 1875. Rev. Alfred Owen, D. D., the present incumbent, was elected in 1879. The fixed property of the university, in ground, buildings, etc., is estimated at \$100,000, and the productive endowment is \$308,000, making a total of \$408,000. J. STEVENS.

**Den'izen** [etymology doubtful], in English law, an alien who has received from the sovereign letters patent to make him an English subject. He may take lands by purchase and devise, but cannot inherit nor enjoy offices of trust or receive a grant of land from the Crown.

**Deniz'li**, or **Degnizli**, a town of Asia Minor, in Anatolia, 53 miles S. E. of Alashehr. It is surrounded by mountains or hills, and has a castle and several mosques. Leather is made here. It is stated that 12,000 of its inhabitants were killed by an earthquake in 1715. Pop. about 20,000.

**Den'man** (THOMAS), FIRST LORD DENMAN, an English judge, born in London Feb. 23, 1779. He was called to the bar in 1806, and elected to Parliament in 1818. In politics he was a liberal. He became attorney-general in 1830, and chief-justice of the king's bench in 1832. In 1834 he was raised to the peerage. Died Sept. 22, 1854.

**Den'mark**, a kingdom of Northern Europe, consists of the peninsula of Jutland and several adjacent islands of the Baltic Sea—viz. Seeland, Fünen, Falster, Laaland, Samsøe, Bornholm, Langeland, and Møen. Area, 14,753 square miles. Pop. in 1880, 1,969,039. Besides Denmark proper, the Danish monarchy possesses Greenland, Iceland, the Färöe Islands, and the West India islands of Santa Cruz, St. Thomas, and St. John. Area of the colonies, 87,258 square miles. Pop. in 1880, 127,422. Jutland is bounded on the N. by the Skager-Rack, on the E. by the Cattegat, and on the W. by the North Sea. Its surface is low and level, the highest elevation, Himmelbjerget (the "Mountain of Heaven"), being only 565 feet, and was formerly covered by forests of beech, birch, oak, etc. The eastern coasts are indented with numerous bays or *fjords*, while the western are lined with a double row of sand-banks, behind which extensive marshes occur in various parts. Denmark has no considerable river. Seeland is separated from Sweden by the Sound, and from the island of Fünen by a channel called the Great Belt.

**Climate, Soil, etc.**—The climate is humid, and is modified by the proximity of the sea, so that the winter is milder than that of Northern Germany. The mean annual temperature is about 46° F. The weather is changeable, but the transition from winter to summer is slower than in most other countries. In spring and summer the W. wind prevails. The soil is generally productive, either alluvial or sandy. The marshy districts produce good pasture. Denmark is pre-eminently an agricultural country. The staple productions are barley, oats, wheat, rye, buckwheat, potatoes, beans, peas, and flax. The Danish farmers, however, derive a large part of their revenue from cattle, horses,

and the products of the dairy. The chief articles of export are cereal grains, butter, horses, hides, and fish. The fjords abound in cod, herring, and other fish. As Denmark has no coal, nor any other mineral resources, its manufacturing industry is comparatively unimportant. There are, however, in the kingdom numerous iron-foundries, sugar-refineries, paper-mills, and distilleries, and Danish furniture, porcelain, gloves, articles of horn, bone and ivory, etc., are celebrated.

**Commerce, Revenue, etc.**—The commerce of Denmark is carried on mainly with Great Britain, Germany, and Sweden. The total value of imports amounted in 1880 to 227,386,000 kroner (\$0,428,000 kroner from Germany, 53,061,000 kroner from England); that of the exports amounted to 196,557,000 kroner (66,528,000 kroner to Germany, 75,994,000 kroner to England). The principal articles of export to England are butter and live animals. The value of the butter export was £767,190 in 1870, £1,347,791 in 1877, and £1,691,894 in 1881. The value of the export of live animals amounted in 1881 to £1,409,372 (£686,247 for oxen and bulls, £472,055 for cows and calves, £193,946 for sheep and hogs, and £20,055 for horses). The principal articles of import from England are cotton manufactures (£399,918 in 1881), coal (£382,740), and iron (£207,022). On Jan. 1, 1881, the commercial fleet of Denmark consisted of 3218 vessels, of an aggregate burden of 255,539 tons, of which 202, of 51,984 tons' burden, were steamers. From 1878 to 1881 the number of sailing-vessels decreased from 3041 (of 213,201 tons) to 3016 (of 203,555 tons), while that of the steamers increased from 188 (of 45,124 tons) to 202 (of 51,984 tons). On Jan. 1, 1881, there were 1105 miles of railway and 2206 miles of telegraph lines in operation, of which, respectively, 932 and 1967 miles belonged to the state. In 1881 the revenue of the state amounted to 51,745,463 kroner, the expenditure to 47,543,367 kroner, and the public debt to 201,664,700 kroner, of which, however, only £700,000 is foreign debt. The army consists of 35,293 regulars and 13,718 reserve, and costs 9,004,309 kroner a year; the navy consists of 41 steamers, of which 10 are armor-clad ships, and costs 5,732,585 kroner a year.

**Religion and Education.**—The established religion is Lutheran, to which 99 per cent. of the population belong, and the king must be a member of the Lutheran Church. According to the census of 1880, there were only 17,678 persons in the country, or less than one per cent. of the population, not belonging to the Lutheran Church. Other sects are tolerated. The kingdom has a good system of education, which is generally diffused among the people. All children between the ages of seven and fourteen are compelled to attend school. Education is given gratuitously in the public schools to children whose parents are too poor to pay for it. Of higher schools, Denmark has a good university at Copenhagen, several academies, twenty-two gymnasia, and seven normal schools. The number of parochial schools is 2940—namely, 28 in Copenhagen, 132 in the other towns, and 2780 in the rural districts.

**Government.**—The government is a hereditary constitutional monarchy. The present constitution is embodied in the charter of June 5, 1849, according to which the executive power belongs to the king, and the legislative power is vested in the king and diet (*Rigsdag*) jointly. The *Rigsdag* is composed of two houses, called the Landsting and the Folkething. The latter, which is the lower house, consists of about one hundred members, elected by universal suffrage for a term of three years. The *Rigsdag* must meet every year on the first Monday of October. All money-bills must in the first instance be submitted by the government to the Folkething. Besides its legislative functions, the Landsting has the duty of appointing from its midst the assistant judges of the Rigsret, which forms the tribunal before which parliamentary impeachments are tried.

**History.**—Denmark is one of the three Scandinavian kingdoms. (See SCANDINAVIA.) On the decline of the Roman Empire the Scandinavians, under the name of Northmen or Normans, became a formidable and aggressive race, much addicted to piracy and maritime enterprises. The Danes conquered Normandy in 912, invaded England with success in the ninth century, and completed the conquest of it about 1016, in the reign of Canute or Knud, who was perhaps the most powerful monarch of his time. He reigned over Denmark as well as England, and is said to have introduced Christianity into his dominions. Margaret, queen of Denmark and Norway, conquered Sweden in 1388, and procured the adoption of the "Union of Calmar" (1397), by which the three Scandinavian kingdoms were united, and her nephew Eric was appointed her heir. At her death (1412) each kingdom chose its separate ruler. In 1448 the Danes elected Christian I., count of Oldenburg, who was the founder of the royal family that has continued to reign to the present

time. The monarchy was elective until 1660, when the clergy and people, impelled by enmity to the nobility, ordained that the power of the king should be hereditary and absolute. As an ally of Napoleon, Denmark was involved in a war against England and Russia, and suffered great disasters. The British fleet bombarded Copenhagen in Sept., 1807. Denmark was compelled to cede Norway to Sweden in 1814. Christian VIII., by the "Open Letter" of 1846, declared his intention to extend the law of succession of Denmark proper to the duchies of Sleswick-Holstein, the inhabitants of which are mostly Germans, in order to secure in this way the indivisibility of the Danish monarchy. When Frederic VII. in 1848 ascended the Danish throne, a rebellion broke out in Sleswick and Holstein, which was put down in 1850, though it was openly supported by Germany, and secretly also by Prussia. In the mean while the non-German great powers and Sweden had agreed (June, 1850) to declare the indivisibility of Denmark, and Austria soon after (Aug., 1850) acceded to this declaration. On June 5, 1851, Prince Christian of Glücksburg was designated in the "protocol of Warsaw" as heir to the throne, and on May 8, 1852, he was recognized as such by the great powers and Sweden. In 1849, Denmark had obtained an extremely liberal constitution, which secured the most entire civil liberty and universal right of suffrage. This constitution was somewhat modified in 1855, and extended to the duchies, but found no favor with the German population of Holstein, which cared very little for liberty, but was very enthusiastic for its German nationality. In Nov., 1858, the king abolished the joint constitution of the Danish state for Holstein and Lauenburg, and restored absolute monarchy in these countries. By a proclamation of Mar., 1863, a new fundamental law was prepared for Denmark and Sleswick. War with Germany broke out soon after, and was terminated by the Peace of Vienna (Oct., 1864), by which Denmark was compelled to renounce all claim on Sleswick-Holstein. (See SLESWICK-HOLSTEIN.) (See ALLEN, "Haandbog i Fædrelandets Historie," 6th ed. 1863; DAHLMANN, "Geschichte von Dänemark," 3 vols., 1840-43.) A. J. SCHEM. REVISED BY CLEMENS PETERSEN.

**Den'ner** (BALTHASAR), a German portrait-painter, born at Hamburg in 1685, died at Lübeck in 1747. Made lame in both legs by a fall, he began to study drawing and painting in Altona, Dantzic, and Berlin, and acquired such dexterity in the manipulation that it soon became fashionable at the courts of Northern Europe to have one's portrait painted by him. He generally painted only the face, leaving the costume to be filled out by some of his pupils. His best picture, the head of an old man, is found in Vienna. He was in possession of many secrets concerning the manipulation of color, but he took his knowledge along with him when he died.

**Dennery** (ADOLPHE PHILIPPE), a French dramatist, born in Paris June 17, 1811, of Jewish parents. He first essayed art, then journalism, and then produced numerous dramas, comic operas, and vaudevilles, among them "The Market of London," "The Bohemians of Paris," "The Memoirs of Richelieu," "The Honor of my Daughter," etc. He wrote, alone or in partnership with other playwrights, more than two hundred pieces, some of them very short, a flimsy joke in one act, but others of them very long, melodramas in five acts and ten tableaux. At the time when his success reached the point of culmination, in 1862 and 1863, it happened not so very seldom that five or six of his plays were represented the same night on the different stages of Paris. They were, however, so absolutely children of the moment that none of them has found a place among the solid stock of the theatres.

**Den'newitz**, a village of Prussia, province of Brandenburg, 42 miles S. S. W. of Berlin. Here the Prussians defeated a large French army commanded by Marshal Ney on Sept. 6, 1813, after a very obstinate fight. The French lost about 15,000 killed, wounded, and prisoners.

**Dennie** (JOSEPH), an American author and critic, born at Boston, Aug. 30, 1768. He studied law, which, however, he did not practise. Having removed to Philadelphia in 1799, he founded the "Portfolio," a literary magazine, which he edited with ability from 1801 till 1812. Among his writings are "The Lay Preacher," which first appeared in the "Farmer's Museum." Died Jan. 7, 1812.

**Dennis** (JOHN), an English dramatist and writer of satires and pamphlets, was born in London in 1657. He studied at Cambridge, made the tour of Europe, and was after his return led to devote himself to literature through his acquaintance with Dryden, Wycherly, etc. He had no talent. Nevertheless, his tragedy "Love Asserted" (1704) achieved a success by its anti-French tendency. His temper was quarrelsome, and he provoked the enmity of many

persons by his libels. He was lampooned by Swift, and satirized by Pope in the "Dunciad." Died Jan. 6, 1733.

**Dennison** (GEORGE), born in Luzerne co., Pa., was a member from Pennsylvania of the House of Representatives from 1819 to 1823. He was register and recorder of Luzerne co., Pa., many years, and was frequently elected to the State legislature before and after his term of service in Congress. He died at Wilkesbarre, Pa., while in office, in 1831.

**Dennison** (WILLIAM), a statesman, born in Cincinnati, O., Nov. 23, 1815, graduated at Miami University in 1835; admitted to the bar in 1840, practised at Columbus, O., 1840-48; was a member of the legislature of Ohio 1848-50; president of the Exchange Bank and of the Columbus and Xenia R. R. Co.; delegate to the Pittsburg convention in 1856 which inaugurated the Republican party, and also to the Philadelphia convention; governor of Ohio 1860-62; postmaster-general 1864-66. D. June 15, 1882.

**Denomi'nator** [a Lat. term, from *denomino*, *denominatum*, to "name" or "designate"], literally, "that which designates," in arithmetic, is the number placed below the line in fractions, giving its name to the fraction, and showing the number of parts into which the integer is divided.

**Denon** (DOMINIQUE VIVANT), BARON, a skilful French artist and author, born at Châlons-sur-Saône Jan. 4, 1747. He became chargé d'affaires at Naples in 1782, and a member of the Royal Academy in 1787, after which he devoted himself to art, and gained distinction as an art-critic. He accompanied Bonaparte to Egypt in 1798, and in 1802 he published an admirably illustrated work entitled "Travels in Upper and Lower Egypt." He died April 27, 1825, leaving an unfinished "History of Art."

**Dens** (PETER), a Flemish Roman Catholic theologian, born near Antwerp in 1690. He published a systematic exposition and defence of the Roman Catholic doctrines in his "Theologia Moralis et Dogmatica," which has been extensively used as a text-book. Died Feb. 15, 1775.

**Den'sity** [Lat. *densitas*, from *densus*, "thick"], a term used in physics to denote the quantity of matter which a body contains in a given or determinate space; for example, a cubic foot. The quantity of matter in any body is called its *mass*, and is measured by the weight of the body, to which it is always proportional. Hence, the density of any body is great in proportion as its weight is great and its volume small; or the density of bodies is directly as their mass and inversely as their volume. It follows that if two bodies have the same volume, their densities are directly as their masses or weights; and if two bodies have the same mass or weight, their densities are respectively in the inverse ratio of their volumes. The term is often used as synonymous with *specific gravity*.

**Density of the Earth** is the ratio of the mass of the earth to that of the same bulk of water. The data of astronomy, in conjunction with the laws of gravitation, give the proportion of the mass of the earth to the masses of the sun and the principal planets; and thus the determination of the absolute mass of the earth will determine the absolute masses of the sun and planets; and then their density can be found. Experiments have been devised for determining the earth's density by observations upon the attraction of a mountain, and have been tried in the Schehallien experiment by Maskelyne, James, and others. The direction of gravity changes very nearly one second of angle for every 100 feet of horizontal distance. Suppose that two stations were taken on a mountain—one on the N. and the other on the S. side—and that their distance apart was 4000 feet. If the direction of gravity had not been influenced by the mountain, the inclination of the plumb-line at these two places would have been about forty seconds. Suppose, on applying the zenith sector, the inclination was found to be fifty-two seconds. The difference, or twelve seconds, could only be explained by the attraction of the mountain, which, combined with the natural direction of gravity, produced directions inclined to these natural directions. In the Schehallien experiment a calculation was made of what would have been the disturbing effect of the mountain if it had been as dense as the interior of the earth, showing that it would have been about twenty-seven seconds. The disturbance proved to be only twelve seconds, and therefore the density of the mountain to that of the earth was as 12 to 27. It follows from this that the mean specific gravity of the earth would be nearly five times that of water. The effect produced by the attraction of a mountain on the direction of a plumb-line was observed by Bouguer at Chimborazo in 1738. Col. James, by observations on Arthur's Seat near Edinburgh, has deduced a mean density of 5.316.

In 1826, Prof. Airy suggested the solving of the problem by pendulum experiments at the top and bottom of a deep mine. Suppose a spheroid concentric with the external

spheroid of the earth to pass through the lower station in the mine. The attraction of the shell included between these has the same effect at the upper station as if all its matter were collected at the earth's centre. At the lower station there is the attraction of the interior mass only; at the upper station that of the interior mass and the shell. By making the proportion of these theoretical attractions equal to the proportion observed by means of the pendulum, we have the elements for finding the proportion of the shell's attraction to the mass's attraction. The mean density is found from these data. The astronomer-royal having twice tried the experiment and failed, the attempt was renewed in 1854 at a colliery near South Shields, England, where the depth was reputed to be 1260 feet. A place was chosen for two stations in the same vertical. An invariable pendulum was mounted in each station, vibrating by means of a knife-edge upon plates of agate. Behind it was a clock, and before it a telescope so mounted that coincidences of the pendulum of the clock might be observed through a slit. The acceleration of the pendulum at the depth of 1260 feet was two and a quarter seconds a day. Taking into account the configuration and nature of the surrounding mass, Airy estimated the earth's density at 6.565.

Two leaden globes, 174 pounds in weight each, are supported six feet apart, by a horizontal frame capable of rotation. Above the centre is suspended horizontally, within a narrow glazed box, by a delicate wire forty inches long, a slender deal rod, carrying at its extremities two equal leaden balls one one-hundredth part as heavy as the globes. The rod being at rest, the globes are brought as near to the balls as the dimensions of the protecting box will allow, their separate attractions tending to turn the rod in the same direction. The amount of torsion produced is observed from a distance with a telescope. By rotation the disturbing force of the globes is then brought to act in the opposite direction, and the torsion is once more observed. Cavendish concluded that the force of mutual attraction between the globes and balls, the distance between their centres being 8.85 inches, was  $\frac{1}{100}$  of a grain; whence he deduced the total mass of the earth, and (its bulk being known) its mean specific gravity also, which he put at 5.480. The experiments of Reich gave 5.438, and those of Baily, 5.660. The mean of all the results obtained is 5.639. It may, then, be assumed that the earth's mean density is not very far from 5.6 times that of water. Combining this result with what is known with respect to the dimensions of the earth, we find that its weight in tons is roughly expressed by 6,000,000,000,000,000,000. F. A. P. BARNARD.

**DENT** (DENNIS) was born in Maryland. He served in the Indian war in Florida as a major-general, and removed to Tuscaloosa, Ala., in whose legislature he served from 1838 to 1850, making himself as well deserved of his country at the council-table as on the battle-field. He died in 1860.

**DENT** (JOHN HERBERT), an American naval officer, born in Maryland, 1782, died in St. Bartholomew's parish, S. C., July 31, 1823. He entered the navy, was made a midshipman March 16, 1798, and served under Truxton in the frigate *Constellation* when she captured the French frigate *Insurgente*; Feb. 1, 1799. On July 11, 1799, he was made a lieutenant, and still served in the *Constellation* when she captured the French frigate *La Vengeance*, Feb. 1, 1800. He commanded the schooners *Nautilus* and *Scourge* in Preble's squadron during the war with Tripoli, and was actively engaged in the attacks on that city and harbor. On Dec. 29, 1811, he was made a captain.

**Dentalium** [from the Lat. *dens*, a "tooth," alluding to the shape of the shell], a genus of gasteropodous marine carnivorous mollusks, called tooth-shells, from their curved, tubular shape. The shells are open at each end. There are many living and fossil species, of which the *Dentalium elephantinum*, or elephant's tooth, is the best known.

**Dentalus** (MANTUS CURIUS), a Roman plebeian consul noted for his martial exploits, frugality, and integrity, is said to have been born with teeth; hence the surname. He defeated the Samnites in 290 B. C., and gained a decisive victory over Pyrrhus near Beneventum in 275. He was consul for the third time in 274, and censor in 272 B. C. During his censorship he constructed an aqueduct which conveyed water from the Anio to Rome. Died in 265 B. C.

**Den'tex** [perhaps derived from the Lat. *dens*, on account of their numerous teeth], a genus of acanthopterous fishes belonging to the Sparidae, resembling the perch in form, with a deep compressed body, scaly cheeks, a single dorsal fin, and numerous small teeth, with four large canine teeth curved inward in each jaw. The *Dentex vulgaris*, sometimes called the four-toothed sparus, is found in great numbers in the Mediterranean, and sometimes on the southern coasts of Great Britain. It is of large size, often three feet long, and is an important article of commerce.

**Den'tifrice** [Lat. *dentifricium*, from *dens*, a "tooth," and *frico*, to "rub"], the name given to powders and washes of various kinds used for cleaning the teeth. Among the substances employed are charcoal, chalk, common salt, myrrh, catechu, cinchona, phosphate of soda, and cream of tartar.

**Den'tils** [from the Lat. *dens* (gen. *dentis*), a "tooth"], in architecture, square blocks or projections in the bed-mouldings of the cornices of the Corinthian, Ionic, and composite orders. The term is also applied to ornaments in cornices of rooms which are founded on the same style of decoration.

**Dentin, or Dentine.** See TEETH.

**Dentiro'stres** [from the Lat. *dens* (gen. *dentis*), a "tooth," and *rostrum*, a "beak"], a tribe of birds of the order Insectores, characterized by a notch or toothlike process on each side of the margin of the upper mandible. These birds have rapacious habits, and prey on smaller birds as well as insects. The butcher-bird is an example of this tribe.

**Dent'istry** [from *dentist* (from the Lat. *dens*, *dentis*, a "tooth"), and *ry*, a suffix denoting "art," "profession," etc.]. In every age and country, even among the rudest and most barbarous nations, the teeth as useful and beautiful organs have attracted attention, and been regarded as of great importance in giving beauty and symmetry to the face. Lord Chesterfield says that "fine and clean teeth are among the first recommendations to be met with in the common intercourse of society." Lavater, the learned physiognomist, remarks that "the countenance is the theatre on which the soul exhibits itself," and adds, "as are the teeth of man, so is his taste." "White, clean, and well-arranged teeth, visible as soon as the mouth opens, but not projecting nor always entirely seen, I have never met with," says he, "except in good, acute, honest, candid, and faithful men;" that "short, broad teeth, standing close to each other, show tranquil, firm strength; and that melancholy persons seldom have well-arranged, clean, and white teeth."

By the ancients, white and well-formed teeth were considered as characteristics of beauty. Jacob, in blessing Judah, says, "His teeth shall be white with milk." Joseph Murphy, in his "Natural History of the Human Teeth," states that the Brahmins are extremely delicate in every point relating to their teeth. Every morning when they rise they rub them for upwards of an hour with a twig from a racemiferous fig tree, at the same time addressing their prayers to the sun, and calling down the blessings of Heaven on themselves and their families. As this practice is prescribed in their most ancient books of law and divinity, we imagine it coeval with the date of their religion and government. These people also separated their teeth with a file as soon as the second set was perfectly formed, which was doubtless done for the purpose of ensuring cleanliness and preventing decay.

The inhabitants of many Oriental countries stain their teeth. Many women in Sumatra have their teeth filed to points, removing the enamel from the surface that they may be more easily dyed black. The Abyssinians and other African nations file their teeth to points, and thus increase the savageness of their aspect. Whether this custom was followed as a matter of ornament or fashion, it doubtless had its origin in the fact that teeth with sufficient space between their proximal surfaces to prevent accumulation of food were much less liable to be affected by caries.

In the time of Herodotus ("Hist." ii. 84) dentistry appears to have been practised in Egypt, also the treatment of diseases of the eye and the ear. In ancient tombs of this people artificial teeth of ivory or wood were found by Belzoni and others, some of which were on gold plates; it is stated that the teeth of mummies have been found at Thebes filled with gold, and others with a white cement.

To what extent the Greeks or Egyptians practised dental surgery as a specialty before the Christian era, there is but little upon record that gives us any definite knowledge. The essays or books upon the subject, if there were any, are lost. The only writings of ancient times extant, where dentistry is spoken of as an art, are those of Galen, who wrote in the second century after Christ; and from then until Ambrose Paré wrote his celebrated work on surgery there was but little to improve the practice or satisfy the



*Dentalium elephantinum.*

student in dental surgery. During the sixteenth century, from 1550 to 1580, there were published six essays or dissertations upon the anatomy, treatment, and preservation of the teeth. The seventeenth century was more favored; from 1614 to 1690 there were forty dissertations on tooth-ache, teething, diseases of the teeth, etc. During the eighteenth century, from 1702 to 1799, there were one hundred and thirty such volumes and essays, many of them works of merit, and the result of the labors of such as Hunter, Jourdain, Lécéluzé, Blake, etc.

In the present century, from 1800 to 1830, sixty-eight volumes were added to the literature of dental surgery. Among the more prominent authors of these were Bell, Baumé, Duval, Rousseau, Delabarre, Laforgue, Fox, Maury, Murphy, Parmly, Fitch, and Gardette. The last three were American practitioners as well as writers. From 1830 to 1873 there have been contributed near forty volumes. Among the more prominent authors of these are Robinson and Tomes of London; Goddard, Harris, Taft, Arthur, Garretson, Richardson, and J. W. White of the U. S.

During the eighteenth century dental surgery became a subject of more critical inquiry and thorough investigation. Men of education and talent devoted themselves to it exclusively, and from that period it has progressed rapidly in importance. But not until within the last few years has it been enabled to claim a recognition from its sister professions of medicine and surgery. Until the latter part of the eighteenth century any advance in dentistry was confined to Europe. Dr. Harris, in his work on the "Principles and Practice of Dental Surgery," gives the following account of its introduction into the U. S. He says: "It was during our Revolutionary struggle for independence that the first knowledge of dental surgery was introduced into this country, and the first dentist in the U. S. of whom we have any account was a man by the name of Le Mair, who accompanied the French army which came over to our aid during that period. Soon after the arrival of Le Mair a dentist by the name of Whitlock came over from England, and from him and Le Mair dental surgery may be said to have had its origin in the U. S. With regard to the professional ability of these gentlemen little is known, but it is probable that it was limited, and that their practice consisted chiefly in the carving of artificial teeth from blocks of ivory and extracting and cleaning natural teeth.

"Mr. John Greenwood, however, I believe, was the first native American dentist, and he commenced practice in New York about the year 1788, and is said to have been the only dentist in that city in the year 1790. It was in this year he constructed an entire denture for General Washington, and in 1795 another, which for neatness of execution was unsurpassed by any of the European artificial teeth at that period. They were carved from ivory, and secured in the mouth with spiral springs."

About the year 1792, Dr. Spence, who had received some instructions from Le Mair, commenced practice in Philadelphia; soon afterwards he was joined by Dr. Gardette, who came from France, where he had previously received instruction. He soon acquired a reputation which he enjoyed through life. Dr. Hudson of Dublin soon followed Gardette to Philadelphia, and from his previous education and skill became the most prominent dentist in this country.

In the year 1800, Dr. H. H. Hayden commenced the practice of dental surgery in Baltimore; in 1807 he was joined by Dr. Koecker of London, who, after practising a few years in Baltimore, removed to Philadelphia. From this time until 1820 the ranks received accessions from Europe, with many in this country—some few with previous education, but others entirely deficient in theoretical or practical knowledge—so that the number of dental practitioners in the U. S. was now little more than one hundred. The next decade increased them to three hundred, and in ten years more they were quadrupled; while the next twenty years gave us at least five thousand in 1860, and in 1880 the dentists in the U. S. numbered 12,314, while those in other countries combined probably do not exceed five thousand.

With this great increase in the number of dental practitioners the progress of dentistry as a science has been very marked. From the more simple and comparatively not difficult operations of cleansing, extracting, and filling small and superficial cavities, it has extended to a thorough and scientific treatment of the mouth, with the view not only of saving teeth slightly decayed, but all teeth, and also of anticipating decay by such operations as shall make it possible for the patient to keep the mouth thoroughly cleansed, and the teeth free from the deleterious effects of the fermentation of portions of food or other substances in the mouth. Cleanliness is indispensable to sound teeth, and the most fruitful source of decay is admitted to be the presence of decomposing portions of food lodged between them and in the interstices of the crown. In view of these facts all den-

tists urge the importance of children acquiring the habit of brushing their teeth daily.

In the successful treatment of teeth where the nerve or pulp is exposed, much credit is due to Dr. Spooner of Montreal, who in 1838 first recommended the use of arsenic for the purpose of destroying the vitality of this tissue. This substance has been used since in combination with sulphate of morphine and tannin, with creosote sufficient to form a thick paste; and though many teeth were saved for years by the use of this escharotic, yet for some time the course was unscientific and far from satisfactory; for when the vitality of the pulp was destroyed and the tooth filled without removing the devitalized tissue, it invariably resulted in a fistulous opening being established in the gum opposite the apex of the root or fang, through which was a constant discharge of pus. The difficulty is invariably removed by opening into the tooth, cleansing out the root, and injecting creosote until its presence is recognized at the fistulous opening in the gum.

The last ten years has been replete with various expedients by cupping to preserve the vitality of the pulp, even though exposed; and the efforts have been crowned with such a degree of success that there is reason to hope the day is not distant when such teeth will invariably be saved, and their vitality and lifelike appearance also preserved. The preparations which have been used for capping are lead, tin, asbestos, gutta-percha, Hill's stopping (made of gutta-percha and felspar pulverized), clarified quill, and oxychloride of zinc; the latter, made of oxide of zinc and dilute deliquescent chloride of zinc, is the most in favor for the purpose, and offers much the larger proportion of successful results. To avoid the pain which is occasioned by this material coming in contact with so highly organized a tissue as the pulp, a thin paste of oxide of zinc and carbolic acid is first applied, and then the oxychloride of zinc placed over this dressing.

The various materials used for filling or stopping teeth are gold, tin, amalgam, oxychloride of zinc, Hill's stopping, and gutta-percha. The requirements for a filling are ability to withstand the mechanical influences of mastication; resistance to chemical agents; non-susceptibility to thermal changes; qualities to admit of ease of introduction into a cavity and consolidation; harmony in color; and the absence of properties injurious to the structure of the tooth or to the system. Of such materials, the very best as a permanent filling is gold; after this amalgam and tin, the other agents being employed chiefly for temporary purposes.

Of the instruments used in filling teeth, the variety is numberless, so far as excavators and ordinary pluggers are concerned; the last few years have given us a number for condensing the gold, representing the mallet in modified forms. The small hand-mallet was used some forty years since for a time to a limited extent; the last decade has again brought it generally into favor. It is made either of steel, ivory, vulcanized rubber, lead, or hard wood. In addition to these, there are much in use two automatic mallets, besides Bonwill's electric mallet. A recent year has also given to the profession several drills for the preparation of cavities and the finishing of fillings; three of them have the motive-power of a foot-lathe, while one has that of a galvanic battery. All are arranged with a mandrel, into which fit burr and chisel drills of various sizes.

The "rubber-dam" given to the profession by Dr. Barnum, as also the steel clamps for holding it in place around the neck of the tooth intended to be protected, is one of the most valuable acquisitions given to the dental practitioner. A matrix invented by Dr. Louis Jack, and given to the profession, has attained a most deserved popularity. In addition to these, the small corundum wheel invented by Dr. Arthur is considered a not less important acquisition.

The great progress made in the dental profession has been contributed to and stimulated not a little by the organization of colleges, formation of societies, and publication of journals. An important event in the history of dental surgery in this country was the establishment of the "American Journal and Library of Dental Science" in Baltimore in 1839. The scattered members of the profession, who had long toiled in comparative obscurity, almost unknown to each other and the world, found through this journal an appropriate medium through which to communicate with each other. Several other important journals devoted to the interests of dentistry have since been established in the U. S. and Canada.

The formation of the "American Society of Dental Surgeons" soon followed the establishment of the above journal; and at its second annual meeting an arrangement was made with the publishers by which it became both the property and organ of the association. Two years afterwards another society of dentists like that of Baltimore was organized at Richmond, Va., and in Aug., 1844, a third was formed at Cincinnati, O., styled the "Mississippi Val-

ley Association of Dental Surgeons." In Aug., 1850, the National Convention of Dentists was formed, and its first annual meeting was held in Philadelphia. Just previous to this the Pennsylvania Association of Dental Surgeons was organized, and some years subsequent, in 1863, the Odontographic Society of Philadelphia. In addition to these, there are throughout the country fifty-five other State and county societies, the latter holding meetings generally monthly. In 1839 the legislature of Maryland chartered the "Baltimore College of Dental Surgery." It was the first dental college in the country. It held its thirty-third annual commencement in 1873, and in the graduating class receiving the honors of the institution was one lady, she being its first female graduate. Its alumni now number over 700.

The "Ohio College of Dental Surgery" was chartered in 1845. It is located in Cincinnati. Its alumni number about 250. It has for the last fifteen years admitted ladies equally with gentlemen, and several have taken their degree. The "Pennsylvania College of Dental Surgery" was chartered in 1856; it is located in Philadelphia. It held its seventeenth annual commencement in 1873. Its alumni numbered 488, of which 443 were regular graduates, 10 honorary, and 35 received the degree after a satisfactory examination, they having been in practice some years previous to the establishment of dental colleges. Among the graduates was one lady, now practising in Berlin; she received the degree in 1869. The "Philadelphia Dental College" was chartered in 1863; its alumni number 260. The "New York College of Dentistry" was chartered in 1865, and established in New York City. Its alumni number 68. The "Missouri Dental College," chartered in 1866, is in St. Louis, Mo.; its alumni number about 50. The "New Orleans Dental College," in New Orleans, La., was chartered in 1867; its alumni number about 30. The "Boston Dental College" and the "Dental School of Harvard University" were both chartered in 1868. They held their fifth annual commencement in 1873. The alumni of the latter number about 35.

A growing desire on the part of the liberal and educated men in the profession that their specialty should be raised above a mere mechanical trade has created an interest in the education of dental students, and a corresponding desire for a more extended and liberal curriculum in the colleges, many of the best men in the profession believing that a thorough medical education, preparatory to studying the specialty of dentistry, would make more efficient and useful practitioners; so that a patient with an oral disease of any complexity, trusting himself to the average dentist, would not meet with disaster because of the absence of surgical knowledge and skill; in fact, that dentistry should be practised as a specialty of medicine; that the practitioner should understand that the welfare of the teeth is intimately connected with that of the general system; and that a knowledge of the diseases whose effects may reach these organs is essential to the scientific dentist. His knowledge of anatomy should not be confined to the structure of the tooth, to the pulp which fills its internal cavity, to the position of the nerves which communicate its complaints to the brain, nor to the manner in which it is held fast in its socket; but his education should embrace a thorough acquaintance with the anatomical and sympathetic relations of the organs of the mouth with all parts of the system.

From what was originally called dentistry there have very naturally and almost without an effort been evolved two widely different occupations. They may properly be termed operative dentistry, or dental surgery, and mechanical dentistry; and as competition necessitates and stimulates proficiency, more distinctly marked must this division become. The artisan who works in his laboratory making casts, swedging plates, grinding and fitting down teeth, and finally soldering them to the plate, and finishing the whole as neatly as a piece of jewelry-work, cannot keep his hands in a condition to successfully perform the delicate manipulative operations required in treating the natural teeth. Delicacy of touch is indispensable in a skilled operator, and one who does not possess it proportionally fails just where it is most essential his operations should be perfect.

Mechanical dentistry has again been relieved of a portion of the labors originally performed by the dentist—that of carving or moulding the teeth used. The early dentists carved from ivory the teeth and plate in one piece, and if a partial set was inserted, the teeth were fastened to the adjoining natural ones by means of ligatures; if a full set was required, springs were used. Ivory and natural teeth were objectionable from their liability to be acted upon by the fluids of the mouth. Absorbing as they did these secretions, they soon became offensive, and often rapidly decayed. Porcelain teeth, well named incorruptible, perfectly resist the destructive action of these fluids; and

as they are made nearly perfect in color and shape, they are not easily detected. Though of French origin, they owe the perfection to which they have been brought to the energy and ingenuity of the American manufacturer.

Mr. Charles W. Peale of Philadelphia has the reputation of making in 1807 the first manufactured in the U. S. He made a set for his son, Rembrandt Peale, in 1808, and gave instruction in his methods to Mr. Barabino, a dentist then practising in Philadelphia. The first regular manufacturers were Greenwood, Woffendale, and Parkhurst, who were engaged in the business in 1825. The manufacture of mineral teeth for the supply of dentists was first undertaken by Samuel W. Stockton in Philadelphia about the year 1835, and to him, together with Neal and Acock, is due the credit of establishing this branch of business in the U. S. The present perfection in moulding and enamelling the teeth was not attained for some years afterwards, nor was the color so life-like or the shades so varied. For many years the coloring was put on in the shape of paint. The teeth were moulded and partially burned, when they were subjected to the process of painting, and again placed in the furnace. Much of the improvement made between 1840 and 1849 in the transparency of the tooth, the granulated appearance of the gum enamel, and the almost unlimited variety of shades, was due to the persistent and untiring experiments of Dr. Elias Wildman of Philadelphia. The use of the purple of Cassius, or oxide of gold, now so generally used in gum-color, was brought to its present state of perfection through his untiring efforts.

An artificial tooth must possess certain qualities apart from size, shape, and color—a front surface which must closely resemble the enamel or external covering of the natural tooth, and a body having the toughness which allows the vigorous use of the hammer in riveting without fracture, and the use of the blowpipe in soldering without liability to crack. If the tooth were one homogeneous mass, the requisite amount of vitrification necessary to imitate the enamel would render it brittle; but a proper amount of translucency must be preserved, or there will be the opaque, clay-colored tooth, which proclaims its artificial character to the most casual glance; so that a nice calculation is necessary not to sacrifice beauty to strength. There must also be the distinctly-marked clear cutting edge of enamel projecting beyond the body of the tooth, and contrasting, as in Nature's work, with the yellow or brown base, and yet this depth of color in the body and translucency of the point must be so nicely blended that the line of union cannot be determined. These and many other valuable results have been secured by patience of research and skill in application.

The principal materials entering into the composition of mineral teeth are felspar, silice (flint), and kaolin (clay), with various fluxes, so known in chemistry, more familiarly characterized as *glazes*, used to determine the point of fusion desired, of different parts of the tooth. The general tone or tint of these materials is white or dusky yellow, so that coloring forms a prime adjunct in the process.

The chief coloring substances are titanium for yellow, platina sponge for gray, oxide of cobalt for bright blue, and oxide of gold for red. These, with others in varying combinations, are used to color the body, point, and outside enamels. There are more than forty shades of color in the bodies used, and an equal number in the point and outside enamels. Thus, starting with the lightest shade of body known as "A," forty different grades may be produced by using a different point-enamel, and on each of these a different effect by the use of various outside enamels, so that with a single body of any one color one may produce 64,000 varieties or gradations of color; and as there are thirty-nine other bodies, a smart calculator can determine the many changes of which they are capable. Some idea may be formed of the need of variety by the fact that out of innumerable trials in the way of combinations, 130 standard shades are made, duly arranged, and classified by numbers, forming a gradual but quite perceptible progression from the most delicate blue-white to the dark tobacco-stain. For the production of these colors one is not to think of a dyer's vat, but to remember that their bath is a glowing muffle at incandescent heat.

Many teeth, good in themselves, have an artificial appearance in the mouth, simply because the dentist, though an excellent mechanic, has lacked the perception to discover the shade made necessary by the temperament, involving the complexion, hair, and eyes of the wearer.

One establishment in Philadelphia turns out 400,000 teeth per month. In Europe a substance resembling Wedgwood ware is of late much used for artificial teeth, and its toughness and durability are admirable, though it is defective in color and translucency.

In fitting artificial teeth it is very important to take a good impression of the shape of the mouth. Various sub-



stances have been used for the purpose, such as wax (either pure or mixed with paraffin, gutta-percha, or other materials); gutta-percha alone or combined; plaster of Paris alone. These substances have each their merits, and the choice for any particular case is to be determined by experience. The two materials principally employed in making the plate upon which the teeth are fastened are gold and vulcanized rubber. The principal advantage of the latter material is its cheapness, which is more than counterbalanced by its clumsiness, fragility, and its irritating effect on the mouth. (See **TEETH**, in APPENDIX.) C. NEWLIN PIERCE.

**Dentition.** See **TEETH**.

**Denton**, capital of Caroline co., Md. (see map of Maryland, ref. 3-G, for location of county), on the E. bank of the Choptank River, 65 miles E. of Annapolis. It has an iron-foundry and an academy. The river on which it is situated is famous for shad and herring. Pop. in 1880, 469.

**Denton**, R. R. junction, capital of Denton co., Tex. (see map of Texas, ref. 2-H, for location of county), 45 miles S. W. of Sherman. Pop. in 1870, 361; in 1880, 1174.

**Denudation** [from the Lat. *denudo*, *denudatum*, to "lay bare"], in geology, is defined by Lyell as "the removal of solid matter by water in motion, whether of rivers or of the waves and currents of the sea, and the consequent laying bare of some inferior rock. This operation has exerted an influence on the structure of the earth's crust as universal and important as sedimentary deposition itself; for denudation is the necessary antecedent of the production of all new strata of mechanical origin. The formation of every new deposit by the transport of sediment and pebbles necessarily implies that there has been somewhere else a grinding down of rock into rounded fragments, sand, or mud equal in quantity to the new strata." Denudation may be divided into *subaërial*, which is effected by the action of wind, rain, and rivers, and *submarine*, which is caused by tides and currents of the sea. In many instances deep and wide channels or valleys have been excavated in rocky strata by the long-continued action of rivers; and these are called *valleys of denudation*. As the strata exposed on the sides of these valleys correspond to each other, both in composition and order of position, it is evident that they were originally continuous. "The larger part of the valleys of the world," says Dana, "are formed entirely by running water. . . . Many examples are on record of gorges hundreds of feet deep cut out of the solid rock by two or three centuries only of work."

**Denver**, city and important R. R. centre, capital of Colorado and of Arapahoe co. (see map of Colorado, ref. 2-G, for location of county), is beautifully situated on South Platte River, 15 miles E. of the base of the Rocky Mountains, 5200 feet above the level of the sea, in lat. 39° 45' 21.68" N., lon. 104° 59' 35.05" W. It commands a magnificent view of mountain-scenery, including Pike's, Long's, and other noted peaks perpetually covered with snow. The climate is peculiarly serene and healthful. The city contains a U. S. branch mint, a graded system of public and several private schools, waterworks, gasworks, street railways, and a varied list of industrial institutions, the Boston and Colorado Smelting-works, employing an immense capital, and the Grant Smelting-works, the largest establishment of its kind in the world.

**Manufactures.**—The census of 1880 shows 259 manufacturing establishments; capital, \$2,301,850; average number of hands employed, 2944; wages paid, \$1,574,438; value of products, \$9,367,749.

Pop. in 1870, 4759; in 1880, 35,629; in 1885, about 70,000.

JOHN ARKINS,  
MANAGER "ROCKY MOUNTAIN NEWS."

**Denver** (JAMES W.), an American general, born at Winchester, Va., in 1818. He removed to California, was elected a member of Congress in 1854, and was governor of Kansas from Dec., 1857, to the autumn of 1858. He became a brigadier-general of Union volunteers in 1861.

**De'odand** [Lat. *deodandum*, from *deo* (dative of *Deus*, "God"), and *dandum*, future passive participle from *do*, to "give," literally, that which is "to be given or dedicated to God"], in English law, a name applied to any personal chattel, animal, or thing which had caused the death of a human being, and for that reason was applied to pious uses, or, as the term implies, given to God. It was, in fact, forfeited to the king, and distributed in alms by his high almoner. The origin of this singular law is very obscure, and the juridical development which in course of time it underwent affords no light. A distinction was made between an animal or a thing in motion and one at rest. If a sailor fell overboard and was drowned while the vessel was in motion, both the hull and the cargo were forfeited; if the vessel was at anchor, only the hull, not the

cargo, was deadand. If a man was thrown from a cart and killed while the cart was in motion, both the cart and the load were forfeited; if he fell while climbing the wheel, only the wheel, and not the cart, was deadand. But these and other distinctions of similar description seem to be wholly arbitrary. Two hypotheses have been proffered. The Mosaic law demands "that if an ox gore a man that he die, the ox shall be stoned and his flesh shall not be eaten;" and the Athenian law demanded that "whatever was the cause of a man's death by falling upon him should be exterminated or cast out of the dominions of the republic," thereby ascribing a moral effect on the animal or thing to the fact of its having caused the death of a human being. One hypothesis connects the English deadand with these old regulations. Another derives it from the smartness of the Roman Catholic Church in finding a peg on which to hang a tax; and, indeed, the Roman Catholic Church in many cases of this kind made seizures as payment for masses to be read by her priests.

**Deodar.** See **CEDAR**.

**Deo'datus**, or **Deus'dedit**, SAINT, pope, succeeded Boniface IV. in 615, died Nov. 9, 618, and was succeeded by Boniface V. He is regarded as a worker of miracles.

**Deodorizers.** See **DISINFECTION**, by PROF. HENRY HARTSHORNE, M. D.

**Deoxidation** [Lat. *deoxidatio*, from *de*, priv., and *oxygen*], the chemical process by which oxygen is abstracted from a compound. This term when applied to metals is synonymous with *reduction*. A compound of a metal with oxygen may in many cases be reduced or deoxidized by heating it with carbon or in a stream of hydrogen gas.

**Depart'ment** [Fr. *département*, from *departir*, to "divide"], literally, a "division;" a portion; a distinct province; a territorial division; a principal division of executive government. In the U. S. each of the secretaries and other functionaries who form the cabinet is the head of a department. These are called the departments of agriculture, education, interior, justice, navy, post-office, state, treasury, and war. A department is not defined by the Constitution, but is recognized and mentioned several times in that instrument. It is a division of government business over which the head, by law, exercises exclusive control, subject only to the supervision and direction of the President. The attorney-general is the head of the department of justice, established in 1870. Portions of the duties of several departments are allotted to bureaus, but there are no separate bureaus in the department of state or that of the post-office. The term department is also applied to the three principal branches or co-ordinate powers of the republic. "Under the Federal Constitution," says Gillet, "the national government is composed of three distinct and independent departments—the legislative, the judicial, and the executive." The whole territory of the U. S. is divided into military departments, each under a general officer.

**DEPARTMENT**, in geography, a primary division of France. In 1790 the old divisions called provinces were abolished, and the country was divided into eighty-three departments, most of which were designated by the names of French rivers or mountains. The old boundary-lines between the provinces, with their toll-gates, custom-houses, military posts, etc., were effaced, and very often districts from two or three different provinces were united to form one department; the object was centralization. During the first empire the number increased to 130, including Belgium, portions of Italy, etc. At the beginning of the German war in 1870 the number of departments was eighty-nine. In 1871, France ceded to the German empire the whole of Bas-Rhin, a large part of Haut-Rhin, nearly all of Moselle, a small part of the department of Vosges, and a part of Meurthe. Each department is divided into *arrondissements*, and is governed by a prefect (*préfet*). The principal divisions of Bolivia, Peru, and some other South American republics are also called departments.

**Departure**, in navigation. See **NAVIGATION**.

**De Pauw University**, Ind. See **APPENDIX**.

**De Pere**, on R. R., a township of Brown co., Wis. (see map of Wisconsin, ref. 5-F, for location of county), containing the villages of De Pere and Nicollet, situated on opposite sides of the Fox River. They are connected by a bridge 1500 feet in length, and contain, together, smelting-furnaces, railroad car-shop and iron-works, foundry, machine-shop, and hub- and spoke-factory, flouring, wooden-ware, shingle, and saw mills, wagon-shops, besides various other industries. A line of steamers makes regular trips to Chicago, and the Buffalo line takes freight from the wharves to Buffalo and intermediate ports. The water-power is made by the first dam on the Fox

River of the Green Bay and Mississippi Canal Company. Pop. of township in 1870, 2800; of De Pere, 1372; in 1880, township, 817; De Pere, 1954. The pop. of township in 1870 included that of De Pere and W. De Pere villages.

**De Peyster** (J. Watts), born Mar. 9, 1821, is of the seventh generation residing or born in the first ward of the city of New York. The first of the name in America, Johannes, of Huguenot extraction, a person of property, came from Holland, was schepen in 1656, etc., alderman in 1666, etc., burgomaster in 1673, and then deputy-mayor in 1677, of New York, refusing the mayoralty because he could not speak English. He had an opportunity for displaying his patriotism and firmness (1673) in one of the most trying crises of the Dutch colony. His eldest son, Abraham (I.), was a man of very great ability and most genial nature. He was acting governor and president of the council in 1700; chief-justice, 1700-01; colonel commanding the colonial militia of the city and county of New York, and treasurer for many years of the colonies of New York and New Jersey. His eldest son, Abraham (II.), succeeded him as treasurer in 1721, and continued in office during his lifetime (1767). James (I.), his eldest son, was a merchant of great note and of much benevolence. In this generation, Arent Schuyler de Peyster, the grandson of Abraham (I.), ultimately colonel B. A., and commanding the Eighth or King's regiment of foot, exercised a vast command and influence in the N. W. with his head-quarters at Michilimackinac, but will be better known by his literary connection with the poet Burns—a private in the Dumfries Volunteers, of which de Peyster was colonel—who dedicated to his military superior his "Poem on Life." The nephew of the preceding, bearing the same name, was a fearless navigator, and has left a memorial in the de Peyster Islands, a group of seventeen in the South Pacific (Mulgrave Archipelago), discovered by him in 1819. The three sons of James (I.), Abraham (III.), Frederic (I.), James (II.), were officers in the British service. Abraham (III.) was second in command in the battle of King's Mountain (1780), and after displaying great valor, severely wounded at the conclusion of this contest, the most desperate and sanguinary at the South. In this battle British troops (and perhaps any troops in the field) were first armed with breech-loading rifles, the invention of Patrick Ferguson, major B. A., and colonel and acting brigadier in America, chief in command of the royal forces in this decisive collision. Frederic (I.) was also severely wounded in the Carolinas, and James (II.), captain-lieutenant in America, and subsequently lieutenant in the Royal Artillery, one of the handsomest men in the British army, was killed under the most extraordinary circumstances at the assault of the French lines of Menin, in Flanders (1793), having been previously buried alive by the explosion of a mine at the siege of Valenciennes, and brought back to light and life almost by a miracle. (See "Gentleman's Magazine," 1793.) Frederic (II.), third son of Frederic (I.), president of the New York Historical Society and prominent member of a number of literary and charitable institutions, was the author of many pamphlets, denoting great knowledge, research, ability, and influence. D. Aug. 17, 1882.—J. WATTS DE PEYSTER has published a number of military, historical, and ethnological, etc. works, of which the most prominent are biographies of the Swedish field-marshal Torstenson (seventeenth century); of Major-General Philip Kearny; of Coehorn, "prince of engineers;" of Carausius; of the History of the Third Corps of the Army of the Potomac; of the decisive conflicts of the great American civil war, and of the Last Campaign of the Army of the Potomac, etc. etc. For the first work he was the recipient of three splendid medals, etc. from Oscar I., king of Sweden, and, for valuable services, of the only brevet major-generalship ever conferred, after debate, by a special law or concurrent resolution of his native, or of any other, State. His writings have won for him the endorsement of a number of our most distinguished generals as "the foremost military writer of the country." He was the first to urge in a series of reports, made in 1852-53, the advantages of a paid fire department for this city, in conjunction with steam as applied to the means of combating fire. His three sons, J. Watts de Peyster, Jr., Frederic, Jr., and Johnston L., were respectively brevetted colonel, major, and lieutenant-colonel U. S. volunteers, and all three colonels N. Y. volunteers, for gallant and meritorious services during the great American conflict. CHARLES W. GREENE.

**De Peyster** (J. Watts, Jr.), born Dec. 2, 1841, displayed in early age great decision of character, power of command, laborious research, and practical power of application. In Mar., 1862, he left the Law School of Columbia College, N. Y., joined his cousin, Maj.-Gen. Philip Kearny, as volunteer aid, and was greatly distinguished

for gallantry and good conduct in the battle of Williamsburg. Promoted to a lieutenancy, and while commanding a company of New York volunteer cavalry, he won the respect and esteem of his colonel, a man of great culture and observation, who testified "that with experience (which he was rapidly acquiring) he would have been one of the best of cavalry officers." Again promoted major of the First New York Volunteer Artillery, he returned to the Peninsula, and, attached to the staff of Maj.-Gen. Peck, acquired the respect, the regard, and good-will, not only of his immediate commander, but of every general with whom he was brought in contact or with whom he served in the course of most varied duties. Prostrated by James River fever, after many months' struggle between life and death he hastened back to the field in the winter of 1863, and, although pronounced by medical examiners as unfit for active duty, he displayed a zeal, capacity, and energy in the campaign of Chancellorsville which elicited the most remarkable commendations from the commander-in-chief, the magnificent hero of the "battle above the clouds," Joseph Hooker, who recommended Maj. de Peyster for brevet as eminently deserving, having been no less remarked for his coolness and courage at Fredericksburg than at Williamsburg; likewise from his immediate superior, Gen. Albion P. Howe.

Maj., Brevet Col. de Peyster, continued to command a brigade of artillery until midsummer, 1863, when the consequences of his faithful service in such a deteriorated sanitary condition developed diseases which neither science nor time could alleviate; and although he survived until 13th April, 1873, this whole period was one long, hopeless struggle of unyielding constancy against the unrelaxing siege of death. CHARLES W. GREENE.

**Depilatory** [Lat. *depilatorius*, from *de*, priv., and *pilus*, the "hair"], a name given to applications used to remove hair from any part of the body. A thin paste of powdered quicklime and water applied to any part until a burning sensation is produced, and then wiped off with a wet sponge, will generally remove hair.

**Deploy** [Fr. *déployer*, to "unfold," to "spread"], a military term, signifies to open or extend troops from column into line; to spread out a body of troops so as to present a wider front. To reverse this movement is to *ploy*.

**Deportation** [from the Lat. *de*, "from," and *porto*, *portatus*, to "carry"], a compulsory removal from one country to another; a banishment. The kings of ancient Assyria attempted to secure their conquests by the deportation of a large part of the native population, as in the case of the Jews, who were carried as captives to Babylon. In French law, deportation is a punishment equivalent to transportation in English. It is ranked as third in degree after capital punishment, the second being condemnation to the galleys or hard labor for life. Deportation has often been inflicted in France as a punishment for political offences since the revolution of 1789.

**Depos't** [Fr. *dépôt*; from the Lat. *depono*, *depositum*, to "lay down"], any matter laid down; that which is thrown down from a liquid in which it has been suspended. In geology, a bed or stratum of rock formed of matter that has settled from suspension in water. Deposits are characterized, according to the conditions under which they were formed, as marine, lacustrine, or fluvial.

**Depos'it**, partly in Broome and partly in Delaware co., N. Y. (see map of New York, ref. 6-G, for location of counties), on the Erie R. R. where it crosses the Delaware River, 177 miles N. W. of New York. It has an academy, stock-yards, a planing-mill, a flouring-mill, etc. Pop. in 1870, 1286; in 1880, 1419.

**Deposition** [Lat. *depositio*, from *de*, "down," and *pono*, *positum*, to "put"], in law, the testimony of a witness set down in writing in answer to interrogatories legally exhibited. Depositions are taken either by a judge or a commissioner specially appointed for that purpose. The questions to which the depositions are answers are usually put by the parties to the suit or their legal representatives, under the control of the court by whose authority the commission to take the testimony issues. Such depositions form an established medium of proof in the English court of chancery. It is a rule in the law of evidence that a deposition cannot be read where the witness himself might be produced, because his oral testimony is the most satisfactory medium of proof.

**Deposition**, in geology, the process by which sedimentary deposits or strata are formed. The greater portions of the strata of sandstone, limestone, and slate are the result of deposition. During the process of deposition each separate layer was once the uppermost, and was in contact with water, as is proved by the numerous fossils of marine animals found in it. "By attending," says Lyell, "to the

nature of these remains, we are often enabled to determine whether the deposition was slow or rapid, and whether it took place in a deep or shallow sea."

**Depot** [Fr. *dépôt*, dâ'pô', from the Lat. *de*, "down," and *pono*, *positum*, to "put" or "place"], a storehouse or place for the reception of goods for safe keeping;\* a military station, where supplies are kept, recruits received and trained, and the needs of soldiers provided for. The term is also applied to that portion of a battalion remaining when the rest are ordered upon foreign service. The combining of several battalions of depots forms a depot battalion. In America the name depot is popularly and somewhat incorrectly given to railroad stations.

**Dep'ping** (GEORGE BERNARD), a *littérateur*, born at Münster May 11, 1784, removed in early life to Paris. He wrote "The Maritime Expeditions of the Normans in the Tenth Century" (1826), "History of Normandy" (1835), and other works. Died Sept. 5, 1853.

**Depres'sion of Equa'tions**, in algebra, the derivation from a given equation of another lower in degree, whose roots are related in a known way to those of the first. This reduction can always be effected by simple division when one or more of the roots are known; but without knowing the roots beforehand the equation may be depressed—1st, when some particular relation subsists between two (or more) of the roots; for example, if an equation contain equal roots, these may be found and the equation reduced by as many dimensions as there are equal roots; 2d, if two roots of an equation be equal in magnitude, but opposite in sign; and 3d, if the equation be a reciprocal one—that is to say, such that its form is not

changed by changing  $x$  into  $\frac{1}{x}$ . (See EQUATION, by F. A. P. BARNARD.

**Dep't'ford**, a town and naval port of England, is on the Thames, 4 miles below London Bridge, and is separated from Greenwich by the Ravensbourne, which here enters the Thames. It is partly in Kent and partly in Surrey. It contains a large naval arsenal and dockyard. The victualing-yard, from which the navy is supplied with provisions, is the largest establishment of the kind in the kingdom. Pop. in 1881, 60,188.

**Dep'uty** [Fr. *député*, from the Lat. *deputo*, to "judge," to "destine," to "appoint"], a person appointed to act for another as representative, lieutenant, viceroy, or agent; a delegate; a legislator chosen to represent his constituents. One of the legislative bodies of France under the monarchy (1814-48) was called the *Chambre des Députés*, and the term *député* is now applied to the members of the French National Assembly. In Italy the lower house is called *Camera de' Deputati*, "Chamber of Deputies." It consists of about 500 deputies, elected by the people who pay taxes.

**Deputy** (HENRY WALTER). See APPENDIX.

**De Quincey** (THOMAS), an English author, born in Manchester Aug. 15, 1785. He was a younger son of a wealthy merchant. He once ran away from school and went to London, where he passed nearly two months in extreme want and strange adventures. He entered the University of Oxford in 1803, and there contracted a habit of using opium. In 1808 he quitted the university, became a friend and associate of Coleridge, Southey, and Wordsworth, and began to reside at Grasmere in the Lake district. He married in 1816, devoted his time chiefly to literature, made good translations from Lessing and Jean Paul Richter, and contributed articles on biography, philosophy, and other subjects to "Blackwood's Magazine." When in the prime of life he reformed the habit of the excessive use of opium, and in 1821 he published "Confessions of an English Opium-Eater." He removed to Scotland in 1843, and passed the later years of his life near Edinburgh. He was one of the most brilliant magazine-writers of his time, and wrote on a great variety of subjects, but his works are mostly fragmentary. The first edition of his collected works was published by Ticknor & Fields, Boston (18 vols., 1851-58). He died in Edinburgh Dec. 8, 1859.

**Der'a Ghazee' Khan**, a town of British India, hard by the river Indus and 65 miles N. W. of Bhawalpoor. It is advantageously situated for trade, and has manufactures of silk and cotton goods and cutlery. Pop. 20,123 (one-half Mohammedan).

**Derah** [Arab. *deraa*], the unit measure of length in Egypt. The subdivisions are the *kadam* = one-half of a derah, the *abdat* = one-sixth of a derah, and the *kerat* = one-twenty-fourth of a derah. Several derahs are in use—viz. the common derah of Egypt = 22.37 British inches;

the derah Hendazeh, by which dry goods are sold = 25.5 British inches; the derah Istambouhi (Constantinopolitan derah), used for European dry goods = 66.34 British inches; and the ancient derah of the Nile or of Memphis = 20.699 British inches. The first three values above are given on the authority of the "Report of the International Conference on Moneys, Weights, and Measures," Paris, 1867; and the last on that of Prof. Piazzzi Smyth. This measure has some interest, in consequence of its connection with recent discussions concerning the Great Pyramid of Egypt, and the purpose of its construction.

**Der'a Is'maeel' Khan**, a town of British India, in Derajat, on the Indus, 17 miles N. N. W. of Bukkur. It has an active trade and manufactures of cotton cloth. Pop. 24,906.

**Derayah, El**, a town of Arabia, in Nedjed, about 430 miles N. E. of Mecca, was formerly the capital of the Wahabees. It has a beautiful situation, with gardens and fertile fields in the environs. It was once a populous town, and contained about thirty mosques, but it was taken and partly destroyed by Ibrahim Pasha in 1819. Pop. about 15,000.

**Der'bend'**, a fortified maritime town of Russia, capital of Daghestan, is on the W. shore of the Caspian Sea; lat. 42° N., lon. 48° 15' E. It is situated at the foot of a mountain, and at the entrance of a defile called by the ancients *Albanis Pylæ*, and now the Pass of Derbend. It is enclosed by walls which are supposed to be 1000 years old or more, and are eight feet thick and twenty-six feet high. The harbor is poor, and accessible only to small boats. Derbend was taken from Persia by the Russians in 1795. Pop. 16,552.

**Der'by**, an inland county of England, occupies nearly the centre of the country, and has an area of 1025 square miles. In the time of the Britons it belonged to the kingdom of the Coribani; under the Roman rule it formed part of *Britannia Prima*; in the period of the Heptarchy it stood under the kings of Mercia. It is bounded E. by Nottinghamshire and Leicestershire, W. by Staffordshire and Cheshire, N. by Yorkshire and Cheshire, and S. by Leicestershire. It consists of 331 parishes and townships, and for electoral purposes is divided into the East, the North, and the South, each of which divisions sends two members to Parliament; so that the whole county, including the two members of the borough of Derby, is represented in Parliament by eight members. It is drained by the rivers Trent and Derwent. The county is remarkable for the variety of its scenery, and is partly occupied by the Penine chain, formed of carboniferous limestone, which abound in precipices, caverns, and rocking-stones. The Peak, the highest hill in Derbyshire, has an altitude of 2000 feet. This county is rich in minerals—viz. coal, copper, iron, lead, zinc, marble, fluor-spar, etc. Here are important manufactures of cotton, silk, and worsted goods, metallic wires, and porcelain. It is traversed by several canals and railways. Capital, Derby. Pop. in 1881, 461,141.

**Derby**, a manufacturing town of England, capital of the above county, is on the river Derwent, at the junction of the main branches of the Midland Railway, 119 miles N. N. W. of London and 35 miles N. N. E. of Birmingham. It is an old town. During the Heptarchy it was called *Northworthing*. Its present name, "Derby," or "Deoraby," was given to it by the Danes. It was incorporated by Henry I. Its present charter was granted to it in 1683 by Charles II. The private houses are mostly built of brick. Here is a free grammar school founded in 1162. Derby has manufactures of silk, cotton, lace, hosiery, porcelain of great beauty, jewelry, and ornaments of fluor-spar; also iron-foundries, rolling-mills, and tanneries. The staple manufacture is throwing silk, introduced early in the eighteenth century. Pop. in 1881, 81,168.

**Derby, Conn.** See APPENDIX.

**Derby** (EDWARD GEOFFREY SMITH-STANLEY), FOURTEENTH EARL OF, an English statesman, was born in Lancashire Mar. 29, 1799. He was educated at Oxford, was elected to Parliament in 1820, and represented successively Preston, Windsor, and North Lancashire. In 1825 he married a daughter of Lord Skelmersdale. He supported the Reform bill, and became chief secretary for Ireland in 1830. In 1833 he entered the Whig ministry as secretary for the colonies, but he resigned office in 1834, and joined the conservative party. He was secretary for the colonies in the cabinet of Sir Robert Peel from 1841 to 1845. Having been created Baron Stanley in 1844, he then passed into the House of Lords. He resigned office in 1845, because he was opposed to the repeal of the Corn laws, and soon after this date began to be regarded as the leader of the conservatives and protectionist party. He stood in the foremost rank as a parliamentary debater. On the death of his

\*The original idea of *depot* is that of a place where something is "put down" for a short time, to be taken up again. *Repository* (from *re*, "back," and *pono*, to "put") is a place where something is put back (out of the way), to be kept a long time.

father, in 1851, he succeeded him as earl of Derby. He was prime minister from Feb. to Dec., 1852, and was then succeeded by Lord Aberdeen. He was the leader of the opposition during the administration of Lord Palmerston, who resigned in Feb., 1858. Lord Derby then formed a new ministry, in which he was first lord of the treasury (premier). He introduced a bill for electoral reform, but the House adopted an amendment offered by Lord John Russell. Lord Derby therefore dissolved Parliament and appealed to the country, but the liberals obtained a majority in the new House of Commons which met in June, 1859, and Lord Derby then resigned office. He produced a translation of Homer's "Iliad" into blank verse (1865), which is highly commended. Russell and Gladstone, whose Reform bill had been rejected by the House of Commons, retired from power in June, 1866, and Lord Derby was then requested by the queen to form a new ministry. He failed in his effort to draw several Whig or liberal leaders into a coalition. His principal colleague was Disraeli, who prepared a new Reform bill, passed in 1867, extending the right of suffrage to great numbers of the middle class. He resigned in Feb., 1868, and was succeeded by Disraeli. Died Oct. 23, 1869.

**Derby, EARLS OF** (England, 1485), Barons Stanley (United Kingdom, 1832), and baronets (1627). The kings of Man were of this line from 1406 till 1505, when they took the title of lords of that island. The lordship of Man passed from the Derby family in 1735.—EDWARD HENRY SMITH-STANLEY, fifteenth earl, P. C., D. C. L., was born at Knowsley Park July 21, 1826. He was formerly styled Lord Stanley. He was educated at Trinity College, Cambridge, where he graduated as first class in classics in 1848, and was elected to Parliament in the same year. He was one of the most liberal members of the conservative party. In Feb., 1858, he entered the cabinet as secretary for the colonies, and in the ensuing May he became commissioner for the affairs of India. He retired from office when the liberals came into power, in June, 1859. On the formation of a conservative ministry by his father in June, 1866, he was appointed secretary for foreign affairs. He presided over the conference of the European powers which was held in London in May, 1867. He resigned with his colleagues in Dec., 1868, and inherited the title of earl of Derby in Oct., 1869; became sec. of foreign affairs 1874, and resigned Mar. 28, 1878.

**Derby (ELIAS HASKET)**, a merchant, born at Salem, Mass., Aug. 16, 1739, was a distinguished ship-owner, and in the Revolutionary war engaged extensively, and successfully in privateering upon British commerce. He afterwards established the American China and East India trade. Died at Salem, Mass., Sept. 8, 1799.—GENERAL ELIAS HASKET DERBY, born at Salem Jan. 10, 1766, was also one of the founders of the India trade. He also began the manufacture of American broadcloth, and is believed to have been the first importer of merino sheep. Died Sept. 16, 1826.—ELIAS HASKET DERBY, a son of the preceding, born Sept. 24, 1803, graduated at Harvard in 1824, became an eminent lawyer and railroad president, and is well known for his contributions to the "Atlantic Monthly," "Edinburgh Review," etc. He labored with zeal in the construction of iron-clad vessels during the civil war.

**Derby (GEORGE H.)**, an American officer and humorist, born in 1823 in Norfolk co., Mass., graduated at West Point in 1846, and July 1, 1860, captain of topographical engineers. He served in the war with Mexico 1846-47, engaged at Vera Cruz and Cerro Gordo (severely wounded and brevet first lieutenant); on various surveys and explorations 1846-52; on improvement of San Diego harbor, Cal., 1853-54; on staff of commanding general and in charge of military roads department of the Pacific 1854-56; on coast survey 1856; and lighthouse engineer 1857-59. Under the *nom-de-plume* of "John Phoenix" he was author of "Phœnixiana, or Sketches and Burlesques," 1860, of "Squibb Papers," 1860, and of numerous humorous effusions. Died May 15, 1861. GEORGE W. CULLUM.

**Derbyshire Spar**, a name given to the fluoride of calcium or FLUOR-SPAR (which see).

**Deroylidas** [Δερυλλίδας], a Spartan commander sent to aid the Asiatic Greeks in their resistance to the Persian forces under Pharnabazus and Tissaphernes, B. C. 399. He captured a number of cities in Asia Minor, and built a wall to protect the Greeks of the Chersonesus against the Thracians. He was superseded by Agesilaus, B. C. 396. HENRY DRISLER.

**Derecske**, a town of Hungary, in the county of Bihar, 12 miles S. of Debreczin. Near it are several small lakes, in one of which pearls are found. Pop. 7630.

**Derg, Lough** ("Red Lake"), a small lake of Ireland between Donegal county and Tyrone. It encloses an isle

called St. Patrick's Purgatory, which is visited annually by nearly 12,000 devotees, and is the most celebrated place of pilgrimage in Ireland. The whole lake is 3 miles by 2½, and is surrounded with high cliffs.

**Derived Function, or Derivative**, a term first used by Lagrange in his "Calcul des Fonctions" to indicate the coefficient of  $h$  in the development of a function  $F(x+h)$  according to powers of  $h$ . It is itself a function of  $x$ , and is usually represented by the symbol  $F'(x)$ . In a similar manner the derived function of  $F'(x)$  is termed the second derived function of  $F(x)$ , and is denoted by the symbol  $F''(x)$ . By allowing  $h$  to diminish indefinitely, the identity of the derived function and the differential coefficient  $\frac{dF(x)}{dx}$  is at once seen. (See DIFFERENTIAL COEFFICIENT, by F. A. P. BARNARD.)

**Der'matophytes** [from the Gr. *δέρμα* (gen. *δέρματος*), the "skin," and *φύον*, a "plant"], a term applied to cryptogamic vegetable growths which inhabit the cuticle or epidermis, and give rise to certain skin-diseases, such as favus, ringworm, etc. It is held that the various forms of these plants are in many cases transmutable into each other. For example, the favus plant, the barber's-itch plant (*Achorion*), and the chloasma plant (*Microsporon*) are only forms of the yeast plant (*Torula* or *Cryptococcus cerevisiæ*).

**Dermop'tera** [from the Gr. *δέρμα*, "skin," and *πτερόν*, a "wing" or "fin"], an order of cartilaginous fishes characterized by the absence of pectoral and ventral fins. The rays of the vertical fins are soft and delicate, or imperceptible. The lancelet and lampreys are of this order.

**Der'moskel'eton** [from the Gr. *δέρμα*, "skin," and *σκελετόν*, a "skeleton"], a term applied to the crustaceous, testaceous, or osseous integument which covers many invertebrate animals, as the beetle and lobster; also some vertebrate animals, as the tortoise. It serves to protect the soft parts of the body, and affords points of attachment for the organs of locomotion.

**Der'ne, Der'na, or Bel'ed-al-Soor** (anc. *Darnis*), a seaport-town of Northern Africa, in Barca, is 1 mile from the Mediterranean; lat. 32° 46' N., lon. 22° 41' E. Its harbor is insecure, and its general prosperity is decreasing. During the hostilities between the U. S. and Tripoli this town was taken in 1805 by the American forces under Gen. Eaton. Pop. about 6000.

**Deroulède** (PAUL), born in Paris in 1846, studied law, served as a volunteer in the campaign of 1870, and was wounded at Sedan, but escaped into Belgium. His "Chansons d'un soldat" (1872) and "Nouveaux chansons d'un soldat" (1875) attracted much attention and ran through many editions. His "Hetman," a drama in five acts and in verse, also proved a success (1877).

**De Rosset** (JOHN ARMAND), M. D., of Wilmington, N. C., was one of the most remarkable men of the medical profession of the U. S. Born in 1767 in North Carolina, of Huguenot descent, he graduated in Princeton College, studied under Dr. Rush (receiving the highest mark of distinction), practised his profession sixty-nine years, and died in the ninety-second year of his age. When eighty years old he said, "I have prescribed for six generations in one family." His grandfather, father, himself and two sons have all practised medicine in Wilmington, N. C. Of him it has been said, "In every respect he was a model of the Christian and gentleman." PAUL F. EVE.

**Der'rick** [said to be the name of a celebrated hangman at Tyburn in the seventeenth century; hence, literally, a "hanger"], a mechanical invention used for lifting machinery, raising wrecks and other great weights, and transporting them from one place to another. A floating derrick or crane consists of an iron pontoon, divided into several watertight compartments, from the centre of which rises a tripod mast. Across the mast turns a boom of great strength: one arm of the boom is furnished with fourfold blocks, through which pass the chains intended to hoist the weight; the chains pass over the top of the mast to the opposite end of the boom, and thence descend to the side of the vessel, where they are connected with steam-engines in the pontoon. Water is admitted into the compartments of the pontoon as a counterpoise to the weight suspended.

**Derrien** (ROMAIN MARIE), born at Quimper, in the department of Finistère, France, June 1, 1780, died in Paris Jan. 20, 1844. He studied engineering and was early connected with the construction of the road across Mont Cenis, which work was finally completed under his direction. As chief-engineer of the department of Maine-et-Loire he drained the swamps of Anthion, constructed the bridge of Saumur, etc. In 1833 he was charged with the building of the strategical roads of Western France.

**De Russy** (RENÉ EDWARD), an American officer, born in 1791 in New York City, graduated at West Point in 1812, colonel of engineers Mar. 3, 1863. In the war of 1812-15 with Great Britain he was engaged on the Canadian frontier in the repulse of the British flotilla at French Creek 1813, battle of Chrystler's Field 1813, attack on La Cote Mill 1814, battle of Plattsburg 1814, and after Gov. Provoost's defeat was chief engineer of Gen. Macomb's division. He served in the construction of fortifications 1816-33; as superintendent of the Military Academy 1833-38; in building coast defenses and improving harbors and rivers 1838-65; as member of various boards of engineers 1848-64; and in command of corps of engineers 1858-61. Brevet brigadier-general, Mar. 13, 1865, for long and faithful service. Died Nov. 23, 1865, at San Francisco, Cal., aged seventy-five.

GEORGE W. CULLUM.

**De Ruyter**, on R. R., Madison co., N. Y. (see map of New York, ref. 5-G, for location of county), about 25 miles S. S. E. of Syracuse. It is the seat of the De Ruyter Institute, and is in a good hop and dairy section. Pop. in 1870, 605; in 1880, 586.

**Der'vish** [probably—though the etymology is somewhat uncertain—derived from *darvêsh* or *darvêsh*], a Persian word signifying "the sill of the door"—that is, one who begs from door to door, a mendicant, a name applied to the orders of Mohammedan monks in Persia, India, and Turkey. Some belong to communities, and reside partly in monasteries and partly outside; others wander solitarily through the land, living on alms and professing abstinence and holiness, but belonging to no particular sect. Their worship consists in prayers, mortifications, and religious dances. Dervishism is supposed to have taken its rise in Persian Soofeism.

**Der'wentwater**, also called **Keswick Lake**, a beautiful lake of England, in Cumberland, is an expansion of the river Derwent. It extends southward from Keswick, is 3 or 4 miles long and  $1\frac{1}{2}$  miles wide. Its banks are rocky, abrupt, and picturesque. On this lake is a remarkable floating island, covered with vegetation and full of air-bubbles, which render it buoyant.

**Derwentwater** (JAMES RATCLIFFE), EARL OF, an English Catholic and Jacobite, born in Northumberland June 28, 1689. He inherited the earldom from his father in 1705. In 1715 he raised a small body of his retainers to fight for the Pretender. He was one of the leaders of the army that was defeated at Preston (Nov. 13), and was taken prisoner. He was convicted of treason, and beheaded Feb. 24, 1716. His estates were given to Greenwich Hospital.

**Derzha'vin**, written also **Derzavin** or **Derjavine** (GABRIEL ROMANOVITCH), a celebrated Russian lyric poet, born at Kazan July 3, 1743. He entered the army in 1760, and was raised to the rank of colonel. Having gained the favor of the empress Catharine, he was appointed secretary of state in 1791. He became a senator in 1793, imperial treasurer in 1800, and minister of justice in 1802. In 1810 he published four volumes of poems, remarkable for originality, sublimity, and for purity of sentiment. His most popular poem is an "Ode to the Deity" ("Oda Bogu"), which has been translated into English, Chinese, and other languages. Died July 6, 1816.

**Desaguade'ro** (i. e. the "outlet"), a river of Bolivia, issues from Lake Titicaca, of which it is the only outlet. It flows southward about 190 miles and enters Lake Aullagas. It is the highest considerable river in America, for the elevation of its source is 12,846 feet, and that of its mouth is not much less.

**Desaguadero**, a vast table-land in Bolivia and Peru, between two ranges of the Andes. It extends from Potosí to the peak of Vilcanota, and is about 400 miles long. Area, estimated at 150,000 square miles. It contains the great lake Titicaca, 12,846 feet above the level of the sea, and Lake Aullagas, which has no outlet.

**Desaix de Veygoux** (LOUIS CHARLES ANTOINE), an able French general, born near Riom, in Auvergne, Aug. 17, 1768. He served with distinction in several campaigns of the army of the Rhine, and was rapidly promoted to the rank of general. In 1798 he took part in the expedition to Egypt. He gained a victory at Sidiman in October of that year, and completed the conquest of Upper Egypt in 1799. He afterwards governed that province with such moderation and justice that the natives called him "The Just Sultan." In May, 1800, he returned to France, and hastened to join the army in Italy. The French were about to retreat at Marengo, when Desaix arrived with a reserve, and converted defeat into a decisive victory, but he was killed in this action, June 14, 1800. (See J. LAVALÉE, "Éloge historique du Général Desaix;" THIERS, "History of the Consulate.")

**De Sanctis** (LUIGI), a leader of the Protestant movement in Italy, born Dec. 31, 1808, was for some years a priest and professor of theology in Rome, became a Protestant in 1847, established the Protestant periodical "Eco della Verità," and was in 1868 appointed professor of theology at the Waldensian Seminary in Florence. He wrote a number of treatises against the Roman Catholic Church which have been translated into several languages. Died Dec. 31, 1869.

**Des Arc**, capital of Prairie co., Ark. (see map of Arkansas, ref. 3-D, for location of county). Pop. in 1880, 548.

**Desaugiers** (MARC ANTOINE MADELEINE), a French song-writer, born at Frejus Nov. 17, 1772. He produced many popular songs and comedies or vaudevilles, and was twice director of the Théâtre du Vaudeville. He taught pianoforte-playing for some years in the U. S. Died Aug. 9, 1827.

**Desault** (PIERRE JOSEPH), an eminent French surgeon, born Feb. 6, 1744, was a pupil of Antoine Petit. He was considered the most skilful French surgeon of his time, and had a very large practice. Died June 1, 1795. His doctrines were published in the "Surgical Works" of his scholar, Bichat. (See PETIT, "Éloge de Desault," 1795.)

**Descartes** (RENÉ), [Lat. *Renatus Cartesius*], an illustrious French philosopher and mathematician, born at La Haye, in Touraine, Mar. 31, 1596. He was educated at the college of La Flèche, where he acquired great proficiency in mathematics and astronomy, and formed an intimate friendship with Mersenne. He left college in 1612, dissatisfied with the method and doctrines which were then in vogue. He resolved to efface from his mind all scholastic dogmas and the prejudices of his education, to reject the authority of books, and to admit only that which was confirmed by reason and experiment. He entered the Dutch army in 1616, and that of the duke of Bavaria in 1619, but he renounced the military profession in 1621. In pursuit of knowledge he travelled for several years in Italy, France, and other countries. He settled in Holland in 1629, in order to devote himself to the study of mathematics, astronomy, metaphysics, etc. He made important discoveries in algebra and geometry, which he announced in his "Discourse on the Method of Reasoning Well and of Investigating Scientific Truth," 1637 ("Discours sur la Méthode pour bien conduire sa Reason," etc.). This work comprises treatises on metaphysics, dioptrics, and geometry. He was the first who introduced exponents or applied the notation of indices to algebraic powers, and he gave a new and ingenious solution of equations of the fourth degree.

He published in 1641 "Meditationes de Prima Philosophia," which gave a wonderful impulse to philosophical inquiry. He founded the superstructure of all positive knowledge on the basis of self-consciousness, or the relation between consciousness and existence, which he expressed in this phrase: "Cogito, ergo sum"—"I think, therefore I exist." He worked a greater change in metaphysical thought than any modern philosopher. The innovations and paradoxes of the Cartesian philosophy excited much hostility among the theologians and the disciples of Aristotle. His book was condemned by the college of cardinals at Rome. Among his other works is "Principles of Philosophy" ("Principia Philosophiæ," 1644), in which he propounds his theory of the world—that the sun is the centre of a vortex of an ethereal fluid, whose whirling motion produces the revolution of the planets and other phenomena. The French court granted him a pension of 3000 livres in 1647. Having been invited to her court by Christina, queen of Sweden, he went to Stockholm 1649, where he died Feb. 11, 1650, from a cold he caught by standing in shoes and silk stockings on the cold marble floor, to teach philosophy early in the morning to the queen, still in bed. Complete editions of his works were published in 1690 and 1824. The "Meditations" have been translated into English by W. Molyneux (London, 1680) and by W. R. Walker ("Jour. Spec. Phil.," St. Louis, 1870). (See G. H. LEWES, "Biographical History of Philosophy;" MILLET, "Descartes, sa Vie, etc.," 1869.)

**Descartes' Rule of Signs**, a theorem by means of which the maximum number of positive or negative roots of an equation can be ascertained by inspection. The theory reduces itself essentially to this: The number of positive roots of an equation cannot exceed the number of variations in the signs of its coefficients, considered in their proper order. As an illustration, take the cubic equation  $F(x) = 3x^3 - 7x^2 + 11x + 4 = 0$ . Inasmuch as there are but two variations of signs on passing from one extreme term to the other, through the intermediate ones, we conclude that the cubic cannot have more than two positive roots. To ascertain the maximum number of negative roots, it is merely necessary to apply the same theorem to the equation which is obtained from the original by chang-



ing  $x$  into  $-x$ . Thus the positive roots  $F(-x) = -3x^3 - 7x^2 - 11x + 4 = 0$  are negative roots of the original cubic, and by Descartes' rule their number cannot exceed one. This rule is a particular case of Fourier's theorem.

**Descent**, in law, is the succession to landed estate after the owner's death, in cases where he has not made previous disposition of the estate. The rule of descent among the ancient Greeks was that the sons shared alike, and the daughters were dependent upon the bounty of their brothers. Among the Hebrews the eldest son had a double portion. With the ancient Romans sons and daughters shared alike. The former English law was very complicated, but has of late received important modifications. The law of primogeniture prevails as to males, while several females of equal degree claim as one heir.

The subject of descent is regulated by positive rules in the U. S., and but few of general application can be stated. The following may be referred to as either of common recognition or having some peculiarity worthy of notice:

1. Title by descent depends upon a rule of law. The person from whom the land descends is termed an ancestor; the one to whom it passes is called an heir, who has no volition in the matter. The estate is cast upon him, at the death of the ancestor, even against his consent.

2. The persons to whom land descends are specifically designated by positive rule, and may be grouped as follows: (1) Lineal descendants. These, if of equal degree, take equally undivided shares or are "tenants in common." If of unequal degree, those who are more remote take the share that would have belonged to their parent if living. Thus, if the ancestor had left a son A, and C, D, E, children of a deceased son B, the grandchildren taken together would have the share of B. Those who inherit on equal terms are said to take *per capita*; those who take the shares of deceased persons, as above illustrated, are said to take *per stirpes*. (2) Where there are no descendants, the next claimants would regularly be the parents (the father being frequently preferred to the mother), as they are removed but one degree from the intestate, while the nearest collateral relatives (brothers and sisters), reckoning according to the methods of the civil law (see CONSANGUINITY), are two degrees. Still, if the estate descended to the intestate from maternal relatives, there are cogent reasons for preferring the brothers and sisters to the father, and the same reasons for preferring them to the mother where the land came from paternal relatives. Under these circumstances the law of some of the States gives the land to the father or mother for life only, as the case may be, and the estate itself to the brothers and sisters. (3) If there be no father or mother or descendants, the land will descend to the brothers and sisters equally, with the same distinctions as to taking *per capita* and *per stirpes* as noticed under subdivision (1). (4) The next claimants are either grandparents, or, if these be passed over, as may be the case, uncles and aunts and their descendants. In the instance of uncles, etc. the law of some of the States distinguishes between the case where the intestate acquired the estate by his own act and where he obtained it by inheritance. In the former instance the descent would take place to maternal and paternal uncles and aunts and their descendants, without discrimination; in the latter, the uncles, etc. belonging to that branch of the family from which the estate was derived would have the preference. More remote claimants need not here be noticed. (5) Distinctions sometimes are recognized between relatives of the whole blood and those of the half blood, so that the latter are excluded from inheriting. An illustration is found in the law of New York, under which, for example, a brother of the half blood on the maternal side (*frater uterinus*) cannot inherit land from a brother having a different father, which land such brother had inherited from his father, as the claimant is not in that case of the blood of the immediate ancestor from whom the estate was derived by the brother from whom inheritance is claimed. (*Wheeler vs. Clutterbuck*, 52 New York Reports 67, 1873.) (6) Posthumous children inherit as if they had been born during the life of the ancestor. They must be born alive, and of such a state of development that by the laws of physiology they are capable of living. (7) The English common law will prevail unless abrogated by statute. Thus, in New York, where the special cases referred to in the statute of descents do not occur, primogeniture still is recognized.

3. Illegitimate relatives cannot in general inherit, though in a number of the States they may under certain qualifications, particularly from the mother and maternal relatives.

4. The law of the State where the land is situate governs descent, without reference to the law prevailing where the owner resides.

5. In general, all interests in and rights to land are governed by the rules of descent. Thus, should the intestate have only a right of action, or be the owner of a future

estate, or have simply a beneficial ownership, such as an estate held in trust, his rights and qualified estates of this nature will be transmitted under the same general rules as if he were legal owner in possession. This proposition is in some respects in marked contrast with the doctrines of the common law. This system required the ancestor to have been at some time seized or to have an estate of which seisin could be affirmed. (See SEIZIN.) Accordingly, if he had acquired only a right of action, this could not descend from him, nor could in general an estate of which he had acquired the ownership, subject to a life estate in another. Still, if he had once been seized, the unlawful deprivation of his seisin would not prevent the operation of the law of descent.

6. In a number of the States aliens cannot inherit. This is a rule of the English common law. In other States it has been abrogated.

(Accurate knowledge of the law of descents in any State can only be acquired by an examination of its statutes. See also WASHBURN "On Real Property," and BLACKSTONE'S and KENT'S "Commentaries.") T. W. DWIGHT.

**Deschamps** (EMILE), a French poet and dramatist, born at Bourges Feb. 20, 1791. He produced in 1818 two successful comedies, entitled "Selmours et Florian" and "Le Tour de Faveur," and took position in the literary world as one of the most ardent champions of the Romantic movement. In 1828 he published a volume of poems called "French and Foreign Studies." He contributed to the journals some prose tales and a great number of critical articles. He also translated "Romeo and Juliet" and "Macbeth." Died April, 1871.

**Deschanel** (MARTIN), a French author, born at Paris Nov. 14, 1819, published in 1850 "Catholicisme et Socialisme," and articles for the republican press which caused his banishment. Returning in 1859, he became an editor of the "Journal des Débats." He printed "Les Courtesanes de la Grèce" (1854), "Histoire de la Conversation" (1858), "Physiologie des écrivains et des artistes" (1864), and "Études sur Aristophane" (1867).

**D'Esclot, or Esclot** (BERNAT). See APPENDIX.

**Descriptive Geometry** is a branch of practical mathematics, the object of which is to obtain representations on plane surfaces of accurately-defined bodies in space, for the investigation of their metrical as well as descriptive properties. It differs from ordinary perspective, inasmuch as by the latter method the actual dimensions of a body cannot be ascertained from its representation. In descriptive geometry points in space are represented by their orthographical projections on two planes at right angles to each other, called the planes of projection. It is usual to suppose one of the planes of projection to be horizontal, in which case the other is vertical; and the projections are called horizontal or vertical according as they are on the one or the other of these planes. Any curve in space will be represented by two curves in the horizontal and vertical planes, and a curved surface by the corresponding representations of certain points and curves on that surface. Thus, a plane would be completely defined by its intersections with the planes of projection. The intersections of a line or surface with the planes of projection are called its traces. Again, a sphere may be represented by the projections of its horizontal (or vertical) great circle; a cylindrical surface by its trace on one of the planes of projection, and the projection of any generator on the other; a cone by the projections of its vertex, and by one of its traces, etc. Although applicable to sculpture and all mechanical arts, it is especially useful to civil and military engineering. Among the best works on the subject are those of Monge, Hachette, Lacroix, and Leroy.

**Des'eret**, a name given by the Mormons to UTAH (which see). The Mormons claim that in the language of their sacred books this word means "honey-bee."

**Deseret, University of**. See APPENDIX.

**Des'ert** [from the Lat. *deserta*, neut. plu. of *desertus*, passive part. from *desero*, *desertum*, to "forsake," "forsaken" places], a term generally used to designate a barren or uninhabited place, but applied more particularly to the vast sandy and stony plains of Africa and Asia. In every region of the globe plains are to be found which, though resembling each other in their grand outlines, exhibit, with the different latitudes in which they are placed, a corresponding variety of character. There are considerable tracts of desert land in Nevada, Arizona, and other parts of the U. S. Such are the "Bad Lands" E. of the Rocky Mountains; these are not plains, but are generally peculiarly broken and rocky surfaces. The principal desert of South America is the nearly rainless Atacama region. The most striking feature of North Africa is its immense deserts; of these the chief is the Sahara, or *The Desert*, so called by way of eminence.

The great deserts of Africa are separated from those of Asia only by the valley of the Nile and the Red Sea, the sandy zone extending throughout the breadth of the old continent from Western Africa to 120° E. longitude.

In many parts the dreary waste of loose and hardened sand is broken by low hills of naked sandstone or by tracts of arid clay, and occasionally it is enlivened by verdant isles or oases, which serve as resting-places for caravans. It has been computed to cover an area of 6,500,000 square miles, but the Asiatic portion of this tract includes many chains of mountains and fertile valleys. It is characterized by arid wastes of sand or clay, sometimes with saline incrustations on the surface. Except the Nile, the Euphrates, the Indus, and the Oxus, there are no large rivers in a region which embraces almost a fourth part of both Africa and Asia. This portion of Central Asia forms a series of elevated plains 6000 miles in length from E. to W. "Some of these plains," says Humboldt, "are covered with herbage; others produce only evergreen saliferous plants; but a great number glitter from afar with a saline efflorescence that crystallizes in the semblance of lichens, and covers the clayey soil with patches like new-fallen snow."

In the Old Testament four words are employed, all of which are sometimes, not uniformly, rendered in our English version "desert," but no one of them denotes a sandy waste. Desert, in the Hebrew sense, is simply untilled pasture-land, which may be covered with a luxuriant vegetation. In the New Testament, *ἐρημος* has the same sense, which of course is quite at variance with classic usage.

REVISED BY R. D. HITCHCOCK.

**Desfontaines** (RENÉ LOUCHE), a French botanist, born in Feb., 1752. In 1798 he published "Flora Atlantica" (2 vols. 4to), which treats of the plants of Africa. He discovered the difference in the growth and structure of endogenous and exogenous plants. Died Nov. 16, 1833. (See A. P. DE CANDOLLE, "Notice Historique sur la Vie de M. Desfontaines," 1834.)

**Desgenettes** (NICOLAS RENÉ DUFRICHE), M. D., BARON, a French physician, born at Alençon May 23, 1762. He was chief physician of the army of Italy in 1795-96, and was physician to the grand army during the empire. He wrote several medical works. Died Feb. 3, 1837.

**Deshoulières** (ANTOINETTE DU LIGIER DE LA GARDE), a French poetess, was born in Paris about 1634. She was distinguished for wit and beauty, and was married in 1651 to an officer named Deshoulières. Among her works are "Les Moutons," an idyl, eulogues, odes, "Moral Reflections," and a tragedy, "Generie." Died Feb. 17, 1694.

**Des'iccant** [Lat. *desiccans*, from *de*, intensive, and *siccans*, pres. part. of *siccō*, *siccātum*, to "dry"], in medicine, an application used to check the secretion of a membrane or ulcer.

**Desicca'tion** [Lat. *desiccatio*, from *de*, intensive, and *siccō*, *siccātum*, to "dry"] is a process of extracting moisture by chemical agency or by the use of air and heat. Chloride of calcium, quicklime, fused carbonate of potash, and oil of vitriol are used for this purpose.

**Desima**, a Japanese island in the Bay of Nangasaki, contains the factories of the Dutch.

**Desmidia'cæ**, an order of the green Algæ, closely approaching the Diatomacæ.

**Des Moines**, de-moin', a river of the U. S., and the largest that traverses the State of Iowa, rises in the S. W. part of Minnesota. It flows in a S. S. E. direction to the capital city Des Moines, below which it runs nearly south-eastward until it enters the Mississippi River at the S. E. extremity of Iowa, about 4 miles below Keokuk. Length, estimated at 500 miles. It flows through fertile undulating prairies and a large field of bituminous coal.

**De Smet**, Dak. See APPENDIX.

**Des Moines**, an important R. R. centre (with 13 R. Rs.), capital of Iowa and of Polk co. (see map of Iowa, ref. 5-G, for location of county), is on Des Moines River at the mouth of the Raccoon, 357 miles W. of Chicago, 174 miles W. of Davenport, and 138 miles E. of Omaha. The State capital was removed in 1857 to this place, at that time called Fort Des Moines. A new State-house is nearly completed, the estimated cost of which is \$3,000,000. The State library contains 28,000 volumes, and the city maintains a free library. The State arsenal, a large building, contains, besides military equipments for the State, the tattered flags of all Iowa regiments engaged in the war of 1861-65, and numberless other trophies and valuables of interest. The city has 36 churches; a large number of public and private schools, a high school, 3 colleges, 3 opera-houses, 4 street railroads, gasworks and waterworks, electric light, 3 daily and 11 weekly newspapers, 4 monthly periodicals, 5 national and 6 private banks with aggregate capital of \$1,200,000, 7 local insurance companies with a

capital of \$800,000, a U. S. court-house and post-office, built of Joliet stone, costing \$250,000, and a large county court-house. The city is built on coal and surrounded with



New State Capitol (Des Moines, Ia.).

coal-lands of inexhaustible deposits, coal being mined for a dollar a ton, making motive-power of trifling cost.

**Manufactures.**—The manufacturing interests are large and rapidly increasing, including starch factories, distilleries, woollen, flour, and oatmeal mills, linseed-oil mills, paint, soap, boiler, plough, scale, and wagon works, several potteries, etc., and 3 large packing-houses. The census of 1880 shows 155 manufacturing establishments; capital, \$1,463,250; average number of hands employed, 1378; wages paid, \$667,699; value of products, \$4,220,709.

**Population.**—Des Moines has advanced from the fifth city of Iowa in 1870 to the first in 1880. Pop. in 1870, 12,035; in 1880, 22,408; in 1885, about 36,000.

J. S. CLARKSON, Ed. of "STATE REGISTER."

**Desmoulius** (BENOIT CAMILLE). See APPENDIX.

**De Soto**, Mo. See APPENDIX.

**De So'to** (HERNANDO), a Spanish explorer, born in Estremadura in 1500. He explored in early youth the coasts of Guatemala and Yucatan. Having a high command under Pizarro, he contributed largely to the conquest of Peru. He conducted an expedition from Spain to Florida in 1539, and discovered the Mississippi River. He died in Louisiana June 5, 1542.

**Des'sau**, a town of Germany, capital of the duchy of Anhalt, is on the Mulde near its entrance into the Elbe, 80 miles by railway S. W. of Berlin. It is well built, and contains a fine ducal palace, a town-hall, a theatre, a college, and a normal school. Here are many paintings of the early German masters. It has manufactures of woollen cloth, hosiery, hats, tobacco, etc. Pop. in 1881, 23,266.

**De Staël-Holstein** (ANNE). See STAËL, DE.

**Desallines** (J. J.). See HAYTI.

**Dester'ro**, or **Nos'sa Senho'ra do Dester'ro** (i. e. "Our Lady of Desterro"), a seaport of Brazil, capital of the province of Santa Catharina, is on the island of Santa Catharina, 460 miles S. W. of Rio Janeiro. It has a trade in feathers and artificial flowers: is defended by several forts, and has a good harbor. Pop. 8000.

**Deter'minant**. This term is used to express a certain symmetrical algebraic function of  $n^2$  quantities of very frequent recurrence in the theory of equations, and still more in the higher geometry. A definition of the term, with a statement of a few of the elementary properties of determinants, and of some of their most simple applications, is all that can be attempted here.

If we take the product  $a_1b_2c_3\dots n_n$  of  $n$  factors, and permute the subscript indices in every possible way, we shall have  $1.2.3\dots n$  products. If now we give to each one of these several products a *plus* sign whenever the number of interchanges of indices necessary to produce it from the above product is *even*, and a *minus* sign when the number of interchanges is *odd*, and add the results, we have the *determinant* of the  $n^2$  quantities  $a_1, b_1, c_1, \dots, n_1, a_2, b_2, c_2, \dots, n_2, a_3, b_3, \dots, n_3$ , etc. etc.

The determinant is usually written thus:

$$\begin{vmatrix} a_1 & b_1 & c_1 & \dots & n_1 \\ a_2 & b_2 & c_2 & \dots & n_2 \\ a_3 & b_3 & c_3 & \dots & n_3 \\ \dots & \dots & \dots & \dots & \dots \\ a_n & b_n & c_n & \dots & n_n \end{vmatrix}$$

but it is also sometimes written  $\pm (a_1b_2c_3\dots n_n)$ , where the

product written in the parenthesis is that of the letters along the diagonal of the matrix, beginning at the upper left corner.

The following equations and propositions will serve to illustrate the definition. Most of them may be verified by inspection, or by actual expansion according to the rule:

$$1. \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = \pm(a_1b_2) = a_1b_2 - a_2b_1.$$

$$2. \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = \pm(a_1b_2c_3).$$

$$= a_1 \begin{vmatrix} b_2 & c_2 \\ b_3 & c_3 \end{vmatrix} - a_2 \begin{vmatrix} b_1 & c_1 \\ b_3 & c_3 \end{vmatrix} + a_3 \begin{vmatrix} b_1 & c_1 \\ b_2 & c_2 \end{vmatrix}$$

$$= a_1b_2c_3 - a_1b_3c_2 + a_2b_3c_1 - a_2b_1c_3 + a_3b_1c_2 - a_3b_2c_1.$$

$$3. \begin{vmatrix} a_1 & b_1 & c_1 & d_1 \\ a_2 & b_2 & c_2 & d_2 \\ a_3 & b_3 & c_3 & d_3 \\ a_4 & b_4 & c_4 & d_4 \end{vmatrix} = \pm(a_1b_2c_3d_4).$$

$$= a_1 \begin{vmatrix} b_2 & c_2 & d_2 \\ b_3 & c_3 & d_3 \\ b_4 & c_4 & d_4 \end{vmatrix} - a_2 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_3 & c_3 & d_3 \\ b_4 & c_4 & d_4 \end{vmatrix} + a_3 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_2 & c_2 & d_2 \\ b_4 & c_4 & d_4 \end{vmatrix} - a_4 \begin{vmatrix} b_1 & c_1 & d_1 \\ b_2 & c_2 & d_2 \\ b_3 & c_3 & d_3 \end{vmatrix}$$

$$= a_1b_2c_3d_4 - a_1b_2c_4d_3 + a_1b_3c_4d_2 - a_1b_4c_2d_3 - a_1b_4c_3d_2$$

$$- a_2b_1c_3d_4 + a_2b_1c_4d_3 - a_2b_3c_4d_1 + a_2b_4c_1d_3 - a_2b_4c_3d_1$$

$$+ a_3b_1c_2d_4 - a_3b_1c_4d_2 + a_3b_2c_4d_1 - a_3b_4c_1d_2 - a_3b_4c_2d_1$$

$$- a_4b_1c_2d_3 + a_4b_1c_3d_2 - a_4b_2c_3d_1 - a_4b_3c_1d_2 + a_4b_3c_2d_1$$

4. The determinant is a linear function of each element.  
5. A single interchange of two adjacent rows, or two adjacent columns, changes the sign of the determinant. Two such interchanges leave the determinant unaltered.

6. The value of a determinant is not affected by changing the rows into columns and the columns into rows.

7. The determinant is zero when two columns are equal, or when two rows are equal.

8. The product of two determinants is a determinant.

9. The differential co-efficient of a determinant with respect to any element is a determinant.

An idea of the use of determinants in the theory of equations and in geometry may be formed from the statement of a few propositions:

$$1. \text{ If } a_1x + b_1y + c_1z = d_1, \quad a_2x + b_2y + c_2z = d_2, \quad \text{and } a_3x + b_3y + c_3z = d_3, \text{ then } x = \frac{\pm(d_1b_2c_3)}{\pm(a_1b_2c_3)}, \quad y = \frac{\pm(a_1d_2c_3)}{\pm(a_1b_2c_3)}, \text{ and } z = \frac{\pm(a_1b_2d_3)}{\pm(a_1b_2c_3)}.$$

2. Similar values are obtained for  $n$  unknown quantities from  $n$  linear equations.

3. Three straight lines whose equations are of the form

$$ax + by + c = 0 \text{ intersect in one point if } \begin{vmatrix} a & b & c \\ a' & b' & c' \\ a'' & b'' & c'' \end{vmatrix} = 0.$$

4. The area of a triangle, the rectangular co-ordinates of

$$\text{whose angles are } x_1y_1, x_2y_2, x_3y_3, \text{ is one-half of } \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}.$$

5. These three points of No. 4 are in a straight line when the determinant is zero. Hence, the equation of a

$$\text{line passing through two given points is } \begin{vmatrix} x & y & 1 \\ x' & y' & 1 \\ x'' & y'' & 1 \end{vmatrix} = 0.$$

6. The volume of a pyramid in terms of the rectangular co-ordinates of its four summits is one-sixth of the deter-

$$\text{minant } \begin{vmatrix} x_1 & y_1 & z_1 & 1 \\ x_2 & y_2 & z_2 & 1 \\ x_3 & y_3 & z_3 & 1 \\ x_4 & y_4 & z_4 & 1 \end{vmatrix}.$$

7. The equation of a plane passing through three given

$$\text{points is } \begin{vmatrix} x & y & z & 1 \\ x' & y' & z' & 1 \\ x'' & y'' & z'' & 1 \\ x''' & y''' & z''' & 1 \end{vmatrix} = 0.$$

There is in all parts of the mathematics, but especially in higher geometry, a frequent recurrence of symmetrical forms which may be written as determinants. Hence, great importance attaches to all propositions respecting them. There is an elementary explanation of determinants in the last three chapters of Todhunter's "Theory of Equations." Their properties and use in plane geometry are developed in full in Whitworth's "Trilinear Co-ordinates." In Salmon's "Higher Algebra" there is an introduction to the theory of linear transformations, a large department of mathematical science which has been created within the past few years.

H. A. NEWTON.

**Determinate Problem,** a problem in geometry which admits of a limited number of solutions, an indeterminate problem being one which admits of an indefinite number of solutions. Thus, the problem, "Given the base, perimeter, and area, to construct the triangle," is determinate, there being in general but four solutions. By omitting

one of the three data, however, the problem becomes indeterminate. For instance, an infinite number of triangles having the same perimeter can be constructed on a given base. The problem, however, is not perfectly indeterminate, for the vertices of all such triangles are restricted to a certain locus—i. e. the ellipse whose foci are the extremities of the given base. In general, the omission of one of the conditions or data which render a problem determinate leads to a local problem.

**Detinue** [an Old Fr. word, from *détenir*, to "detain," literally, that which is "detained"], in law, an action for the recovery of a personal chattel wrongfully detained, or its value, with damages and costs. The action is for the recovery of a specified article; the chattel therefore must be of such a character that it can be distinguished from others, as a horse. The plaintiff must have an absolute or special property in the article at the time he brings the action. The defendant must have had possession at some time, which should have been acquired in some lawful manner, as by contract or finding. The nature of the possession must also continue. As if a finder should sell the thing found before action, the proper remedy would be an action for conversion, though if he had not sold there might be a case of detinue.

**Detmold**, a town of Germany, capital of the principality of Lippe-Deimold, on the Werra, 42 miles S. W. of Hanover. It has a fine castellated palace, a theatre, a public library, and a celebrated teachers' seminary; also manufactures of linen and woollen goods. Near this town is the battlefield where Hermann destroyed the Roman army of Varus in 9 A. D. Pop. in 1880, 8053.

**Detmold** (WILLIAM), M. D. See APPENDIX.

**De Tocqueville** (ALEXIS CHARLES HENRI CLEREL), a renowned French statesman and political economist, was born in Paris July 29, 1805. He studied law, and in 1827 became judge-auditor at the tribunal of Versailles. In 1831 he was commissioned to investigate the penitentiary systems of the U. S., which he visited in company with Gustave de Beaumont. In 1832, having returned from the U. S., he resigned his office, and in 1835 he gave to the public the first volume of his work "De la Démocratie en Amérique" ("On Democracy in America," 4 vols., 1835-40), which met with a brilliant success. About this time he married Mary Mottly, an English lady. De Tocqueville, though himself opposed to democracy, foretold its rapid growth in the world. In 1838 he was made a member of the Academy of Moral and Political Sciences, and in 1839 he was elected to the Chamber of Deputies. He became a member of the French Academy in 1841. In 1848, having been elected to the Constituent Assembly, he lent his support to the cause of order. In 1849 he was minister of foreign affairs from June 2 to Oct. 31. The coup-d'état of Dec. 2, 1851, drove him from the public service. He published in 1856 his "L'ancien Régime et la Révolution" ("The Old Régime and the Revolution"), a very excellent work. Died at Cannes April 15, 1859.

**Detonation** [from the Lat. *detono*, *detonatum*, to "thunder"], combustion with explosive rapidity, accompanied with sound and light, as in the case of gunpowder, percussion-caps, and fulminating-powder. When a mixture of oxygen and hydrogen is inflamed by the electric spark, it is said to *detonate*. Detonation is due either to the sudden liberation and expansion of large volumes of gases, or to the sudden contraction of gaseous matter and its reduction to a liquid or solid state.

**Detritus** [from the Lat. *de*, "down" or "off," and *tero*, *tritum*, to "rub"], literally, that which is rubbed or worn off, a geological term applied to material composed of small portions of a rock or a deposit which have been detached and removed to a distance by the action of any abrading power.

**De Trobriand** (PHILIP REGIS), an officer of the U. S. army, born in Tours, France, June 4, 1816, and a French baron by inheritance; "Bachelier-ès-lettres" (University of Orleans), "Licencié-en-droit" (legal faculty of Poitiers). During the recent civil war he entered the service as colonel of the Fifty-fifth New York Volunteers, July, 1861; commanding brigade (Third corps) 1862-63; appointed brigadier-general volunteers Jan., 1864; commanded defences of New York May, 1864; commanded brigade (Second corps) July, 1864; brevet major-general volunteers commanding division (Second corps) April, 1865; appointed colonel Thirty-first Infantry U. S. A., July, 1866; brevet brigadier-general U. S. A., Mar., 1867; commanding the district of Dakota Aug., 1867; colonel Thirteenth Infantry U. S. A., and commanding the district of Montana, Mar., 1869; Camp Douglas 1870; Fort Steele 1871; and the district of Green River in 1874. Author of "Les Gentilshommes de l'Ouest," Paris, 1841; "Quatre ans de

Campagnes à l'armée du Potomac," Paris et Bruxelles, 1867; editor and publisher of the "Revue du nouveau-monde," New York, 1849-50; editor of the "Courrier des États-Unis," New York, 1854-61. Retired Mar. 20, 1879.

**Detroit** [Fr. *Détroit*, "the strait"], an important R. and commercial centre, the metropolis of Michigan, and capital of Wayne co. (see map of Michigan, ref. 8-K, for location of county), is situated on the W. bank of the Detroit River, 18 miles from Lake Erie and 7 miles from Lake St. Clair, in lat. 42° 19' 53" N., lon. 82° 58' W. The Detroit River, which is the boundary-line between the U. S. and Canada, is of varying width, being half a mile broad opposite the city, and of great depth, forming the most perfect harbor on the whole chain of lakes.

The site upon which the city is built rises from the edge of the river, the inclination being gradual, at the rate of about 58 feet per mile, affording the most perfect drainage. It is one of the best sewered cities in the country.

The city is abundantly supplied with water, there being 241 miles of pipe laid up to the close of 1883, at which period the aggregate cost of construction of the water-works amounted to \$3,315,989. The water-works have a bonded debt of \$1,555,000. The city has a perfectly disciplined paid fire department, with steam apparatus, etc., costing \$475,000, and also a fire-alarm telegraph. The expense of the department in 1883 was \$142,536.55. The city has a uniformed metropolitan police force, with a central, 3 precinct and 6 sub-stations. The expenses of the force for 1883 were \$210,000. There are 31 public school buildings, valued at \$1,000,000, with 282 teachers, and an enrolment in 1882 of 17,392 pupils. The annual expenses of the schools are \$275,000. There are, besides, 3 seminaries, Detroit College, and 16 Roman Catholic parish schools, 9 German Lutheran schools, and a large number of private institutions, including 3 commercial colleges. The assessed valuation of the real and personal property of the city in 1884 was \$110,721,995. The bonded debt of the city is \$1,056,500; but there are resources sufficient in the sinking fund to extinguish the debt. The principal work of art adorning the city is the Michigan Soldiers' and Sailors' Monument, designed by Randolph Rogers, and built of bronze and granite at a cost of \$75,000. The structure is fifty-five feet high, surmounted with a colossal bronze allegorical statue of "Michigan." The chief public building is the city hall, situated on the Campus Martius and facing upon four streets, being in length 200 feet, in width 90. It is regarded as one of the finest in the West, and cost \$600,000. The house of correction is also a very fine building, and has attained a national and European reputation. It is valued at upwards of \$400,000, and it has a capacity for 600 prisoners. A post-office is to be built at a cost of \$900,000. There are eight lines of street railway, and one of transit railway. The public library contains 53,621 volumes. There are 2 bar libraries, with upward of 6000 volumes. There are 2 medical colleges, 4 public hospitals, 4 orphan asylums, 2 foundling and women's hospitals, 1 insane asylum, a house of shelter for magdalen, 1 industrial school, 1 house of refuge for aged persons, and 1 old ladies' home. There are 86 churches and 6 chapels. Some of these church edifices are noble specimens of architecture. The city contains 5 national, 6 savings, and 11 other banks. It is the seat of the U. S. circuit court for the sixth circuit, and the U. S. district court for the eastern district of Michigan, the Wayne county circuit court, the superior court, the recorder's and the probate court of Wayne county. The U. S. custom-house for the port of Detroit and the internal revenue office are located here, as are also the principal office of the U. S. lake survey, the department in charge of the lake lighthouses, and the head-quarters of the military department of the lakes. Fort Wayne, designed to be the most extensive American fortification on the northern frontier, is located just below the city, commanding both it and the river. Though in an incomplete state, it includes a series of batteries protected by earthworks, and is garrisoned by a force of infantry and artillery. There are eight cemeteries. The three principal—Elmwood, Mount Elliott, and Woodmere—are upon locations of great natural beauty, and are embellished by skilful landscape gardening and monuments of taste. There are many small parks scattered throughout Detroit, and an island in the river near the city has recently been purchased for a public park. It contains 700 acres. The city is lighted by electricity.

**Manufactures.**—The manufacturing advantages of the city are great, and these have been taken advantage of by the establishment of many foundries, blast-furnaces, copper-smelting-works, locomotive and car works, shipyards, dry-docks, iron-bridge works, safe manufactures, furniture and other establishments using wood as the chief material, and some of the most extensive tobacco and cigar factories in

America, producing in one year, according to the census of 1880, goods worth \$2,409,016. There are a number of pork-packing establishments, and the shipping trade of the city in produce and manufactures is very large. The census of 1880 shows 919 manufacturing establishments; capital, \$15,594,479; average number of hands employed, 16,110; wages paid, \$6,306,460; value of products, \$30,181,416. There are 7 daily papers published in the city, 2 being in the German language, 1 tri-weekly, 24 weeklies, 6 monthlies, and 1 quarterly.

**History, etc.**—The present site of the city was occupied by Indian villages at the period of the discovery of the country. In 1610 it was first visited by the French, and remained under their dominion until 1762. The first legitimate settlement was made in 1701, at which time a fort was erected called Ponchartrain, the first governor being the Sieur de la Motte Cadillac; and from time to time emigrants were sent here by the French government. In 1763 the British assumed possession, erecting fifteen years later a fort. In 1787 its government was assumed by the U. S., Gen. Arthur St. Clair being the first governor. In 1812 it was surrendered to the British, and was retaken in 1813. The history of Detroit is intimately connected with the history of the whole North-west. Three different sovereigns have claimed its allegiance, and since the U. S. have held it thrice has its government been transferred. It has twice been besieged by Indians, once captured in war, and once totally consumed by fire. For the rest, the streets are broad and well paved, handsomely embellished with shade trees, and ornamented with beautiful private residences, while the business quarters are well built up with lofty, substantial, and beautiful structures. Pop. in 1870, 79,577; in 1880, 116,340; in 1884, 133,269.

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**Detroit City**, capital of Becker co., Minn. (see map of Minnesota, ref. 5-B, for location of county), on Detroit Lake and the Northern Pacific R. R., 206 miles W. of Duluth. Pop. in 1880, 554.

**Detroit River** issues from Lake St. Clair, flows nearly southward, forms part of the boundary between Michigan and Canada, and enters Lake Erie. It is about 24 miles long, and from half a mile to one mile wide. It is navigable for vessels of the largest size.

**Detroyat** (PIERRE LEONCE), born at Bayonne Sept. 7, 1829, entered the navy in 1845, and served in the Crimean war and in the expeditions to China and to Mexico. Accompanying the empress Charlotte back to Europe, he was by the French government forbidden to return to Mexico on account of the unfavorable report he made on Bazaine, after which he threw up his position in the navy and devoted himself to journalism. In 1871 he was for some time commander of the camp at La Rochelle, but resumed, after the end of the war, his journalistic work as editor of "Le Bon Sens," and afterward of "L'Estatette." In book-form he published "La Cour de Rome et l'empereur Maximilien" (1868), "L'Intervention française en Mexique" (1868), etc.

**Dett'va**, a town of Hungary, in the county of Sohl, 20 miles E. of Altsohl. Pop. in 1881, 10,329.

**Deucalion** [Gr. Δευκαλίων], a personage of the Greek mythology, was a son of Prometheus and the husband of Pyrrha, and was the father of Amphictyon and Hellen. According to tradition, he saved himself and his wife from a deluge by building a ship or ark, which, when the water subsided, rested on Mount Parnassus. They threw stones behind them, which were transformed into men and women.

**De'us ex Mach'inâ** [a Latin phrase, signifying a "god from a machine," alluding to the machinery of the theatrical stage], an expression borrowed from the classic stage. The poets of Greece often had recourse to the intervention of a god, who descended by stage machinery, and brought about a speedy dénouement of the plot. The proverb has also been applied to savants or philosophers who, unable to explain facts by known laws, have had recourse to the aid of a supernatural power.

**Deuteronomy** [Lat. *Deuteronomium*; Septuagint Gr. Δευτερονόμιον, the "duplicate law," from *deuteros*, "second," and *nomos*, "law"], the last book of the Pentateuch, consisting, in part, of a restatement of the law, as given in Exodus, Leviticus, and Numbers, and containing also, besides special commands and admonitions not previously given, an account of the death of Moses. The authorship of this book has been traditionally assigned to Moses, but of course the part relating to his death is not supposed to have been written by himself, and indeed the last four chapters may have been added by another hand. Of late years much critical labor has been bestowed upon the book, and its Mosaic authorship has been both assailed and defended with great learning and ability. See PENTATEUCH.

**Deutsch** (EMANUEL OSCAR MENAHEM), born at Neisse, in Prussian Silesia, Oct. 28, 1829, died at Alexandria, Egypt, May 12, 1873. He studied, in Berlin, Hebrew, especially the Talmud, Aramaic, Chaldee, etc., visited the East twice, in 1869 and 1872, was in 1855 appointed assistant in the library of the British Museum, and contributed a number of valuable articles to various periodicals and encyclopædias. His article "On the Talmud" in the "Quarterly Review" in 1867 made quite a sensation, and was immediately translated into French, German, Russian, Dutch, and Danish. His literary "Remains" were edited by Lady Strangford, with a brief sketch of his life, and appeared in London and New York (1874).

**Deutz** (anc. *Tuitum*), a fortified town of Prussia, on the right bank of the Rhine, opposite COLOGNE (which see). It is the terminus of a railway extending to Minden. Pop. in 1871, 11,881.

**Deutzia** [named in honor of Deutz, a botanist], a genus of shrubs belonging to the order Saxifragaceæ, and indigenous in Northern India, China, and Japan. *Deutzia scabra* has leaves very rough, with siliceous hairs, which are used in Japan for polishing wood, and which are most beautiful objects under the microscope. *Deutzia gracilis*, a hardy shrub with elegant white flowers, is much cultivated in American gardens.

**Deux Ponts.** See ZWEIFBRÜCKEN.

**Dev**, or **Dew**, a Persian word, akin to the Sanscrit *dēva* (a "god"), but applied in the system of Zoroaster to a class of demons supposed to be servants of Ahriman. (See ZOROASTER, RELIGION OF.)

**Dēva**, *dā'va*, a Sanscrit word signifying "god," and forming a part of many names in Hindoo mythology, as *Kamadēva* ("the god of love"), *Mahadēva* (the "great god"), a name of *ŚIVA* (which see).

**Devall's Bluff**, Prairie co., Ark. (see map of Arkansas, ref. 3-D, for location of county), on R. K. and White River, 48 miles E. of Little Rock. It is situated in a cotton and corn-growing region. Pop. in 1880, 186.

**Devanagari.** See SANSKRIT, by PORTER C. BLISS, A. M.

**Devapraya'ga**, a town of Northern Hindostan, in Gurwhal, in lat. 30° 8' N., lon. 78° 39' E., is at the junction of the Alakanonda and Bhagirathi, which unite to form the Ganges. As the origin of that sacred river, it is considered a holy place by the Hindoos, and is visited by multitudes of pilgrims. A flight of steps is hewn out in the rock down to the very edge of the water, and two large basins have been formed for ablution.

**Devel'op** [Fr. *développer*], in algebra, to expand an expression by writing out in full the operations previously indicated by symbols. In geometry to develop a curve or a curved surface is to find an equivalent straight line or plane surface, by rolling the former on the latter. The equivalent straight line or plane surface thus formed is called the *development* of the curve or curved surface rolled.

**Development.** See EVOLUTION, by PROF. H. HARTSHORNE; also DARWINISM, by PROFS. YOUMANS and SEELYE.

**Development of the Embryo.** See EMBRYOLOGY.

**Dev'ens** (CHARLES, JR.), LL.D., an American jurist, b. in Charlestown, Mass., Apr. 4, 1820, graduated at Harvard in 1838, and admitted to the bar in 1841; member of the Massachusetts State senate 1848-49; U. S. marshal for the district of Massachusetts 1849-53. On the outbreak of the recent civil war he entered the service as major of the third battalion of Rifles Massachusetts volunteers, was appointed colonel Fifteenth Massachusetts Aug., 1861, and was promoted brigadier-general April 15, 1862; brevet major-general U. S. volunteers for gallant and meritorious conduct at the capture of Richmond, April 3, 1865; military governor East district of South Carolina Sept., 1865, to June, 1866, when he was mustered out of the service; wounded at Ball's Bluff, Fair Oaks, Chancellorsville, and Cold Harbor. Throughout the war he distinguished himself, from the early engagement at Ball's Bluff till the closing scenes at Appomattox Court-house. He was appointed associate justice of the superior court of Massachusetts in 1867, which position he retained until Oct., 1873, when he was appointed associate justice of the supreme court of Mass. Appointed atty.-gen. by Pres. Hayes Mar. 7, 1877; resumed his position as associate justice of supreme court of Mass. 1881.

**Dev'enter** [Lat. *Daventria*], a fortified city of Holland, in the province of Overysseel, is on the river Yssel, about 60 miles E. by S. from Amsterdam. It is surrounded by walls or ramparts, and has a good harbor. It contains a large town-house, a court-house, five or more churches, and several hospitals. It is the seat of an old Catholic (Jansenist) bishopric. About 600,000 pounds of butter are annually exported from this place. It has manufac-

tures of carpets, hosiery, etc., and iron-foundries. Pop. 18,218.

**De Vere** (MAXIMILIAN SCHELE), LL.D., a writer, born in Sweden Nov. 1, 1820, emigrated to the U. S., and became in 1844 professor of modern languages and belles-lettres in the University of Virginia. Among his works are "Outlines of Comparative Philology" (1853) and "Stray Leaves from the Book of Nature" (1856), etc., which attracted considerable attention.

**Devereux** (JOHN HENRY). See APPENDIX.

**De Vesci**, VISCOUNTS (1776), BARONS KNAPTON (1750, Ireland), and baronets (1698).—THOMAS VESSEY, third viscount, born Sept. 21, 1803, representative peer for Ireland in 1857, was M. P. for Queen's county 1835-37 and 1841-52, and succeeded his father Oct. 19, 1855. D. Dec. 23, 1875.

**Dēvi** (Sanskrit, "goddess"). See PARVATI.

**Deviation of Projectiles.** See GUNNERY; GYROSCOPE, by GEN. J. G. BARNARD, U. S. Army.

**Deviation of the Compass** is the variation of a ship's compass from the true magnetic meridian, caused by the proximity of iron. In iron ships it depends upon the direction, with regard to the magnetic meridian, in which the ship was built. It is least when the ship has been built with her head to the south. Armor-plated ships should be plated with the head in the opposite direction to that in which they are built. Two methods are employed by which this variation is attempted to be neutralized: the first is by ascertaining the actual variation in every position of the ship with regard to the magnetic meridian, and working by a table of errors; the other is by introducing on board ship masses of iron and magnets to neutralize exactly the action of the ship's magnetism. The latter method is now very generally employed. It is important that the ship should not be hurried out immediately for a voyage, and that her compasses should be readjusted before sailing.

**Deviation of the Plumb-Line** has been especially observed near mountains, in which case it is evident that the attraction of the mountain has drawn the line out of the perpendicular. Maskelyne took advantage of this fact in his experiments to determine the density of the earth. (See DENSITY OF THE EARTH.) The same phenomenon has been observed on plains, and is probably caused either by great caves under ground, or by large masses of matter near the surface greatly surpassing in density the average of the earth near the point of observation.

**De Vigny** (ALFRED VICTOR), COMTE, a distinguished French author, one of the most prominent representatives of the Romantic school, was born at the castle Loches Mar. 27, 1799. In 1828 he published a collection of poems called "Poèmes antiques et modernes." He also produced (1826) "Cinq-Mars, or a Conspiracy under Louis XIII.," which was very favorably received; "Stella, or the Blue Devils," a narrative; and the tragedy of "Chatterton" (1835). Died Sept. 18, 1863.

**Dev'il** [Persian *dev* or *dew*, a "demon;" Ger. *Teufel*; Gr. *δαιμόλος* (i. e. "accuser" or "slanderer"); Lat. *diabolus*; Fr. *diable*], the name among Christians of any evil spirit, but especially of the chief of evil spirits, nearly corresponding in the latter sense to the Hebrew Satan and the Mohammedan Iblis or Shytān. It is proposed in this article to limit ourselves chiefly to a notice of the popular and prevailing notions entertained of the devil in Europe during the Middle Ages and later; referring the reader to the article SATAN for a consideration of those graver questions respecting the character of the great Enemy of mankind which may be said to belong more properly to theology. The Greek for devil appears to be derived from the character of Satan as presented in the book of Job—that of a fault-finder or slanderer. In the Middle Ages, and even later, the devil was supposed to possess in the highest perfection every kind of skill and knowledge—a skill and knowledge resembling that of man, indeed, but immeasurably surpassing it in degree. The devil was believed to possess transcendent skill in all the magic arts, and when a man of genius had accomplished some wonderful feat which seemed clearly above the unassisted powers of the human mind, it was commonly supposed (especially if he was not pre-eminently a religious man) that he had been either assisted by the devil, or that the latter had performed for him the entire work; in which case, of course, some promise (such as the final surrender of the soul of the assisted party) or reward had to be given as an equivalent for his services. This idea, once almost universal in Europe, furnished the basis of the legend respecting Dr. Faustus.

It would seem probable that the prevailing superstitions of the Middle Ages respecting the devil might have been considerably influenced by the notions entertained of the character of Loki, the god of evil in the Norse mythology. As Loki is said to have taken various forms—sometimes



of a woman and sometimes of one of the lower animals—in order more successfully to deceive, so the devil was supposed to assume at one time the appearance of a most beautiful woman to mislead and ruin the souls of men, at another time to take the form of a hunted animal to draw the too eager pursuer into danger and death; but all his wiles were of course lost upon those who looked to Heaven for help, and called on the protecting saints. J. THOMAS.

**Devil's Dust.** See SHODDY.

**Devil's Lake, Dak.** See APPENDIX.

**Devil-worshippers, or Yezidees,** a sect of religionists, founded by one Yezed, and living in Armenia, Koordistan, etc. They number more than 200,000. They treat the devil with great respect, because they believe he will be restored to heaven, where they wish him to be their friend. There are various other sects of devil-worshippers.

**Devin** (THOMAS C.), born in New York City, Dec. 10, 1822; lieutenant-col. 1st Cavalry National Guard, N. Y., in 1861; joined the army of the Potomac in 1862, and commanded 2d brigade, 1st division, of its cavalry; brigadier-general in 1864; in 1865 commanded 1st division of cavalry corps; after the war was lieutenant-col. 8th Cavalry in the regular army, and was promoted to command of 3d regiment cavalry, U. S. army. Died Apr. 4, 1878.

**Deviz's,** a parliamentary borough of England, in Wiltshire, 22 miles N. N. W. of Salisbury, has silk-throwing mills, and manufactures of snuff and malt. Here are ruins of a castle of the time of Henry I. Pop. in 1881, 6645.

**Devon** [Lat. *Devonia*], a county of England, is bounded on the N. by the Bristol Channel, and on the S. by the English Channel. Area, 2590 square miles. The surface is mostly hilly, and in some parts rocky. The highest point, called Yes Tor, has an altitude of 2050 feet. Granite, magnesium limestone, Devonian and Silurian rocks occur here; also copper and tin. It is drained by the rivers Exe, Dart, Tamar, and Torridge, the estuaries of which form good harbors. The climate of the S. coast is mild; the soil is generally fertile. This county produces good apples, and is famous for cider. The Red Devon breed of cattle is highly esteemed. Pop. in 1881, 604,397.

**Devonian Age** [named by Murchison from Devonshire, England, where rocks of this age abound], in geology, the time succeeding the Silurian and preceding the carboniferous age. The American Devonian rocks are assigned to five divisions or periods of time, known as the Oriskany (the oldest), the Corniferous, the Hamilton, the Chemung, and the Catskill periods. The Devonian strata of Europe are variously divided in different countries. The old red sandstone of Scotland and Herefordshire was for some time described by English geologists as the only group of rocks separating the Silurian system from the carboniferous. The discovery made by Murchison and Sedgwick, that the calcareous slates and limestones of Devonshire were contemporaneous with the old red sandstone and with the Eifel series, was a great step in advance, and tended to fix important positions in geological classification. Normandy presents Devonian rocks in a characteristic state. The system is also largely developed in Russia, as well as in Western New York, Pennsylvania, Ohio, Michigan, Indiana, etc. The Devonian rocks of the U. S. are rich in fossil shells of mollusks and in fishes. "In the Devonian age," says Dana, "the fishes are the dominant type." (See GEOLOGY, by PROF. J. W. DAWSON, LL.D., F. R. S.)

**Devonport** (before 1824 called PLYMOUTH DOCK), a maritime and fortified town of England, is in Devonshire, on the E. shore of the estuary of the Tamar (called the Hamoaze), 2 miles W. N. W. of Plymouth. It occupies high ground, and has ramparts defended by batteries. It derives its importance from the dockyard and naval arsenal, which is perhaps the largest in Great Britain. The national works occupy about 350 acres, and the dockyard comprises six building-slips for vessels of various rates. Here are also five docks, and manufactures of sails, ropes, anchors, soap, etc. Devonport has a residence for the port-admiral, a military hospital, and a large barrack. It returns two members to Parliament. Pop. of municipal borough in 1881, 48,939.

**Dew** [Sax. *deaw*; Ger. *Thau*], moisture deposited during the night on the surfaces of bodies exposed in the open air. Dew is produced by the condensation of watery vapor from the atmosphere. Its deposition is, however, unaccompanied by the appearance of any visible mist. Such mist appears when the condensation takes place within the body of the air itself, and is then called "fog" in the lower regions of the atmosphere, and "cloud" in the higher. Dew occurs only at the surfaces of contact with solids, the air above remaining clear. The deposit of dew is caused by the cooling of the bodies bedewed, and this takes place in consequence of the radiation of heat into

open space, without any equivalent return. Experiments on vaporization have shown that when a liquid is exposed in a confined space to a constant temperature, vapor will be formed from it until the density reaches a certain determinate limit, invariable for the temperature, but greater as the temperature is higher, after which evaporation will cease. This maximum density is called the density of saturation, or the density due to the temperature. Air is said to be saturated with vapor when the density of the vapor in it is the density due to its temperature. Should the temperature of a body of air in this condition be in the slightest degree depressed, the air will be supersaturated, and some of the vapor will be condensed, forming a visible cloud. But if, the temperature remaining the same, a body colder than the air be immersed in it, condensation will occur on the surface of that body only, and the air itself will remain clear. If, as is usual in the atmosphere, the air contain vapor without being saturated, it may be brought by cooling to a temperature at which it will be saturated, and then any further cooling will produce precipitation, as in the case before supposed. Or if the temperature of air in this condition remain unchanged, a body colder than the air immersed in it may produce condensation, provided its temperature be as low as the point of saturation, or lower, but not otherwise. This point is called the dew-point. (See DEW-POINT.)

During the day the loss of heat by bodies on the earth, in consequence of radiation, is more than compensated by the amount received directly or indirectly from the sun. After sunset all such bodies begin to cool, but they cool with unequal rapidity, because of their different relations to heat. The atmosphere cools very slowly. Badly conducting solids cool rapidly. Good conductors, if in contact with the earth, cool much less rapidly, because the heat they lose by radiation is, to an extent proportioned to their conducting power, restored by conduction from the earth beneath. If of small mass, however, and insulated by bad conductors, their temperature falls much more rapidly. So soon as the cooling process has depressed the temperature of any object down to the point of saturation for the vapor present in the air, dew will begin to form upon it. Some bodies are bedewed very soon, others more tardily, and some occasionally escape altogether. Grass, which radiates well and conducts ill, is in the first class; wool and woollen stuffs, cotton, linen, silk, wood, earth, gravel, stone, and metals contract dew with less and less facility, nearly in this order. Polished metallic surfaces often remain untarnished by moisture throughout the night. In clear nights the difference of temperature shown by two thermometers, one lying on the grass and the other suspended in the open air a few feet above, is often 8° or 10° F., and is sometimes much greater. In one instance, Mr. Glaisher (*Phil. Trans.*, 1847) observed a difference as great as 28½° F., the lower thermometer lying on raw wool.

Clouds check the formation of dew by obstructing radiation, or restoring by counter-radiation some of the heat lost. When the sky is wholly overcast no dew is formed. Neither is any dew formed beneath an open shed or shelter, though the earth around may be so distinctly wet as to leave the form of the roof distinctly marked on the ground. Facts of this kind were long supposed to prove that the dew descends like rain—a belief of which the trace is still preserved in the expression "the falling of the dew." Even a very slight screen, as a sheet of paper or a cambric handkerchief, spread out above an object exposed in the open air, will protect it perfectly against moisture from dew. Wind also prevents the formation of dew, by continually changing the strata of air in contact with the colder solids. The nights most favorable to the deposit of dew are those in which the sky is quite clear and the air quite motionless. The profuseness of the deposit will depend, however, upon the hygrometric state of the atmosphere.

Very various and very absurd notions prevailed among the ancients in regard to the dew. By some it was supposed to descend from the stars, and to be possessed of wonderful virtues. The Roman ladies were accustomed to use it as a cosmetic, supposing it superior to all other applications for the improvement of the complexion. If the cosmetics of those days were no better than those in use at present, their opinion was doubtless correct, though the grounds of it were mistaken. The true theory of dew was first clearly set forth by William Charles Wells, a physician of London, in his famous "Essay on Dew," first published in 1814. This has been many times reprinted, and still continues to be the standard authority on the subject. F. A. P. BARNARD.

**Dew** (THOMAS R.), an American writer, born in Virginia Dec. 5, 1802. He became professor of political economy and history in William and Mary College in 1827, and president of that institution in 1836. He published, besides

other works, an "Essay in Favor of Slavery" (1832), and a "Digest of the Laws, Customs, etc. of Ancient and Modern Nations" (1853). Died in Paris, France, Aug. 6, 1846.

**Deweese** (WILLIAM POTTS), M. D., an American physician, born at Pottsgrove, Pa., May 5, 1768. He practised in Philadelphia, and became in 1834 professor of obstetrics in the University of Pennsylvania. He published, besides other works, an excellent "System of Midwifery" (1825). Died May 20, 1841.

**De Wet** (DR. WILHELM MARTIN LEBERRECHT), an eminent German biblical critic, born at Ulla, near Weimar, Jan. 14, 1780, died at Basel June 16, 1849. He was educated at Weimar, under the influence of Herder, and studied theology at Jena, where Paulus was his teacher. In 1807 he was appointed professor of theology at Heidelberg, and in 1810 he was called to the newly-founded University of Berlin. But in 1819 he was dismissed, and even banished, from the Prussian territories, because he had written a letter of consolation to the mother of that Sand who murdered Kotzebue. He removed to Weimar, and was in 1822 called to Basel. As a theologian he occupies a somewhat peculiar position intermediate between the orthodox and the rationalists, rejected by the orthodox as a rationalist, and scorned by the rationalists as an orthodox. His influence on biblical criticism and exegesis is, nevertheless, unquestionable. Among his works are a "Commentary on the Psalms" (1811), "Jewish Archæology" (1814), "Christian Dogmatics" (1813-16), "Introduction to the Old and New Testaments" (1817-26), translated by Theodore Parker and Frederick Frothingham (1843-58), "Lessons on Morality" (1824). (See accounts of De Wet by SCHENKEL (1849), HAGENBACH (1849), and LÜCKE (1850).)

**Dewey** (CHARLES AUGUSTUS), LL.D., was born at Williamstown, Mass., Mar. 13, 1793, and graduated at Williams College in 1811. He began the practice of law in his native town in 1814, and removed to Northampton about 1826. He became judge of the Massachusetts supreme court in 1837, and retained the office till he died, Aug. 22, 1866.

**Dewey** (CHESTER), D. D., LL.D., an American botanist and teacher, born at Sheffield, Mass., Oct. 25, 1781. He was for many years professor of natural philosophy at Williams College, became principal of the Collegiate Institute at Rochester, N. Y., in 1836, and in 1850 professor of chemistry in the University of Rochester. He wrote many excellent monographs on the Carices of North America, etc. for the "American Journal of Science" and other publications. Died Dec. 15, 1867.

**Dewey** (GEORGE), U. S. N., born Dec. 26, 1837, in Vermont, graduated at the Naval Academy in 1858, became lieutenant in 1861, lieutenant-commander in 1865, commander in 1872, and capt. 1884. He served on board the steamer Mississippi at the passage of Forts Jackson and St. Philip and capture of New Orleans, April 24, 1862, and is thus handsomely spoken of in the official report of his commanding officer, Commander Melancthon Smith: "I have much pleasure in mentioning the efficient service rendered by Executive Officer George Dewey, who kept the vessel in her station during the engagement, a task exceedingly difficult from the darkness and the thick smoke that enveloped us from the fire of our vessel and the burning gunboats." He was on board the Mississippi when she was lost in attempting to pass the batteries at Port Hudson, Mar. 14, 1863, and gained the commendation of his commander a second time by his "coolness" on this trying occasion.

FOXHALL A. PARKER.

**Dewey** (ORVILLE), D. D., LL.D., an eminent Unitarian minister, born in Sheffield, Mass., Mar. 28, 1794. He graduated at Williams College in 1814, and preached in the pulpit of Dr. Channing as his assistant for nearly two years. He was pastor at New Bedford from 1823 to 1833, after which he preached about fourteen years in the city of New York. In 1858 he became minister of the New South church in Boston, but retired in 1862 to his farm in Sheffield and devoted himself exclusively to literary work. He was an original thinker and an impressive pulpit-orator. He wrote "The Unitarian Belief," "The Education of the Human Race," "The Problem of Human Destiny," etc. Died Mar. 21, 1882.

**De Wint** (PETER), an English painter in water-color, born in 1783. He was the son of Harry de Wint, an American who went to England and married. He was a distinguished member of the Old Water-color Society, and was formed by the influences that produced Turner, D. Cox, Stanfield, and Prout. His subjects were usually of a very simple character, but treated in a large and masterly style. He died in 1849.

CLARENCE COOK.

**De Winter** (JAN WILLEM), born at the Texel in 1750, died in Paris June 2, 1812, entered the Dutch navy in

1762, but fled to France in 1787, having taken part in the attempts of the revolutionists, served afterward under Pichegru in the French, and was by Napoleon placed at the head of the Dutch fleet.

**De Witt**, capital of Arkansas co., Ark. (see map of Arkansas, ref. 4-E, for location of county), about 70 miles S. E. of Little Rock. Pop. in 1880, 169.

**De Witt**, city and R. R. junction, Clinton co., Ia. (see map of Iowa, ref. 5-K, for location of county), 25 miles N. of Davenport. It has some manufactures. Pop. in 1870, 1749; in 1880, 1608.

**De Witt** (CORNELIUS), a Dutch naval officer and statesman, born at Dort June 23, 1623, was an elder brother of John, noticed below. He had a high command under De Ruyter in 1666, when he burned the English shipping in the Thames. He distinguished himself in the naval battle of Solebay in 1672. In the same year he was falsely accused of complicity in a plot formed to poison the prince of Orange. He was imprisoned, tried, and acquitted, but was murdered by a mob (Aug. 20, 1672) as he was coming out of prison.

**De Witt** (JOHN), an eminent Dutch statesman and republican, born at Dort Sept. 25, 1625. He was a leader of the party which was hostile to the House of Orange, or wished to reduce the power of the prince of Orange. William II. died in 1650, and De Witt was elected grand pensionary of Holland in 1653. In 1654 he negotiated with Cromwell a treaty of peace, in which a secret article stipulated that no member of the Orange family should ever be stadtholder. He was re-elected grand pensionary for a term of five years in 1658, and again in 1663. In 1665, Charles II. of England declared war against the Dutch, whose fleet entered the Thames and burned some shipping at Chatham. De Witt conducted the war with ability, and it was terminated by a treaty of peace in July, 1667. In the same year a perpetual edict was issued for ever abolishing the office of stadtholder, and the policy of the grand pensionary seemed absolutely triumphant. Meanwhile, Louis XIV. had invaded the Spanish Netherlands, and De Witt, thoroughly realizing the danger to Holland which would arise from the annexation by France of those provinces, formed the triple alliance between England, Sweden, and Holland, and compelled Louis XIV., by the Peace of Aix-la-Chapelle, to give up his plans. The French king, however, stung to the quick by this humiliation, succeeded, by his crafty diplomacy, in estranging England from Holland and in exciting a number of the minor German princes against the republic. And in the mean time a change took place in the position of the grand pensionary. His popularity began to wane. The clergy, his natural enemies, openly attacked him. Finally, the king invaded the republic with a great army. De Witt, being unable to repel the enemy, who captured several towns, was blamed for these misfortunes, and naturally became the object of public fury. William of Orange was chosen general-in-chief and stadtholder. De Witt went to prison to visit his brother Cornelius, who had been tried and acquitted. They were both murdered by the populace at the prison Aug. 20, 1672. (See P. SIMON, "J. de Witt en Zijn Tijd," 3 vols., 1832-35.)

**De Witt** (THOMAS), D. D. See APPENDIX.

**Dewlet-Gherai III.**, the last khan of the Crimea, died about 1780 in Constantinople. He succeeded his uncle, Kerim-Gherai, as chief of the Crimean Tartars in 1769, but he had more taste for court etiquette and ceremonies than for war, and, though supported by the Turks, he was expelled by the generals of Catharine II.

**Dew-point**, the temperature at which watery vapor in the air begins to be condensed. Its determination is of great importance to the meteorologist, as by comparing it with the actual temperature he can tell the relative humidity of the air. He knows that at the actual temperature the air would be saturated if it contained a certain quantity of moisture; and also that the actual quantity present is only such as would suffice to saturate air at the observed dew-point; the ratio of this last quantity to the former expresses the relation between the actual humidity of the air and the humidity of saturation at the observed temperature. The dew-point in the evening further shows the temperature near which the minimum during the night is likely to be. When the temperature has fallen to the dew-point, the vapor in the air will be condensed, and an amount of heat will be set free which will raise the temperature of the air. The temperature will again sink by radiation somewhat below the dew-point; dew will be formed, and the temperature again be raised.

F. A. P. BARNARD.

**Dewsbury**, a manufacturing town of England, in the West Riding of Yorkshire, on the river Calder, 8 miles S. S. W. of Leeds. It is on the Lancashire and Yorkshire

Railway, and is connected with London by another railway. It has manufactures of blankets, carpets, and coarse woollen goods made from shoddy (*i. e.* refuse rags worked over). There are collieries and iron-works in the vicinity. Pop. in 1881, 29,687. It is 1 mile S. of Batley, which has extensive manufactures of woollens. P. of Batley, 25,589.

**Dexippus.** See APPENDIX.

**Dexter,** on R. R., Penobscot co., Me. (see map of Maine, ref. 6-E, for location of county), 70 miles N. E. by N. from Augusta. It has manufactures of woollen goods, and also several mills. Pop. of Dexter township in 1870, 2875; in 1880, 2583.

**Dexter,** Washtenaw co., Mich. (see map of Michigan, ref. 8-J, for location of county), on R. R. and the Huron River, 47 miles W. of Detroit. It has two flouring-mills, a woollen-mill, a planing-mill, and car-works. Pop. in 1870, 1161; in 1880, 1008.

**Dexter** (FRANKLIN), LL.D., a son of Samuel Dexter, noticed below, was born at Charlestown, Mass., Nov. 5, 1793, and graduated at Harvard in 1812. He practised law in Boston with marked success. He was a member of the State legislature and senate, and in 1849 was appointed U. S. district attorney for Massachusetts. In 1830 he was opposed to Daniel Webster in the famous murder trial of the Knapps. Died Aug. 14, 1857.

**Dexter** (HENRY), a successful sculptor, born in New York, was originally a blacksmith in Connecticut. Among his productions are "The Young Naturalist," "The First Lesson," and others, besides many excellent portrait-busts. Mr. Dexter resides at Cambridge, Mass.

**Dexter** (HENRY MARTYN), D. D., an eminent Congregational minister, was born at Plympton, Mass., Aug. 13, 1821, graduated at Yale in 1840, and at Andover in 1844, was pastor in Manchester, N. H. (1844-49), and of the present Berkeley street church, Boston (1849-67). From 1859 to 1865 he was one of the editors of the "Congregational Quarterly," and in 1867 became editor-in-chief of the "Congregationalist." He is the author of "Street Thoughts" (1859), "Twelve Discourses" (1860), and of several other works, the most important of which is his "Congregationalism," a work of high authority, which reached a second edition in 1871. He has made the Massachusetts "Pilgrims" his special study, and is now (1873) preparing an elaborate "History of the Plymouth Colony."

**Dexter** (SAMUEL), LL.D., an American jurist and statesman, born in Boston May 14, 1761. He was admitted to the bar in 1784, attached himself to the Federal party, and was elected a Senator of the U. S. in 1798. He was appointed secretary of war in 1800 by John Adams, and became secretary of the treasury early in 1801. When the executive power was transferred to Jefferson in 1801, Dexter retired from the public service and resumed the practice of law in Boston. He had no superior and few equals as an advocate before the Supreme Court in Washington. As a supporter of the war against England, he separated from the Federalist party in 1812. Died May 4, 1816.

**Dexter** (TIMOTHY), an eccentric American merchant, born at Malden, Mass., Jan. 22, 1747. He rose from poverty to affluence, and assumed the title of "Lord Timothy Dexter," by which name he is generally known. Many traditions with regard to his life are current in New England. Died at Newburyport Oct. 22, 1806. (See his Life by S. L. KNAPP, 1823.)

**Dextrine** [from the Lat. *dexter*, the "right hand"], ( $C_6H_{10}O_5$ ), **British Gum**, **Alsace Gum**, **Gom'meline**, or **Lei'ocome**, a gum-like substance produced from starch by the action of heat, dilute acids or alkalies, diastase, saliva, bile, blood serum, pancreatic juice, etc., and by the action of sunlight on starch paste. It is soluble in water, and its solution turns the plane of polarization of a luminous ray to the right; hence the name *dextrine*. It is prepared from starch (potato starch is preferred on account of its cheapness and purity) by several processes: (1) By heating it in sheet-iron trays to a temperature of 300° F., by which it is changed into semi-transparent, yellowish-brown lumps, which are converted into a pale yellow powder by grinding between millstones. It is sometimes roasted in iron or copper cylinders or coffee-drums. (2) By the action of nitric acid (Payen's process): 1000 parts of starch are mixed with 2 parts of nitric acid (specific gravity, 1.4), diluted with 300 parts of water, and the mixture is carefully dried, the temperature being finally raised to between 230° and 250° F. The transformation is completed in about an hour and a half. (3) By carefully boiling starch with dilute acids: the operation must be discontinued as soon as the starch has all disappeared, which is shown by the failure to obtain the blue coloration characteristic of starch on adding iodine solution to a por-

tion of the liquid. For 100 parts of starch, 25 of sulphuric acid and 280 of water may be used; the mixture to be heated to about 194° F. When the reaction is complete, the acid is neutralized with chalk, the insoluble gypsum separated by filtration, and the solution concentrated to a syrup or to a semi-solid mass, which can be transferred to a hot-air chamber and completely dried. Thus prepared, it contains a little gypsum. This impurity is avoided by using 300 parts of starch, 1500 of water, and 8 of oxalic acid, heating over a water-bath till all the starch has disappeared, neutralizing with carbonate of lime, filtering after two days' standing, and evaporating. (4) By the action of the diastase of malt: 80 parts of water are heated with 1 part of ground malt to 167° F., and 125 parts of starch are added in small portions. As soon as the starch has all passed into dextrine the solution is boiled to arrest the action of the diastase, which would otherwise change the dextrine to glucose. The solution is filtered and concentrated.

Cellulose is changed by the action of strong sulphuric acid into a substance resembling dextrine, but which rotates the plane of polarization to the left. Commercial dextrine always contains some glucose (grape-sugar), and generally some unchanged starch. It may be purified from the latter by solution in cold water and filtration; from the former, by repeated precipitation from its solution by alcohol or by dialysis.

Dextrine occurs in old potatoes and in young wheat plants in very small quantity. In the sprouting of seeds and buds it is produced from starch; hence it occurs in malt and malt liquors. In the baking of bread it is formed from the starch of the flour, and often constitutes 10 per cent. of the loaf. The glazing on the crust is chiefly a coating of dextrine. Limpin found four-tenths of 1 per cent. of dextrine in the flesh of a horse.

Dextrine is an uncrystallizable, translucent solid, resembling gum-arabic. It is soluble in water and in dilute alcohol, but insoluble in absolute alcohol. Its aqueous solution is clear and limpid when dilute, but adhesive, viscid, and gummy when concentrated; it rotates the plane of polarization to the right, while the natural gums rotate to the left. It is not colored blue by iodine. By boiling with dilute acids or caustic alkalies it is converted into glucose. It is precipitated from its solution by an excess of strong alcohol. It has the same percentage composition as starch and cellulose. Dextrine is extensively used as a substitute for gum-arabic and other gums in stiffening, sizing, and glazing calicoes, nets, crapes, laces, silks, papers, cards, etc., as mucilage on every office-table, and for the adhesive layer on the back of postage stamps and on self-sealing envelopes. (Interesting observations on the transformation of starch into dextrine are recorded in the annual volumes of WAGNER's "Jahresbericht der Chemischen Technologie.")

C. F. CHANDLER.

**Dextrogyrate** [from the Lat. *dexter*, the "right hand," and *gyro*, to "turn"], a term applied in optics to crystals which have the power to rotate a plane of polarization of a plane polarized ray towards the right. It is opposed to *laevogyrate*, which expresses the power to rotate the plane in like manner towards the left.

**Dey**, *dā* [etymology doubtful], a Turkish title of dignity given formerly to the governors of Algiers (before the French conquest), and still given to the chief ruler of Tripoli. Tunis was governed by a dey at one period, but this title in the latter country has long been supplanted by that of bey.

**Dezfool'**, a town of Persia, in the province of Khoozistan, on the Dezfool River, here crossed by a fine bridge of twenty-two arches, 28 miles W. N. W. of Shooster. It is the chief mart of Khoozistan. Ancient ruins and mounds, evidently of Sassanian origin, are found in the vicinity. Pop. estimated at 15,000.

**Dhar**, a decayed town of Central Hindostan, in Malwa, the capital of a protected state of the same name, 32 miles W. S. W. of Indore. It has two large mosques of red stone, and other traces of former magnificence.

**Dhawalaghi'ri**, a lofty peak of the Himalaya Mountains, in Northern Hindostan, was formerly supposed to be the highest mountain of the earth. It is in Nepal, in lat. 28° 42' N., lon. 82° 32' E. Its altitude is 26,826 feet.

**Dhole**, *dōl* (*Canis scylax*), a wild dog found in the Western Ghats and other mountainous parts of India. It is of a light-bay color, with a sharp muzzle, large and pointed ears, and in size is somewhat less than a wolf. This species is remarkable for fierceness and courage, and for hostility to tigers and other feline races.

**Dhōl'ka**, a town of British India, in the presidency of Bombay, 22 miles S. W. of Ahmedābād. It is in the midst of ruined palaces, mosques, mausoleums, and spacious tanks lined with masonry. It is enclosed by a mud wall. Pop. about 25,000.

**Dhōl'poor**, a town of Hindostan, on the Chumbul, 34 miles S. of Agra, is the capital of a protected state. Here are some old freestone mosques and mausoleums.

**Dhubboree'**, a decayed town of Hindostan, in Guzerat, 78 miles N. E. of Surat. It has a ruined rampart two miles in circuit, and numerous Brahmanical temples built of hewn stone and adorned with sculptures.

**Dhun'chee**, or **Dhanchi**, a plant of the natural order Leguminosæ, of the genus *Sesbania*, having an extended loment with many seeds. It is an annual plant, cultivated extensively in some parts of India for its fibre, which is used in the manufacture of paper, cordage, canvas, and cloth. The plant has a slender stem about eight feet high.

**Dia** [διά], a Greek preposition and particle signifying "through," "apart," implying "separation" and "distinction," "across," "between," implying mutuality. (For examples or illustrations, see **DIAGONAL**, **DIAMAGNETISM**, and **DIALOGUE**.)

**Diab'etes** [Gr. διαβήτης, from διά, "through," and βαίνω, to "go"], the name of two diseases characterized by the excessive excretion of urine; whence the name. *Diabetes insipidus* (now called **POLYURIA**, which see) is distinguished from the other much more dangerous disease by the fact that the urine consists chiefly of water. It is neither frequent nor formidable. But *Diabetes mellitus*, "sweet" or "honeyed diabetes" (*Mellituria*), is one of the most incurable and serious of diseases. The urine has its specific gravity greatly increased by the presence of diabetic sugar, a substance believed to be identical (in most cases) with liver-sugar, and very closely approaching grape-sugar in its composition and reactions. In some cases it appears to be muscle-sugar (*inosite*). The disease is further characterized by indigestion, intense thirst, wasting, prostration of mind and body, and in many cases by degenerative changes in the tissues. Its causes are obscure and its treatment not well understood. Some cases are greatly benefited by opium and the use of strictly nitrogenous food, like gluten bread and skim-milk. Temporary diabetes has been observed after the administration of woorari poison and other drugs.

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**Diadel'phia** [from δις, "twice," and ἀδελφός, a "brother"], in botany, the seventeenth class of the Linnæan artificial system. It comprises plants of which the filaments are united in two sets or brotherhoods. These are called *diadelphous*. Many plants of the natural order Leguminosæ and a few other plants belong to this class.

**Di'adem** [Gr. διάδημα; Lat. *diadema*], the symbol of royalty among several Oriental nations, was originally a fillet wound round the forehead and temples. The diadem of the Egyptian goddesses and kings bore the symbol of the serpent. Among the Persians the diadem was bound round the tiara or turban, and was of a blue color. Diocletian was the first Roman emperor who wore a diadem. After his time it was adorned with a single or double row of pearls or precious stones. Diadem is sometimes used as synonymous with crown.

**Diagno'sis** [Gr. διάγνωσις, from διά, "apart," and γινώσκω, to "know"], the discovery of the nature and seat of disease, one of the most difficult and important branches of medicine and surgery. Diagnosis is based upon "physical signs and rational symptoms;" "signs" being appreciable by the senses, and "symptoms" arrived at by the educated judgment. Both, however, are popularly known as symptoms. Diagnosis is best learned at the bedside, under the guidance of good instructors. The stethoscope, thermometer, laryngoscope, etc. furnish important aid in this branch of medical practice. The term is often used by naturalists for the discrimination of species of animals, plants, or minerals.

**Diagom'eter** [from the Gr. διάγω, to "conduct," and μέτρον, a "measure"], an electric instrument for determining the conducting power of fixed oils, invented by M. Rousseau. It consists of a dry pile, by means of which a current is passed through the oil, and the strength of the current determined by a magnetized needle. It is used especially for the detection of the adulteration of olive oil, which is said to have the lowest conducting power of such oils.

**Diag'onal** [Lat. *diagonalis*; Gr. διαγώνιος, from διά, "through," and γωνία, an "angle"], a straight line drawn through a figure, joining two opposite angles. The term is chiefly used in geometry in speaking of four-sided figures, but it is also properly applied with reference to all polygons of which the number of sides is not less than four. Euclid uses the term *diameter* in the same sense, but modern geometers use diameter only when speaking of curved lines, and diagonal when speaking of angular figures.

**Diag'oras** [Διαγόρας], a Greek poet and philosopher,

born in the island of Melos, lived about 425 B. C., and is said to have been a disciple of Democritus of Abdera. He was a citizen or resident of Athens. As he rejected or doubted the popular religion and polytheism, he was stigmatized as an atheist. He fled from Athens in 411 B. C., or, as some say, was banished for impiety. He appears to have been a witty and fearless man of good moral character. His works are not extant. (See REUTHER, "De Atheismo Diagoræ," 1812.)

**Di'al** [from the Lat. *dialis*, belonging to the day; Lat. *solarium*], an instrument which shows the hour of the day by the shadow of a gnomon or style cast by the sun on a graduated arc; it is also called **Sun-Dial**. The invention is of great antiquity, the Greeks having, it is said, learned its use from the Chaldeans. In the construction of a dial the object is to find the sun's distance from the meridian by means of the shadow. When this is known, the hour also is known, provided we suppose the sun's apparent motion to be uniform, and that it moves in a circle parallel to the equator during the whole day. In point of fact, neither of these conditions is fulfilled, but the error arising from this is of small amount. Although dials have many different constructions, the general principles are the same. The style, gnomon, or axis of the dial is either a cylindrical rod or the edge of a thin plate of metal. It must be parallel to the earth's axis, and thus it may be considered, on account of the smallness of the earth's diameter compared with the distance of the sun, as coinciding with the axis of the diurnal rotation; consequently the plane which passes through the centre of the sun, and the style will coincide with the shadow, and will turn with the sun, as the sun turns round the style, by the effect of the diurnal motion. Dials are horizontal, vertical, or inclined, according to the position of the plane of the dial with respect to the horizon of the place. The essential principle of the dials is, that the rod shall point to the pole of the heavens. F. A. P. BARNARD.

**Di'al, The**, a literary journal, the organ of the so-called "New England Transcendentalists," was founded in 1840 under the editorship of Margaret Fuller, assisted by George Ripley and R. W. Emerson. After a time, Mr. Emerson became its sole editor. It was published only four years, and probably never exercised any appreciable influence, but was noted for the unusual number of persons of genius who contributed to it.

**Di'alect** [Gr. διάλεκτος, from διά, "apart," implying "difference," and λέγω, to "speak,"; Lat. *dialectus*], a provincial form or manner of speaking or writing a language. The four Greek dialects, Attic, Doric, Ionic, and Æolic, were the four written varieties of the language, each having a literature of its own. No cultivated modern tongue resembles the Greek in this respect, as in all one dialect has been adopted as the standard of literature and polite society. In almost all languages there are still dialectic variations, in so far as colloquial discourse is concerned. English is a notorious example.

**Dialectic** [Gr. διαλεκτική, from διαλέγομαι, "I converse"] is a technical expression much used both in the Greek and German philosophy, but of a somewhat vague signification. In the Greek philosophy it may be best explained by considering it in its relation to logic. Logic was the science of the forms of thinking, the science of conclusion and evidence; it taught the manner by which to arrive at truth. Dialectic treated of the truths arrived at; it was the science of expressing and setting forth ideas, the science of definition. With an idealistic thinker like Plato, with whom truth is an intuition and the idea an inspiration, dialectic, the science of definition, the art of defining, means the highest function of science—science itself. With a realistic thinker like Aristotle, with whom truth is the result of induction and deduction, and the idea an evidence, dialectic means only a part, and even an inferior one, of logic. Hence the multitude of contradictions which invests this word all around. In the German philosophy it may be best explained by considering it in its relation to the expression "dogmatical." Dogmatical is applied to a definition when it excludes absolutely the opposite; "dialectical," when it combines the opposites as correlatives. According to the dogmatical definition, everything is either good or bad; and if it is good, it is not bad; if it is bad, it is not good. According to the dialectical definition, anything which is essentially good may have some bad in it, and anything which is essentially bad may have some good in it. According as the object passes under different views, the different constituents of the idea shift place and importance in the definition; relativity is the character of the actual world, relativity must be the character of the world of thought. Both in the Greek and German philosophy the word *dialectic* is sometimes used to signify a mere word-fence. CLEMENS PETERSEN.

**Di'alogue** [Gr. διάλογος, from διά, "between," or

"among," and λόγος, a "discourse"], originally a discourse between two or more persons. In literature, a composition in the form of a conversation between two or more individuals. The dialogue was the form most generally adopted by the ancients for the conveyance of instruction, and was considered applicable to the gravest and most philosophical subjects. It was adopted by Plato, Cicero, and Lucian with great success. The philosophical dialogue has also been employed by several eminent modern writers, as Fénelon, Fontenelle, Machiavelli, Berkeley, Lessing, and Herder. In the drama, dialogue is combined with action, and those dramas which are not written for the stage differ from the dialogue chiefly in having a plot and a dénouement, while the dialogue is more strictly didactic.

**Dialysis** [Gr. διάλυσις, a "separation;" from δια, "apart," and λύω, to "loose"], the separation of certain substances by means of liquid diffusion. The dialyzer is usually a hoop of wood, gutta-percha, or metal on a low broad glass bell-jar, open above as well as below. A piece of wet parchment paper is stretched over the hoop and securely tied in place. The fluid to be dialyzed is poured into the hoop to the depth of half an inch, and the whole is floated on distilled water. Crystallizable bodies, as common salt, nitrate of potassa, etc., and bodies closely allied to them, such as hydrochloric acid and alcohol, pass rapidly through the membrane into the water; while bodies which do not crystallize, but are inclined to assume the gelatinous form, such as silicic acid, hydrated alumina, starch, gum, caramel, tannin, albumen, gelatine, and extractive matters, diffuse with extreme slowness. Such bodies are called *colloid*, from κόλλη, "glue." When a mixture of sugar and gum was placed in the dialyzer, three-quarters of the sugar passed through in twenty-four hours, without a trace of the gum. On treating silicate of soda (soluble glass), acidulated with hydrochloric acid, in the same way, seven-eighths of the silicic acid was left in the dialyzer at the end of five days, without a trace of hydrochloric acid or chloride of sodium. Urine dialyzed for twenty-four hours gave a liquid so free from mucous and gelatinous matter that on evaporating to dryness and extracting with alcohol a solution was obtained which gave pure urea in crystalline tufts.

The purification of soluble colloids is best effected by dialysis; they are thus completely freed from crystalloids. A solution of pure hydrated alumina is obtained by dialyzing its solution in the chloride or acetate. In a similar manner may be obtained, *in solution*, hydrated sesquioxide of iron and of chromium; Prussian blue from its solution in oxalate acid; an aqueous solution of silicic acid from silicate of soda and hydrochloric acid; pure albumen from albumen and acetic acid; pure gummy acid from gum-arabic (gummate of calcium) and hydrochloric acid. Mr. Whitelaw was granted a patent for the application of dialysis to brine from salted and corned meats. The salt and nitre pass rapidly through the parchment paper, while the nutritious extractive matters dissolved out of the meats are retained, and may be used for soup. (For the application of dialysis to the purification of beet-molasses, see *ENDOSMOSIS*.)

Dialysis is specially useful in examining animal fluids for poisons where the presence of the colloids interferes with the ordinary tests. Arsenious acid may be readily separated in twenty-four hours from the contents of a stomach in sufficient purity to be immediately recognized by the usual tests. Tartar emetic, morphine, strychnine, and, in fact, almost all soluble poisons, may be thus separated.

Decompositions are also effected by dialysis. Bisulphate of potassa is partially separated into neutral sulphate and hydrated sulphuric acid; alum is partially separated into sulphate of alumina and sulphate of potassa; sulphate of potassa and lime-water yield considerable hydrate of potassa and sulphate of lime. Separations and decompositions of this kind undoubtedly occur in plants and animals, and in the soil; and dialysis is probably one of the most common processes in nature. (See *WATT'S "Dictionary of Chemistry,"* under "Liquids, Diffusion of;" also the original papers of PROF. GRAHAM, who minutely investigated this subject, in the "Philosophical Transactions" for 1850 and 1862, and in the "Journal Chem. Soc.," iii. 60, 257; iv. 83; xv. 216.) C. F. CHANDLER.

**Diamagnetic.** See DIAMAGNETISM, by PROF. ALFRED M. MAYER, Ph. D.

**Diamagnetic Polarity.** It is well known (see *ELECTRO-MAGNETISM*) that if a bar of iron be placed in a helix or spool of copper wire, through which circulates a current of electricity, the bar will be magnetized; and if we look at the end of the bar round which the current passes in the same direction as the motion of the hands of a watch, this end will be a south magnetic pole. When a bar of bismuth

replaces the bar of iron, we find that the end above spoken of is a north magnetic pole in the bismuth; that is, bismuth has its poles the reverse of iron when it is placed in the same conditions of magnetization. Weber held to the opinion of the reversed polarity of bismuth, but Faraday denied any such condition. Tyndall settled the question by a series of experiments of great delicacy made with an apparatus designed for that purpose by Weber, and proved conclusively the existence of reversed polarity, not only in bismuth, but also in other diamagnetic solids and liquids. (By the author of the following article.)

**Diamagnetism** [for etymology see below]. The line joining the two opposite poles of a horseshoe magnet is called the *axial* line, while a line bisecting at right angles this axial line is called the *equatorial* line of the magnet. The space included between the opposite polar surfaces of the magnet is called the *magnetic field*.

When small bars of iron, nickel, cobalt, manganese, etc., are suspended between the poles of a magnet, they place their lengths in the axial line. Substances taking the above position are called magnetic substances, or, as Faraday termed them, *paramagnetic* substances. The majority of bodies, however (*e. g.* bismuth, antimony, phosphorus, heavy glass, wood, water, blood, bread, hydrogen, and ammonia), when delicately suspended in the magnetic field, place their lengths equatorially, and to distinguish them from magnetic substances they were called *diamagnetic* (διά, "across," and μάγνης, the "magnet") by Faraday, who in Dec., 1845, gave the discovery of diamagnetism to the world in a paper read before the Royal Society of London.

The difference in the behavior of magnetic and diamagnetic substances in the magnetic field was thus concisely stated by Faraday: Magnetic substances tend to go from weaker to stronger places of magnetic action, while diamagnetic bodies tend to go from stronger to weaker places in the magnetic field.

Faraday found that not only solids, but also liquids and gases, possessed magnetic and diamagnetic properties. In experimenting with these bodies he enclosed them in glass tubes, whose magnetic behavior was determined before they were filled with the liquids or gases to be examined, and the previously determined action of the magnet on the empty tube was deducted from the resultant magnetic effect on both the tube and its contained liquid or gas. Or two tubes of exactly the same size and material were hung opposite each other from the ends of a short piece of light wood, which was then placed across the end of a longer wooden rod, and the latter was suspended by silk fibres or by a fine silver wire. The two tubes hung on opposite sides of the axial line of the magnet, and with their centres equidistant from it. By this ingenious arrangement it is evident that the actions exerted by the magnet on the glass tubes neutralized each other, and whatever motion he observed was due to the difference in the action of the magnet on the two substances they contained. By filling one of the tubes with water or air, and the other successively with different liquids and gases, he determined the *specific magnetism* of these substances relatively to water or air taken as unity. Further experiments on the action of the magnetic field on water and air enclosed in a vacuum gave the data for reducing all of his measures to what he would have found had all the substances been suspended *in vacuo* between the poles of the magnet. Plücker in Germany and E. Becquerel in France also made very refined measures of these actions.

In the following table are contained the results of Faraday's measures of the actions of attraction or repulsion of magnetism on various substances, determined by means of a delicate torsion balance. In the comparisons equal volumes of the substance were used, and the action on water taken as the unity of intensity. The sign + indicates that the substance is magnetic, while — shows that it is diamagnetic:

Table of Specific Magnetism.

Substances.	Powers.	Substances.	Powers.
Iron.....	+ 2,500,000	Absolute alcohol.....	— 0.815
Protochloride of iron (saturated solution).....	+ 62.	Essence of citron.....	— 0.828
Protoammoniuuret of copper.....	+ 1.390	Camphor.....	— 0.855
Perammoniuuret of copper.....	+ 1.240	Camphine.....	— 0.859
Oxygen.....	+ 0.181	Linseed oil.....	— 0.886
Air.....	+ 0.035	Olive oil.....	— 0.888
Olefiant gas.....	+ 0.006	Wax.....	— 0.887
Nitrogen.....	+ 0.003	Nitric acid.....	— 0.911
Carbonic acid.....	0.000	Liquid ammonia.....	— 1.010
Hydrogen.....	— 0.001	Bisulphide of carbon.....	— 1.031
Ammonia (gas).....	— 0.005	Nitrate of potassa (saturated solution).....	— 1.036
Cyanogen.....	— 0.009	Sulphuric acid.....	— 1.081
Glass.....	— 0.188	Sulphur.....	— 1.221
Zinc.....	— 0.772	Chloride of arsenic.....	— 1.260
Ether.....	— 0.797	Borate of lead.....	— 1.413
		Bismuth.....	— 20.369



The general law of these actions was discovered by Faraday, and Becquerel has formally stated them as follows: If we place in the neighborhood of a magnetic pole a fixed vessel filled with a fluid, the latter will experience no motion. Imagine any portion of the interior of the fluid mass isolated; it is solicited, according as it is magnetic or diamagnetic, by a force  $f$ , positive or negative; and as it is not displaced, the medium which surrounds it must necessarily exert on it an equal and contrary pressure equal to  $-f$ ; this is to say, that the principle of Archimedes applies as well to these forces as to gravity. Replace now the mass of the fluid we supposed isolated from the same fluid surrounding it by another which is bounded by the same surface as the former, but of a different magnetic nature; it will receive from the magnet a different action  $f^1$ , positive or negative, and from the surrounding fluid the same action as above,  $f$ ; the resultant action on the new substance will be  $f^1 - f$ . Consequently, the action which the pole of a magnet exerts on any body whatever, plunged in a fluid medium, is equal to the difference of the actions which it exerts separately on this body and on the fluid in which it is suspended.

From these considerations the following consequences result: When the medium is magnetic,  $f$  is positive, and  $f^1 - f$  is negative; consequently, any body whatsoever tends to become diamagnetic in a magnetic fluid or medium. Conversely, in a diamagnetic medium  $f$  is negative, and  $-f$  is positive; and the substance may act as though it were magnetic, even when it really is not when tested in a vacuum, and will become more diamagnetic when it really is diamagnetic when suspended in a vacuum between the poles of the magnet.

Faraday beautifully illustrated the above principle by the following ingenious experiments: He filled glass tubes with solutions of sulphate of iron (a magnetic substance) of different degrees of strength, and suspended them between the poles of his magnet in similar solutions, also of different degrees of strength. When the solution in the tube was stronger, or contained more iron, than that in the solution in which it was suspended, it pointed axially; when it was weaker, or contained less iron, than that in the surrounding liquid, it pointed equatorially; and when the solution in the tube and outside of the tube were of the same degree of strength, the tube was indifferent.

In Sept., 1847, Bancalari of Italy discovered that when the flame of a candle was placed between the poles of an electro-magnet, it was deflected into the equatorial line the moment the iron of the magnet was magnetized, and the flame returned to its first position when the magnet was demagnetized. Faraday repeated these experiments with the powerful magnet of the Royal Institution, and greatly extended these observations by his discovery of the magnetic character of oxygen, olefiant gas, and nitrogen, when these gases were contained in tubes and placed in a vacuum in the magnetic field; and observed that hydrogen, cyanogen, and ammonia were diamagnetic when placed in similar conditions. Faraday made many important experiments on the effects of the change of temperature and pressure in modifying the magnetic conditions of gases, and found that the action in the magnetic field on these bodies diminished with an elevation of their temperature and a diminution of their density. Thus, hot air is shown to be diamagnetic when allowed to ascend through cold air between the poles of the magnet. This and other similar facts he showed by causing the currents of gas in their progress towards the magnetic field to pass over pieces of paper saturated with chlorhydric acid, while between, around, and above the poles were placed little tubes moistened with ammonia. When the gases entered one of these tubes the fact was known by the formation in it of white fumes of chloride of ammonium. He thus found that the heated air on reaching the magnetic field was repelled from the poles, while a descending current of cold air was attracted towards the poles.

The writer of this article has recently devised a superior method of observing these phenomena, by passing through the gases, as they ascend or descend or pass between the poles, a strong diverging beam from an electric or calcium light. The difference in refracting power of the hot or cold gas currents and the surrounding air causes shadows of the currents to be projected on a screen placed on the side of the magnet opposite the light; and thus can be seen at once all the parts of the phenomena; and he has thus been able to draw and even to photograph them. In these experiments the writer used the powerful electro-magnet of the Stevens Institute of Technology. With this magnet the experiments of Bancalari are very remarkable. On bringing the flame of a candle slowly upward between the poles of the magnet, the top of the flame is first depressed and spread out equatorially in the magnetic field; as we elevate the flame it spreads out yet more, and often takes the form of

an oval-shaped vase flattened equatorially, with an interior depression extending down nearly to the base of the wick. A larger flame becomes compressed into a flattened elliptical dish, with two curved arms or handles projected upward.

After Faraday had discovered the magnetic properties of oxygen, he experimentally determined that one cubic metre of this gas equalled in magnetic effect fifty-four centigrammes of iron, and hence that the whole atmosphere acted as would a layer of iron which enveloped the earth and had a thickness of one-tenth of a millimetre. Parts of this gaseous magnetic shell are successively heated—and therefore weakened in magnetic intensity—by the sun in his apparent daily and yearly changes of position; and hence Faraday reasoned that here was certainly a true, and probably a sufficient, cause of the diurnal variation of the needle. (*Phil. Trans. R. S.*, Nov., 1850.)

Faraday, in the course of his experiments on bars of bismuth, met with the following anomalous actions. He found that some cast bars of bismuth pointed axially, others equatorially, while yet other bars took intermediate positions of rest. These extraordinary phenomena both he and Plücker of Germany endeavored to explain, and they both observed that there was some relation between the positions of crystals in the magnetic field and their crystalline forms. The phenomena received their full explanation at the hands of Tyndall, whose subtle examination and lucid explanation of these phenomena—though not popularly known—we think form his greatest claim to illustrious distinction as a man of science.

We can best make clear Tyndall's discoveries by quoting from his paper "On Diamagnetism and Magne-crystalline Action" (*L., E., and D. Phil. Mag.*, July, 1850) the following experiments, and then give in his own words the law which embraces their characteristic phenomena: "If we take a slice of apple about the same size as a penny, but somewhat thicker, and pierce it through with short bits of iron wire in a direction perpendicular to its flat surface, such a disk, suspended in the magnetic field, will, on the evolution of the magnetic force, recede from the poles and set its horizontal diameter strongly equatorial; not by repulsion, but by the attraction of the iron wires passing through it. If, instead of iron, we use bismuth wire, the disk, on exciting the magnet, will turn into the axial position; not by attraction, but by the repulsion of the bismuth wires passing through it.

"If we suppose the slice of apple to be replaced by a little cake made of a mixture of flour and iron filings, the bits of wire running through this will assert their predominance as before; for, though the whole is strongly magnetic, the superior energy of action along the wire will determine the position of the mass. If the bismuth wire, instead of piercing the apple, pierce a little cake made of flour and bismuth filings, the cake will stand between the poles as the apple stood; for though the whole is diamagnetic, the stronger action along the wire will be the ruling energy as regards position.

"Is it not possible to conceive an arrangement among the particles of a magnetic or diamagnetic crystal capable of producing a visible result similar to that here described? If, in a magnetic or diamagnetic mass, two directions exist, in one of which the contact of the particles is closer than in the other, may we not fairly conclude that the strongest exhibition of force will be in the former line, which therefore will signalize itself between the poles in a manner similar to the bismuth or iron wire? . . .

"If analogic proof be of any value, we have it here of the very strongest description. For example: bismuth is a brittle metal, and can readily be reduced to a fine powder in a mortar. Let a teaspoonful of the powdered metal be wetted with gum-water, kneaded into a paste, and made into a little roll, say an inch long and a quarter of an inch across. Hung between the excited poles, it will set itself like a little bar of bismuth—equatorial. Place the roll, protected by bits of pasteboard, within the jaws of a vice, squeeze it flat, and suspend the plate thus formed between the poles. On exciting the magnet the plate will turn, with the energy of a magnetic substance, into the axial position, though its length may be ten times its breadth.

"Pound a piece of carbonate of iron into fine powder, and form it into a roll in the manner described. Hung between the excited poles, it will stand as an ordinary magnetic substance—axial. Squeeze it in the vice and suspend it edgewise, its position will be immediately reversed. On the development of the magnetic force the plate thus formed will recoil from the poles as if violently repelled, and take up the equatorial position.

"We have here 'approach' and 'recession,' but the cause is evident. The line of closest contact is perpendicular in each case to the surface of the plate—a consequence of the pressure which the particles have undergone in this direc-

tion; and this perpendicular stands axial or equatorial according as the plate is magnetic or diamagnetic."

Prof. Tyndall thus sums up the law which rules all of these actions: "If the arrangement of the component particles of any body be such as to present different degrees of proximity in different directions, then the line of closest proximity, other circumstances being equal, will be that chosen by the respective forces for the exhibition of their greatest energy. If the mass be magnetic, this line will stand axial; if diamagnetic, equatorial."

The above law explains clearly the anomalous actions Faraday observed in his bars of bismuth. Bismuth is a crystallized body, and the lines of greatest proximity of its particles are in the direction of its cleavage planes. Therefore, this line of greatest condensation will always place itself equatorially in the magnetic field. In other words, the planes of cleavage will take an equatorial direction. But in casting bars of bismuth, these planes may, on the solidification of the bismuth, take various positions in reference to the length of the bars; hence the anomalous actions which are sometimes observed in these bars.

When the crystal cleaves equally easy in two planes, the lines of greatest compression will be parallel to both of these planes, and therefore the intersections of these planes will determine the position the crystal takes in the magnetic field. This is confirmed by experiment.

If there are three cleavage planes, perpendicular to each other, as in rock-salt, or if there are none, as in quartz, there will be no line of elective polarity, and the body will act as though it were not crystallized.

Finally, when three planes of cleavage are not perpendicular, there is generally one direction of greatest compression, which is found—for example, in calc-spar—parallel to the axis of crystallization; this line will place itself axially if the crystal is magnetic, and equatorially if it is diamagnetic. This deduction is confirmed by experiment.

ALFRED M. MAYER.

**Diamanti'na** (formerly **Tejuco**), a city of Brazil, in the province of Minas Geraes, is the chief town in a diamond and gold mining district, and is situated in a valley between high mountains, 220 miles N. E. of Ouro Preto. It is 5700 feet above the level of the sea. It is the seat of a bishop, and is a handsome and wealthy place. Diamantina became a city in 1831. Pop. about 12,000.

**Diam'eter** [from the Gr. *διά*, "through," and *μέτρον*, a "measure"; Fr. *diamètre*], a right line drawn through the centre of a circle, and terminated on both sides by the circumference. Diameter in architecture is the measure across the lower part of the shaft of a column, which is usually divided into sixty minutes, and forms a scale for the measurement of all the parts. In astronomy the apparent diameter of a celestial body is the angle which the latter subtends at the eye, and is measured by the micrometer. The distance of the body in question from the earth, when multiplied by the sine of this angle, gives the real diameter of the body. In elementary geometry, diameter is any right line through the centre of a figure. In conics a diameter always bisects a system of parallel chords. Newton showed that the centres of mean distances upon a system of parallel lines, of the  $n$  intersections of each with a curve of any order, always lie on a right line, which may be called a diameter. A diameter of any curve is simply the polar line with respect to the curve of an infinitely distant point. The  $r$ th diameter is the  $r$ th polar of an infinitely distant point, and consequently a curve of the  $(n-r)$ th order. The  $(n-2)$ th diameter is called the diametral conic, the  $(n-3)$ th the diametral cubic, etc. The same extension is applicable to surfaces. When the primitive surface is of the second order, there is but one diametral surface, and that is the diametral plane which bisects a system of parallel chords. Three diametral planes so situated with respect to each other that each bisects all chords parallel to the intersection of the other two, constitute a system of conjugate diametral planes, and intersect each other in conjugate diameters.

**Diamond** [Fr. *diamant*; Ger. *Diamant* or *Demant*, a corruption of *ADAMANT* (which see)], the most valuable of precious stones and the hardest of known substances, consists of pure carbon. The primary form of the diamond is a regular octahedron, but it often occurs in cubes and rhomboidal dodecahedrons, and sometimes in twin crystals; the faces are frequently convex. The finest diamonds are transparent and colorless, but those which are of decided tints of pink, green, or blue are prized, while those which are slightly colored are held in least estimation. They are found in alluvial deposits, from which they are extracted by washing. The most celebrated mines are those of India. In 1728 diamonds were found in Brazil, and since that time the mines of Minas Geraes have produced most of the diamonds of commerce until quite recently. At present

there is a considerable importation from Southern Africa, where they were first discovered in 1870. They have also been brought from Siberia, Borneo, and other countries. The largest known diamond is probably that mentioned by Tavernier as belonging to the Great Mogul. It was found in Golconda in 1550, and it is said to have weighed in its original state 900 carats. Among the crown-jewels of Russia is a diamond weighing 194 carats; it is of the size of a pigeon's egg, and was stolen from a Brahmanical idol by a French soldier. It was ultimately bought by Catharine of Russia for about \$450,000 and an annuity of \$20,000. One of the most perfect diamonds was brought from India by a gentleman named Pitt, who sold it to the regent-duke of Orleans for about \$625,000. The celebrated Koh-i-noor (the "mountain of light") became the property of Queen Victoria on the annexation of the Punjab by the East India Company in 1850. It is mentioned by Tavernier in 1665 as the property of the Mogul emperor, and, together with the Dürriya-i-noor ("sea of light"), formed part of the plunder seized by Nadir Shah at the taking of Delhi in 1739. It weighed originally 186½ carats, but it has been recut and reduced to 103½ carats, and it is greatly improved in appearance. The diamond was first proved to be combustible in 1694 by the Florentine academicians, who found that when exposed to the heat of the sun in the focus of a large lens it burnt away with a blue lambent flame. The products of its combustion were first examined by Lavoisier in 1772, who showed that when burnt in air or oxygen it produced carbonic acid. Subsequent experiments have demonstrated that nothing but carbonic acid is thus formed. Diamonds of inferior quality have extensive employment in the diamond-drill (see **BLASTING**, by GEN. J. G. FOSTER), and in machines for sawing stone, dressing mill-stones, etc. (See also **PRECIOUS STONES**, by PROF. H. B. CORNWALL, E. M.) Attempts have been made to produce true diamonds by the crystallization of carbon, but thus far without success.

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**Diamond**, in printing, a very small type, less than pearl, and next larger than brilliant.

**Diamond Beetle** (*Curculio*), a coleopterous insect belonging to the weevil tribe, remarkable for the splendor of its colors. It is golden-green, with two black bands on the thorax; on the wing-covers are rows of depressed spots of a sparkling green color, with intervals of black.

**Diamond Harbor**, in British India, the port of Calcutta for large ships, is in the river Hoogly, 34 miles below that city, with which it is connected by an excellent road. The adjacent country is so swampy and unhealthy that few Europeans reside here.

**Diamond Necklace**, a celebrated necklace containing 500 diamonds, and valued at 1,800,000 livres (about \$400,000), made in 1773-75 by order of Louis XV. for Madame du Barry, his mistress; but before it was finished the king died, and Du Barry was excluded from court. In the years 1783-84 the prince-cardinal de Rohan was persuaded by the so-called countess Jeanne de Lamotte-Valois, an unscrupulous adventurer, that the queen Marie Antoinette regarded him with interest, which would be increased if he would assist her in buying the diamond necklace by becoming her surety for the payment of its price to the makers of the ornament, MM. Boehmer and Bassanges. The next steps in the affair are involved in some mystery. The count Cagliostro was probably one of the participants in the plot. The queen was believed (unjustly, as it is thought) to have been also involved in it. Certain it is that the cardinal agreed to stand surety for the payment—that the necklace was delivered to him, was stolen from him, was broken up, and sold in pieces. The jewellers, not having received their pay, went to court and made complaint. Cagliostro, the cardinal, and others were thrown into the Bastille. The trial in 1785-86 proved the guilt of no one but the countess Lamotte, who, with her husband, was branded on each shoulder and sentenced to a life imprisonment, from which she shortly afterwards escaped to London, where she died Aug. 23, 1791, having fallen from a window as she was trying to hide from her creditors. There is little doubt that the pretended signatures of the queen upon the papers and agreements made respecting this affair were clever forgeries.

**Dian'a**, an ancient Italian divinity worshipped by the Romans as the goddess of the moon. Her name is, indeed, the feminine form of Janus. She was thought to preside over the woods and the lakes, to govern the changes of human character, more especially those of the female sex, and to lead in chase and war. Worshipped by the Sabines, the Æqui, the Hernici, the Latins, etc., she had sanctuaries among all these tribes; but her most celebrated sanctuary was her grove at Aricia, on the Lake of *Nemi*, whence she was called "Nemorensis." After the destruction of Alba Longa the grove was for a long time, until the

undisputed supremacy of Rome was disputed, the common sanctuary for the Latin and Rutulian cities. The principal festival of Diana was celebrated on the Ides of August—that is, the full moon of the hot season; and torchlight was one of the principal features of the celebration. She was identified by the later Romans with the Artemis of the Greeks, who was often called Delia, from her native island, Delos. She was supposed to be the daughter of Jupiter and Latona, and the sister of Apollo, with whom she shared his attributes of destruction and healing. She was represented as a virgin armed with bow and arrows, and was regarded as the patroness of chastity. As the goddess of the moon she was often called Selene and Phoebe, and was represented as loving to dwell in groves and in the neighborhood of wells.

**Diana, Temple of**, at Ephesus, one of the Seven Wonders of the World, built at the common charge of all the Asiatic states. The chief architect was Chersiphron; and Pliny says that 220 years were employed in completing this temple, whose riches were immense. It was 425 feet long, 225 broad, and was supported by 127 columns of Parian marble (60 feet high, each weighing 150 tons), furnished by so many kings. It was set on fire on the night of Alexander's nativity by an obscure individual named Erostratus, who confessed on the rack that the sole motive which had prompted him to destroy so magnificent an edifice was the desire of transmitting his name to future ages (356 B. C.). The temple was rebuilt, and again burned by the Goths in their naval invasion (A. D. 256).

**Diane de Poitiers**, a beautiful French lady, born Sept. 3, 1499, was married at the age of thirteen to Louis de Brézé. After his death (1531) she became a favorite of the king's son, who in 1547 ascended the throne as Henry II., and created her duchess of Valentinois in 1548. She had great influence over the king, who permitted her to exercise royal power and control his foreign policy. She maintained her ascendancy until the death of Henry in 1559. Died April 22, 1566.

**Dianthus**. See PINK.

**Diapason** [Gr. *διά*, "through," and *πασών* (genitive plural feminine of *πᾶς*, "all"), in music, a term by which the ancient Greeks designated the octave. In modern music, diapason is used to denote the range or compass of the voice or of an instrument. The French use the term as equivalent to pitch, and apply it also to the steel instrument commonly called "tuning-fork" in English, which is employed to give a certain pitch. Diapason is also the name given by organ-builders to certain stops of pipes in the organ of eight feet pitch. (See ORGAN.)

**Di'aper** [Fr. *diapre*, a corruption of d'Ypres, a town of Flanders, where it was first manufactured], a linen fabric woven in flowers or regular patterns, chiefly used for napkins, table-cloths, etc. Diaper is also made in Scotland, Ireland, and Germany.

**Diaphanous** [Gr. *διαφανής*, "transparent," from *διά*, "through," and *φαίνωμαι*, "to shine"], a term nearly synonymous with *translucent*, is applied to bodies which like porcelain, permit light to pass through their substance. The term transparent is applied when the distinct forms of objects can be seen through the body.

**Diaphoresis** [Gr. *διαφώρησις*, from *διά*, "through," and *φέρω*, "to carry"], the excretion of sweat from the skin without perceptible moisture; insensible perspiration. Medicines promoting this excretion are called "diaphoretics," while those producing perceptible wetness of the skin are called "sudorifics." Of late, however, the terms "diaphoretic" and "diaphoresis" are frequently applied to both the sensible and insensible perspiration.

**Diaphragm** [Gr. *φρήν* or *διάφραγμα*, from *διά*, "apart," and *φράγνυμι* (*φράσσω*), "to fence," "to enclose"], or **Midriff** [from the Ang.-Sax. *mid*, "middle," and *hrif*, the "abdomen"], a thin musculo-aponeurotic septum which in mammals separates the abdominal cavity from the thorax. Its centre in man is occupied by the cordiform tendon or trifolium (trefoil), so called from its shape, which roughly resembles a clover-leaf (Lat. *trifolium*). The diaphragm is attached to the vertebral column by two muscular buttresses or pillars called, in the plural, *crura*. These crura bear the names "right" and "left crus" (Lat. *crus*, *cruris*, a "leg," so called from their shape and position). The diaphragm is traversed by the phrenic (internal respiratory) nerves, and is, like the other respiratory muscles, partly involuntary. In forcible inspiration it is drawn down like the piston of an air-pump. It is one of the principal agents in the various expulsive acts, and also in sneezing, coughing, and laughing. Hiccough (Lat. *singultus*) is a clonic spasm of the diaphragm.

The term diaphragm is frequently applied by mechanics and others to a thin layer of leather, metal, or other mate-

rial stretched across a cavity, after the manner of the above muscle.

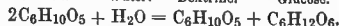
**Diarbektir** [Turkish, *Kara-Amid*], a town of Asiatic Turkey, capital of a pashalic of its own name, is situated on the right bank of the Tigris, near its source, and about 200 miles N. E. of Aleppo; lat. 37° 55' N., lon. 39° 52' E. It is enclosed by a high, strong stone wall flanked with towers. It is the seat of a Nestorian and a Jacobite patriarch, and of a Catholic and an Armenian bishop. It has numerous handsome mosques, bazaars, and khans. It was formerly a more populous city, and had extensive manufactures of silk and cotton, but these have declined. The manufacture of silk is still carried on here. Pop. 45,000.

**Diarrhœa** [Gr. *διάρροια*, from *διά*, "through," and *ῥέω*, "to flow"], a disease characterized by frequent soft alvine discharges; acute or chronic intestinal catarrh. Many writers have drawn nice distinctions between the various assumed varieties of this disease, which indeed is very frequently a symptom rather than a distinct disease; but nearly every case is in reality due to inflammation or irritation of some part of the intestinal canal. Diarrhœa as a symptom of cholera, dysentery, typhoid fever, pulmonary consumption, and some forms of peritonitis, is treated of under these respective heads. When resulting from local or general disease of the alimentary canal, its symptoms and treatment vary greatly according to the age of the patient. In infants both its acute and chronic forms are very frequent and fatal. These cases often depend on improper food and clothing—less frequently upon disturbances caused by dentition than is generally supposed. These cases require, first, a careful attention to hygienic conditions. Flannels should be worn next to the skin. If a milk diet should disagree, as it often does, finely-cut raw beef or strong broth may be given to the child. Medication should generally be cautious, but active. Many children suffer or die from over-medication, and still more probably from lack of active treatment. If scybalous masses of fecal matter exist in the bowels, they should be cleared out by cathartics, such as rhubarb, etc., with aromatics, or castor oil. The proper use of astringents, tonics, and opiates in infantile diarrhœa is a matter requiring much discrimination. Chronic diarrhœa in the adult is an obstinate and rather common disease. A certain proportion of the cases are improved by iron, quinia, salicine, and other tonics. Change of climate, visits to mild saline chalybeate springs, sea-bathing, etc. are useful in many instances. Balsam of copaiba relieves some patients with surprising readiness. Astringent remedies and opiates have much value as palliative, and sometimes as curative, agents. In the simple acute diarrhœa of temperate climates, adults previously well are in general promptly cured by these agents, judiciously administered.

REVISED BY WILLARD PARKER.

**Di'astase** [Gr. *διάστασις*, "division," "separation," from *διά*, "apart," and *ίστημι*, "to stand"], a name given to the constituent of malt (germinated barley) which changes starch to dextrine and glucose (grape-sugar). Diastase may be extracted from ground malt by treating it with tepid water (80° F.), heating the solution to 160° F. to coagulate the albumen, filtering, and precipitating the diastase by absolute alcohol. It is purified by redissolving in water and reprecipitating by alcohol. Malt does not yield more than 0.002 to 0.003 per cent. of diastase. Thus obtained, diastase is a white amorphous substance, soluble in water and in dilute alcohol. It has not been obtained sufficiently pure for analysis. It is supposed to be a nitrogenous body. Mulder believes it to be a group of bodies, not a single, well-defined compound. Its most characteristic property is its action upon starch. At a temperature of 158° F. it rapidly changes this substance to a mixture of dextrine and glucose. Payen and Persoz say 1 part of diastase will change 2000 parts of starch. It was at first supposed that the starch was first changed to dextrine, and the dextrine then changed to glucose. Musculus claimed to have proved that the two products resulted simultaneously from the starch, in the ratio of 1 equivalent of glucose to 2 of dextrine, and that diastase would not change dextrine to glucose. Payen proved that diastase does change dextrine to sugar, but that the process is interrupted by the presence of a certain percentage of glucose, to be resumed when this glucose has been destroyed by fermentation. Schultz and Märker confirm to a certain extent the observations of Musculus; they claim to have proved the simultaneous formation of both products, and propose the following expression for the reaction:

Starch.      Water.      Dextrine.      Glucose.



Before Payen and Persoz discovered diastase, Saussure obtained a substance from malt which changed starch to

dextrine and glucose, for which he proposed the name *mucin*. This name having been previously applied to a substance obtained from animal mucus, Ritthausen changed it to *mucidin*. Mucidin is probably identical with diastase. Dubrunfaut has obtained a body from malt which he calls *maltin*. It is precipitated from malt extract by tannin. He describes it as "a diastase of a true platonic character." The action of diastase on starch is prevented by nitric, sulphuric, hydrochloric, phosphoric, oxalic, tartaric, or citric acids; also by caustic potassa, soda, or lime, sulphate or acetate of copper, corrosive sublimate, nitrate of silver, alum, copperas, and borax. It is retarded by formic acid, arsenious acid, magnesia, ammonia, and alkaline carbonates; slightly by acetic acid, hydrocyanic acid, strychnine, quinine, morphine, and their salts. Essential oils, creosote, alcohol, and ether do not interfere with its action. Starch is also changed to dextrine and glucose by dilute acids, putrid flesh, yeast, gastric juice, by animal membranes, and in fact by all albuminoids in a certain stage of decomposition. (See STARCH, DEXTRINE, GLUCOSE, FERMENTATION.)

It is probable therefore that diastase is not a definite compound, but a certain condition of albuminous matter. Diastase plays a very important part in the germination of seeds and the sprouting of buds in tubers and stems containing starch. It serves to render the starch and albumen soluble, and thus facilitates their circulation and assimilation. (See GERMINATION.) In the manufacture of beer and spirits the diastase changes the starch into dextrine and glucose, and thus makes fermentation possible. (See BEER, ALCOHOL, WHISKY.) (The investigations with regard to the nature and action of diastase are recorded in LIEBIG and KOPP's "Jahresbericht," and WAGNER's "Jahresbericht.") C. F. CHANDLER.

**Diathesis** [Gr. *διάθεσις*, from *διά*, "apart," and *τίθημι*, to "place;" Lat. *dispositio*], in medicine, a predisposition; a constitution of body tending towards some particular disease. Writers mention the strumous, cancerous, scorbutic, rheumatic, gouty, hæmorrhagic, and other diatheses. These tendencies exercise a most powerful influence upon life and health, and their detection and treatment are matters of great practical importance.

**Diatomacæ** [named from *Diatoma*, one of the genera], an order of microscopic plants which are usually referred to the class Algæ. Owing chiefly to the curious movements which the Diatomacæ exhibit, they have been by some few naturalists considered as animals, and by others as belonging to a class of organisms intermediate between the animal and vegetable kingdoms; but movements like those of the Diatomacæ are by no means absent from the higher vegetable world, and are especially frequent among the Protophytes; while it is certain that the organisms we are considering are closely akin to the Desmidiacæ, which are confessedly of vegetable nature. They also contain endochrome (chlorophyll), which, however, is, during life, of a brown color, owing to the presence of iron.

Each diatom consists essentially of a single cell, and the wall of each cell is a layer (frustule) of siliceous, interpenetrated by organic matter chemically identical with the cellulose of higher plants. Each frustule is curiously marked with lines or dots, often of the most beautiful characters when seen under a powerful microscope. The interior contains endochrome and often oil-globules. Many diatoms have a protoplasmic layer outside the frustule, and it is upon contractions of this layer that the motions above alluded to are supposed to depend. Many of the most interesting diatoms are strung together in filaments; others are agglutinated in masses. Their reproduction is not well understood, but it is certain that they increase by the conjugation of cells, and also by fission.

The Diatomacæ are found fossil in vast deposits. Bergmehl, tripoli, flint, and rotten-stone consist principally of these fossils. Bog-iron ore consists chiefly of these plants, which in some of the species incorporate large proportions of iron into their frustules. Diatoms are found in guano and in fresh and salt water, in some cases attached by stalks to fixed objects, and in other cases floating in the water in such numbers as to color it with their characteristic brown tint. They are eaten by the minute animals which form so large a part of the food of the whale. They abound especially in polar regions, some species ranging from Spitzbergen in the N. to Mount Erebus in the farthest S. A stratum eighteen feet thick of their fossil frustules underlies the city of Richmond, Va. On the Columbia River there is a mass of these fossils 500 feet thick. Living specimens are extensively found in soils and in the mud of many salt-water inlets and harbors. The ice in both polar regions is often colored with them; they also occur alive in springs whose water is near the boiling-point. (See CARPENTER on "The Microscope," and the articles

of Prof. BAILEY and others upon this subject in the "American Naturalist," vol. i. et seq.) CHAS. W. GREENE.

**Diatonic Scale of Colors**, the spaces occupied by the seven primary colors in the solar spectrum, and supposed by Newton to be exactly proportional to the length of strings that sound the seven notes in the diatonic scale of music. It is now known, however, that this theory is not well founded, although there is an analogy between the pitch of sounds and the color of bodies.

**Diaz** (BARTOLOMEU), a Portuguese navigator, eminent for his learning, talents, and enterprise. He commanded an expedition sent in 1486 to explore the western coast of Africa. He sailed or was driven by the wind around the southern extremity of Africa, to the mouth of the Great Fish River. Returning homeward, he discovered the cape which he had previously doubled unawares, and called it Tormentoso, which was soon exchanged for the name of Cape of Good Hope (Cabo de Buena Esperanza). He was captain of one of the ships in the fleet of Cabral, which sailed for India in 1500, and he perished by shipwreck May 29 of that year.

**Diaz de la Peña** (NARCISSE-VIRGILE), a French painter, born at Bordeaux Aug. 20, 1809. He began as a landscape-painter, but later he occupied himself with subjects of pure fancy, filling a crowd of small canvases with nymphs and cupids, and with boys and girls dressed in costumes that might pass for Eastern, but in which no attempt at faithfulness to details is allowed to interfere with the effects of color, which is all the artist aims at, and which he is often successful in obtaining. At one time the pictures of Diaz fetched high prices, and when he first made a name it was by work that showed an original vein; but he greatly deteriorated, and by flooding the market with pictures merely made to sell, he nearly lost all reputation. He obtained a third-class medal in 1844, a second-class in 1846, and the first-class in 1848. D. Nov. 18, 1876. —He had a son, M. EUGÈNE DIAZ, who has some local repute as a musical composer. CLARENCE COOK.

**Dibdin** (CHARLES), an English musician and writer of songs, born at Southampton Mar. 15, 1748. He composed over 1000 sea-songs, among them "Tom Bowling" and other favorites of the English tars. Died July 24, 1814. —His son, THOMAS DIBDIN, born in 1771, was an actor and author of innumerable melodramas, farces, etc., of which the best known is "The Cabinet." Died Sept. 16, 1842.

**Dibdin** (THOMAS FROGNALL), D. D., an English bibliographer, born in Calcutta in 1776, was a nephew of Charles, noticed above. He took orders as a priest in 1804. He published, besides other works, "Bibliomania" (1809); a new edition of Ames's "Typographical Antiquities of Great Britain" (4 vols., 1810–19); "Bibliographical Decameron, or Ten Days' Pleasant Discourse over Illuminated MSS." (1817); and "Reminiscences of a Literary Life" (2 vols., 1836). Died Nov. 18, 1847.

**Dibrell** (ANTHONY), a minister of the Methodist Episcopal Church South, born in Virginia Aug. 19, 1805. He was educated at the University of North Carolina, studied law, entered on the practice of his profession at Lynchburg, abandoned it for the ministry, and in 1830 joined the Virginia Conference, in which he became eminent for piety, talents, and zeal. Died in Norfolk, Va., of yellow fever, Sept. 1, 1855. T. O. SUMMERS.

**Dicaeum** [from the Gr. *δικαίος*, "decent," "well-ordered," alluding to the habits of these birds], a genus of tenuirostral birds remarkable for their beauty, their rapid flight, and the sweetness of their long-continued though very soft notes. They are of small size, and inhabit the highest trees. They weave a purse-shaped nest from the down found about the seeds of many plants. The best known species are the Australian *Dicaeum hirundinaceum* and the *Dicaeum cruentatum* of India.

**Dicast** [Gr. *δικαστής*, from *δίκη*, "justice"], a name for a body of Athenian citizens, consisting of 6000, who were chosen yearly by lot from the body of freemen for the purpose of assisting in the administration of justice. They were divided into ten sections, generally about 500 each, before which causes were tried. The leading points of law and evidence were previously ascertained



Australian *Dicaeum*.

before a magistrate, and the conflicting issues were reduced to a formal statement called the *anakrisis*. This was carried for decision before a section of the dicasts, who were supreme judges of the law and the fact. They were kept in ignorance of the cause which was to come before them, and each dicast was sworn to vote according to the law and justice. The analogies of the system to jury trial are obvious, as are also the differences between the two systems.

The word *dicasterion* was used to denote the whole body of the dicasts and the place where their session was held.

**Dice** (plu. of **Die**), [Lat. *alea* and *tessera*; Gr. *βοῖς*; Fr. *dé*; It., Sp., and Port. *dado*; Ger. *Würfel*], small cubes used in playing certain games of chance. They are made of bone, ivory, or close-grained wood, having their six sides marked with dots or pips from one up to six. These dots are so arranged that the numbers on two opposite sides taken together always count seven. The dice are shaken in a box called a dice-box, and then thrown on a board or table, and the number of dots on the upper faces decides the game. The invention of dice is very ancient, and is variously ascribed to the Greeks and Egyptians, and by Herodotus to the Lydians. Dice similar to those of our day have been found in Thebes. The Greeks gave the names of their gods and heroes to the different throws. The game of dice was popular among the Romans, and it is said that during the decline of the empire wealthy Romans not unfrequently staked their whole fortunes on a single throw. Gamblers resort to the practice of loading dice by adding lead to them on one side, so that the higher numbers are almost sure to turn up. When this trick is suspected, the thrower should turn down the mouth of the box abruptly, and this will prevent the dice from arranging themselves unjustly. Two cubes, supposed to be Etruscan dice, but marked with words instead of pips, have given ground for Taylor's theory that the Etruscan was a Turanian language, the words being assumed as numerals.

**Dicentra** [from the Gr. *δῖς*, "twice," or "two," and *κέντρον*, a "spur," a term descriptive of the blossom of these plants], a genus of herbaceous perennials belonging to the order Fumariaceæ. They are found in moist, rich woodlands, and flower in spring. Among the species native in the U. S. are *Dicentra Cucullaria* (commonly called Dutchman's breeches), *Dicentra Canadensis* (squirrel corn), and *Dicentra eximia*. *Dicentra chrysanthra*, found in California, has large golden-yellow flowers. *Dicentra spectabilis*, introduced from Japan about 1846, grows sometimes to the height of three feet, and produces long racemes of rosy blossoms of great beauty.

**Dichlamydeous** [from the Gr. *δῖς*, "twice" or "two," and *χλαμύς*, a "short cloak"], a botanical term applied to flowers or plants having both calyx and corolla. In the system of Decandolle exogenous plants are divided into *dichlamydeous* and *monochlamydeous*.

**Dichotomous** [from the Gr. *δῖχα*, "double," and *τέμνω*, "to cut"], two-forked, a term in botany, is applied to branches or stems which bifurcate, and are repeatedly divided into pairs. The stems of some ferns, the fronds of some algæ, and the stems of several phanerogamous plants are dichotomously branched.

**Dichotomy** [for etymology see **Dichotomous**], an artificial system for the arrangement of natural objects, based upon principles of binary distinction. In logic, the division of a class into two sub-classes, which are opposed to each other by contradiction. In anthropology, the recognition of two factors, and only two, in man—the physical and the spiritual—contrasted with trichotomy, which recognizes in man three factors—viz. body, soul, and spirit.

**Di'chromism** [from the Gr. *δῖς*, "twice," and *χρῶς*, "color"], the property possessed by some crystallized bodies of showing two different colors, according to the direction in which rays of light pass through them. The crystals of the double chloride of palladium and potassium appear deep red along the axis, and vivid green in a transverse direction.

**Di'chroite** [etymology same as for **Dichromism**], also called *l'olite*, a mineral so called from the different colors it exhibits, is a silicate of magnesia, iron, and alumina. It is found in prisms belonging to the trimetric system, and is sometimes used as a gem.

**Dick** (JAMES T.), an artist born in New York City in 1834, was a son of A. L. Dick, an engraver of good reputation. The younger Dick gained several prizes at the age of fourteen, and was one of the founders of the Brooklyn Art School and of the Academy of Design. Died Jan. 19, 1868.

**Dick** (THOMAS), LL.D., a Scottish author, born near Dundee Nov. 24, 1774, was educated for the ministry in connection with the Secession Church. He taught school for many years at Perth, and wrote numerous popular sci-

entific and religious works, among which are "The Christian Philosopher" (1823), "The Philosophy of Religion" (1825), "The Philosophy of a Future State" (1828), "Celestial Scenery" (1838), and the "Sideral Heavens" (1840). He received a pension from the government. D. July 27, 1857. In the "Christian Philosopher" he aimed, as he said, "to illustrate the harmony which subsists between the system of nature and the system of revelation, and to show that the manifestations of God in the material universe ought to be blended with our view of the facts and doctrines recorded in the volume of inspiration." His above-mentioned later works were all supplementary in aim to the "Christian Philosopher."

**Dickens** (ASBURY) was born in North Carolina; removed to Philadelphia; spent some years in Europe; was afterward chief clerk in U. S. state department, and secretary of U. S. Senate 1836-61. Died Oct. 23, 1861.

**Dickens** (CHARLES), one of the greatest novelists that England has produced, was born at Landport, Portsmouth, on Feb. 7, 1812. His father was John Dickens, who held a position in the navy pay department, and who afterwards became parliamentary reporter for one of the London daily papers. After studying in a college near Rochester, young Dickens was placed in an attorney's office to learn the profession of the law. This pursuit proving uncongenial to his taste, he left it and obtained a position as reporter on the staff of the "Morning Chronicle." In this paper appeared the first efforts of his genius, his "Sketches of Life and Character," which in 1836 were collected and published in two volumes under the title "Sketches by Boz." The public gave these a favorable reception, and in 1837 they were followed by "The Posthumous Papers of the Pickwick Club," which first appeared as a serial in monthly parts. The work had an immediate and almost unparalleled success, and raised its author at once to the first rank among the popular writers of the day. In its peculiar vein of humor it has never been equalled in English literature. He was married in 1838 to the daughter of George Hogarth, a musical critic, and in the same year appeared "Oliver Twist," a novel in three volumes. This was followed by "The Life and Adventures of Nicholas Nickleby" (3 vols., 1839), "Master Humphrey's Clock" (1840-41), and "Barnaby Rudge" (1841). In 1841 he visited the U. S., and in the following year appeared his "American Notes for General Circulation," in which American life and character were somewhat severely satirized. The "Notes" were followed in 1842-44 by the "Life and Adventures of Martin Chuzzlewit" (3 vols.), a work which reflected still more on the faults and foibles of our countrymen.

In 1844, Mr. Dickens went to Italy, whence he returned in 1845, and towards the end of that year he assumed the chief editorship of the "Daily News," a Liberal journal then just established. He soon, however, resigned this position. In 1847-48 appeared his "Dombey & Son," which, in some of its passages at least, is not surpassed by any of his works either in power or pathos. It was followed in 1850 by "The Personal History of David Copperfield," which is regarded by many as the best of all his novels. Certainly in none other is the interest more intense or better sustained from the beginning to the end. It is commonly understood that in the story of "David Copperfield" the novelist has introduced many of the incidents or circumstances of his own life, without, however, following so closely the real history as in any way to compromise the characters of those with whom he associated. Among his other works may be mentioned "Bleak House" (1852), "Hard Times" (1854), "Little Dorrit" (1857), "A Tale of Two Cities" (1860), "Great Expectations" (1862), "Our Mutual Friend" (1864-65), and "The Mystery of Edwin Drood," left unfinished at his death. "Household Words," a weekly periodical originated by him in 1850, had a very extensive circulation. He afterwards in 1859 started another weekly journal entitled "All the Year Round." In 1867 he made a second visit to the U. S., and met everywhere with a cordial and even enthusiastic reception. He gave in the principal cities public readings from his own works, which were attended by crowded audiences. He returned to his native country in the spring of 1868, and died at Gad's Hill June 9, 1870. He was buried in Westminster Abbey June 14, 1870. (See his "Life" by JOHN FORSTER, 3 vols. 8vo, 1871-72-74, and KENT's "Charles Dickens as a Reader," also MISS KATE FIELD's "Pen Photographs of Charles Dickens' Readings in America.")

**Dickins** (JOHN), a Methodist Episcopal preacher, born in London in 1746, studied at Eton, and came to America before the Revolutionary war. In 1774 he became a Methodist, and soon began to preach. He was one of the ablest preachers of his day, and contributed much to the foundation of Cokesbury College and the Methodist Book Concern. Died of yellow fever in 1798.



**Dickinson** (ANNA ELIZABETH), an American public speaker, b. of Quaker parents at Philadelphia Oct. 28, 1842, was educated in the Friends' free schools. Her first public speech was delivered in Jan., 1860, at a meeting for the discussion of woman's rights, and at once established her reputation. During the civil war she delivered many patriotic and political addresses, and since that time she has spoken much upon labor reform, woman's suffrage, etc. In 1875 she entered upon the dramatic profession and produced two plays, "Marie Tudor" and "Anne Boleyn," in both of which she performed the principal part. It seems, however, that she did not achieve the same success in the theatre as in the lecture-room.

**Dickinson** (DANIEL STEVENS), LL.D., an American Senator and lawyer, born in Goshen, Conn., Sept. 11, 1800. He was elected as a Democrat to the senate of New York in 1836, and became lieutenant-governor of that State in 1842. In 1844 he was chosen a Senator of the U. S. for six years. He was distinguished as a debater, and was the leader of the conservative ("Hunker") Democrats of New York. After he retired from the Senate he practised law at Binghamton, with a high reputation. In 1861 he was elected attorney-general of New York. During the civil war he zealously supported the cause of the Union by public speeches. He was appointed district attorney for the southern district of New York in the spring of 1865. Died April 12, 1866. (See his "Life," by his brother, 1867.)

**Dickinson** (EDWARD), LL.D., an American lawyer, was born at Amherst, Mass., Jan. 1, 1803, graduated at Yale with the highest honors in 1823, studied at the Law School of Northampton, Mass., and in 1826 became a lawyer of his native town, where he has since resided. He became treasurer of Amherst College in 1835, holding that position nearly forty years, greatly to the advantage of the college. In 1838, 1839, and 1873 he was chosen representative to the general court of Massachusetts, was State senator 1842-43, State councillor 1845-46, and a Whig member of Congress 1854-55, having declined other important public trusts. He was a prominent supporter of the railroad interests of his town and State, and was distinguished for integrity, public spirit, and professional success. Died June 16, 1874.

**Dickinson** (JOHN), LL.D., an American statesman and lawyer, born in Maryland Nov. 13, 1732. He received his legal education in London, practised law with success in Philadelphia, and was a deputy to the first Colonial Congress in 1765. He was a member of the Continental Congress in 1774, and wrote for that body several important state papers, among which was a "Declaration to the Armies." He was an eloquent and ready debater. In 1776 he spoke against the Declaration of Independence, which he regarded as premature, and he was one of the few members of Congress who did not sign that declaration. He consequently became unpopular, and was defeated in the next election, but he served as a private soldier in the war of Independence. In 1779 he represented Delaware in Congress. He was president of Pennsylvania in 1782-85. He wrote numerous political essays, and had a high reputation for learning. In 1783 he founded and endowed Dickinson College at Carlisle, Pa. Died Feb. 14, 1808.

**Dickinson** (REV. JONATHAN), a Presbyterian theologian, born at Hatfield, Mass., April 22, 1688, graduated at Yale College in 1706. He preached at Elizabethtown, N. J., for more than thirty years, and was elected president of the College of New Jersey in 1746. He wrote several works on theology. Died Oct. 7, 1747.

**Dickinson College**, next to the University of Pennsylvania, is the oldest college in the State; the former was founded in 1753, the latter in 1783. As to its establishment and its location in Carlisle, the board of trustees in 1784 set forth the following: "The fitness of the situation, not only central to the State, but to the several States of the Union, the healthfulness and beauty of the country around, recommend the fitness of the situation. The great embarrassments learning lay under during the war pointed it out as a virtue peculiarly commendable to use our endeavors to revive the drooping sciences. Gratitude to God for the prosperous conclusion of the war laid us under obligation, our new relations to the other nations of the world, and especially the important interests of religion and virtue in this growing empire." In consequence of the valuable gifts to, and personal interest in, the college of Hon. John Dickinson, "president of Pennsylvania," the institution received his name. The first president was Charles Nisbet, D. D., a native of Scotland, and minister at Montrose. During the Revolutionary war his voice was in favor of the colonies. The college has had eleven presidents: Charles Nisbet, D. D., elected 1784; Robert Davidson, D. D., in 1804; Jeremiah Atwater, D. D., in 1809; John M. Mason,

D. D., in 1821; William Neill, D. D., in 1824; Samuel B. How, in 1830; John P. Durbin, D. D., in 1833; Robert Emory, D. D., in 1845; Jesse T. Peck, D. D., in 1848; Charles Collins, D. D., in 1852; Herman M. Johnson, D. D., in 1860; Robert L. Dashiell, D. D., in 1868; James A. McCauley, D. D., LL.D., in 1872.

The institution is denominational. Until 1833 it was under Presbyterian control, but the division of that Church into the old and new branches brought the college under grave embarrassments. The Old School kept the educational funds; the New School had a majority of the board of trustees, but, being without funds, transferred the college to the Methodist denomination, under whose care it now remains. At the breaking out of the late civil war it had many students from the Southern States; these left, others were called to the battle-field, and the college suffered in its finances until the year of the centenary of Methodism, when its endowment fund was increased \$100,000. During the present year, in connection with the centennial commemoration of the college, upward of \$100,000 has been added to its permanent funds, making the total endowment about \$325,000. In addition to this increase, funds have been contributed for a scientific building, which is now in process of erection.

The course of study retains the old classical course, but allows a divergence in the junior and senior years from the ancient languages in two directions—one in favor of the Hebrew language and literature, to accommodate those studying for the ministry; and the other in favor of natural science.

The buildings are three in number. The libraries contain 28,800 volumes.

S. D. HILLMAN. REVISED BY J. A. MCCAULEY.

**Dickson** (SIR COLLINGWOOD). See APPENDIX.

**Dickson** (SAMUEL HENRY), M. D., LL.D., was born of Scottish parentage at Charleston, S. C., Sept. 20, 1798, graduated at Yale in 1814, and received the degree of M. D. at the University of Pennsylvania in 1819. In 1824 he became professor of the institutes and practice of medicine at Charleston medical school (S. C.), was professor of practice in the University of New York (1847-50), and again in Charleston. In 1858 he was called to the chair of practice at Jefferson College, Philadelphia, which he filled with great ability. He was the author of several valuable works and numerous brochures upon medicine and other subjects. Died Mar. 31, 1872.

**Dicotyledonous** [from the Gr. *δί* (for *δύς*), "twice" or "double," and *κωτυλίδων*, a "cotyledon"] **Plants**, the name given to plants which have the embryo furnished with two, or more than two, COTYLEDONS (which see). More than two are of rare occurrence, but are found in the fir, larch, spruce, etc. of the Coniferae. It is not always easy, however, to determine whether a plant is dicotyledonous or monocotyledonous. Sometimes only one cotyledon presents itself, though the plant is really dicotyledonous, as is the case with several species of the sub-genus *Bulbocapnos* in the genus *Corydalis*. Sometimes the cotyledons are altogether wanting, as in dodder, or the embryo is in so rudimentary a state in the seed that it at first consists only of a pair of cells, as in *Monobrapa*. The habits of the plants must, therefore, be taken into account, not to speak of numerous other things of minor importance. As a general rule, exogens are dicotyledonous, while endogens are almost always monocotyledonous. (See EXOGENOUS PLANTS.)

**Dictator** [Fr. *dictateur*, from the Lat. *dicto*, *dictatum*, to "say often," to "dictate"], the title of an extraordinary magistrate in the republic of ancient Rome, who was invested with nearly absolute power for a period of six months, and was irresponsible. Dictators were appointed when the republic was in danger, or when an important crisis demanded the prompt decision and vigorous action of a single executive chief. The first dictator, according to some authorities, was Titus Lartius, who was appointed 501 B. C.; the last, Marcus Junius Pera (216 B. C.). In general, no one could be made dictator who had not previously been consul. It is doubtful whether election by the curiae was necessary to his appointment, but the nomination by the consul was indispensable. The dictator appointed a *magister equitum* ("master of the horse"), who in his absence acted as his deputy or lieutenant. The office of dictator was at first confined to patricians, and the first plebeian dictator was C. Marcus Rutilus, appointed in 356 B. C. The power of the dictators was subject to these limitations: they could not touch the treasury, they were not permitted to leave Italy, nor to ride through Rome on horseback without the consent of the people. The dictatorships of Sulla and Cæsar, both of whom transcended their limitations, were irregular and illegal, entirely different from the former dictatorships.

**Dic'tionary** [Modern Latin, *dictionarium*, from *dictio*, a "word," and *-arium*, a suffix, denoting a "place where things are kept;" Fr. *dictionnaire*; It. *dizionario*; Sp. *dicionario*], a book giving the words of a language in alphabetical order, and explaining their meaning. It is also a general term for works on science, literature, and art, giving information under separate classified heads, and in modern times under heads alphabetically arranged. The multiplication of books upon history, science, and literature has made it necessary to reduce the body of knowledge in specific branches of inquiry to the form of dictionaries, with the topics alphabetically arranged for convenience of reference. The earliest work of the kind is in the Chinese language, compiled about 1100 B. C. One of the first lexicographers among classic writers was M. T. Varro (128-116 B. C.), but the most celebrated dictionary of antiquity is the "Onomasticon" of Julius Pollux, completed early in the third century. In modern times the first Latin dictionary was published by Balbi of Genoa (1460). Sebastian Münster's "Chaldee Dictionary" appeared in 1527; Pagninus's "Lexicon of the Hebrew Language" (1529); Stephens's "Thesaurus" (1535); Erpeuius's "Arabic Dictionary" (1613); Schindler's "Lexicon Pentaglotton" (1612); Castell's "Lexicon Heptaglotton" (1669); Moreri's "Dictionnaire" (1673); Bayle's "Historical and Critical Dictionary" and the "Dictionary of the French Academy" (1694); Dr. Johnson's "English Dictionary" (1755); Grose's "Dictionary of the Vulgar Tongue" (1785); Walker's "Dictionary" (1791); Webster's (1806); Webster's "American Dictionary" (1828); revised edition, unabridged (1864); Richardson's "Dictionary of the English Language" (1835-37; reissued with a supplement in 1856); Worcester's (1830-60); J. L. Grimm's "German Dictionary" ("Deutsches Wörterbuch," begun in 1852; still unfinished). Among works of the kind may also be mentioned Wm. Smith's "Dictionary of Antiquities" (1842), "Dictionary of Biography" (1849), and his "Dictionary of Ancient Geography" (1857). His "Bible Dictionary" (1860-63) and his Latin Dictionaries (1855 and 1870) are valuable. Littré's "Dictionnaire de la Langue Française" (1863-73); the Greek-German Lexicon of Passow, translated into Greek-English by Liddell and Scott, and enlarged by Drisler; Yonge's English-Greek Lexicon, greatly enlarged by Drisler; Barretti's Italian Dictionary; Adler's German and English Dictionary (1848), and Sophocles' Dictionary of Byzantine Greek (1860), are among the best works of the kind. E. A. Andrews's Latin Dictionary, based upon that of Freund, and the lexicographic works of the late Prof. Anthon, are of much value. Quite recently much attention has been given in the U. S. to the compilation of dictionaries of the aboriginal languages of the country—a task upon which much valuable labor has been bestowed.

**Dic'tyogens** [from the Gr. *δίκτυον*, a "net" or "network"], a name proposed by Lindley for a sub-class of plants included by other botanists among endogenous plants. While they agree with endogens in the structure of the embryo, they are distinguished by having net-veined instead of parallel-veined leaves, and the growth of their stems appears to be partly exogenous and partly endogenous. The most important natural orders referred to this class are Dioscoreaceæ and Smilacæ; and among the plants are the different species of yam and sarsaparilla.

**Dicyn'odon** [from the Gr. *δί* (for *δύς*, "twice" or "two," *κύνω*, a "dog," and *δόνος* (gen. *δόνοντος*), a "tooth"], literally, having two tusks or canine teeth, the name applied to a genus of fossil reptiles whose remains have been found in South Africa. Animals of this genus united in their structure the characteristics of different reptiles. The closed orbits and sharp, compressed jaws covered with a horny plate ally it closely to the tortoise, but it also has affinities with the lizard and crocodile. It takes its name from a pair of sharp-pointed tusks growing downward, one from each side of the upper jaw. The articulating surfaces of the vertebrae being hollow, it may be supposed these reptiles were good swimmers; and if they were inhabitants of the water, the construction of the bony passages of the nostrils proves that they must have come to the surface to breathe air.

**Didac'tic** [Gr. *διδασκτικός*, from *διδάσκω*, to "teach"], a word signifying skilled in teaching, imparting instruction. **DIDACTIC POETRY**, a term applied to that poetry the chief object of which is to teach some art, science, or system of philosophy. Among the most remarkable examples of ancient didactic poems are the following: Lucretius's "De Rerum Naturâ" (designed to explain and defend the philosophy of Epicurus), which Macaulay pronounces "the finest didactic poem in any language;" Virgil's "Georgics" (a treatise on agriculture); and Horace's "De Arte Poetica"

("On the Poetic Art"). Many fine didactic poems have also been written in modern times. Among the principal of these are Vida's "Art of Poetry" ("De Arte Poetica"); Boileau's "Art of Poetry" ("L'Art poétique"); Pope's "Essay on Criticism" and "Essay on Man;" Darwin's "Botanic Garden;" and most of Cowper's longer poems.

**Didelphys**. See **OPOSSUM**.

**Diderot** (DENIS), a French philosopher, born at Langres Oct. 5, 1713, and educated by the Jesuits, was destined for the Church, and later for the law, but eagerly embraced the study of literature. His father, a prosperous cutler of stern character, withdrew from him all support upon his refusal to pursue his professional studies. Among his first writings were "Essai sur le Mérite et sur la Vertu" and "Lettre sur les Aveugles" (1749), which last established his reputation, but cost him a year's imprisonment. His earlier works were all written under the duress of poverty. His reputation is founded chiefly on the "Encyclopædia" ("Encyclopédie, ou Dictionnaire raisonnée des Sciences, des Arts et Métiers"), of which he and D'Alembert were joint editors. He wrote the articles on ancient philosophy, history, and on the arts and trades, and supervised other parts of the work. He expended many years on this arduous labor, for which he was qualified by great quickness of intellect and extent of information. Grimm expressed the opinion that he had perhaps the most encyclopedic head that ever existed. The first volume of this work was published in 1751. The government suspended the publication, because it advocated infidel doctrines, but it was finished in 1765. Catharine II. of Russia granted him a pension in 1765, and invited him to St. Petersburg, whither he went in 1773, but he soon returned to France. Among his works are novels entitled "The Nun" and "Jacques the Fatalist." He is considered as the chief of the skeptical philosophers called Encyclopedists. Died in Paris July 30, 1784. His complete works were published by Naigron (15 vols., 1798; new ed., 22 vols., 1821). (See DAMIRON, "Mémoire sur Diderot," 1852; CARLYLE, "Essay on Diderot;" ROSENKRANZ, "Leben und Werke Diderots," 2 vols., 1866.)

**Did'ius** (SALVIUS JULIANUS), a Roman emperor, born at Milan in 133 A. D. He had a high command in the army, and was chosen consul with Pertinax, after whose death (193 A. D.) the prætorians offered the empire at public auction to the highest bidder. Didius, who was very rich, gave 6250 drachmas to each soldier, and was proclaimed emperor. After he had reigned nearly two months he was killed (June 1, 193) in his palace by his soldiers. He was succeeded by Severus.

**Di'do** ("the fugitive"), [Gr. *Διδώ*], whose real name was **Elissa** or **Elisa**, a daughter of the Tyrian king Matgen, after whose death she and her younger brother Pygmalion (Piimeliun) were to reign conjointly. But Pygmalion, aided by democratic partisans, usurped the whole authority, and procured the assassination of her husband, Zieharbaal (the Sicheus of Vergil). She then fled with many Tyrians by sea, and founded Carthage about 870-860 B. C. Virgil has been charged with committing an anachronism in representing her as contemporary with Æneas. (See VERGIL, "Æneid," i., ii., and iv.)

**Didot** (FRANÇOIS), born at Paris in 1689, was the founder of a famous house of printers and type-founders in Paris. Died Nov. 1, 1757. The business was carried on by his sons, FRANÇOIS AMBROISE (born in 1730, died July 10, 1804), who made improvements in the printing-press and paper manufacture, and PIERRE FRANÇOIS. Of the sons of the former, PIERRE (born 1760, died Dec. 31, 1853, leaving as his successor his son JULES) took charge of the printing-house in 1789, and published magnificent folio editions of Virgil, Horace, Racine, and other classic authors; and FIRMIN (born 1764, died April 24, 1836) took charge of the type-foundry, improved the art of stereotyping, and became known also as an author and translator. His business was inherited by his sons, AMBROISE FIRMIN (born Dec. 20, 1790, died Feb. 22, 1876) and HYACINTHE FIRMIN (born Mar. 11, 1794, died Aug. 6, 1880).

**Didron** (ADOLPHE NAPOLEON), a French archæologist, born at Hautvillers (Marne) Mar. 13, 1806. He began in 1844 to publish "Annales Archéologiques," devoted to mediæval art and antiquities. His chief work is "Christian Iconography" (1843). Died Nov. 13, 1867.

**Didym'ium** [from the Gr. *δίδυμος*, a "twin"], a rare metal, so named from its resemblance to lanthanum, and the difficulty of separating the two. It is a dyad, its symbol D; atomic weight, 96. It forms a protoxide (D<sub>2</sub>O), which is a powerful base, and forms with acids rose- or violet-colored salts. It was discovered in 1841 by Mosander.

**Did'ymus** [Gr. *Δίδυμος*], a grammarian of Alexandria in Egypt, was born about 62 B. C., and was surnamed

**CHALCENTERUS.** He was noted for his fecundity as a writer, and is said to have written nearly 4000 treatises, mostly frivolous, on various subjects. All of his works have perished.

**Didymus (THE BLIND)**, one of the most learned men of his age, was born at Alexandria A. D. 308, became blind in his fifth year, and was at the head of the theological school in Alexandria from 390 to 395, the year in which he died. His most important extant works are a treatise upon the "Spirit" and a treatise upon the "Trinity."

**Die** (anc. *Dea Vocontiorum*), a walled town of France, department of Drôme, on the river Drôme, 26 miles E. S. E. of Valence. It has manufactures of silk and paper, and is the seat of a Catholic bishop. Pop. in 1881, 3703.

**Die** (plu. *Dies*), in coinage, the instrument by which impressions are stamped upon coins. The intended device is first engraved upon a plug of forged steel, which, when complete, is hardened, and is called a *matrix*. From this, by means of a powerful fly-press, an impression in *relief* is taken upon another piece of soft steel, which, when duly shaped and hardened, is called the *punch*. From this again indented impressions upon pieces of steel are taken, which, being shaped in the lathe and tempered, are the *dies*. A good pair of dies will sometimes yield from two to three hundred thousand impressions before they become too much worn for use.

Die-sinking has acquired increased importance on account of the great extension of the process of stamping metal. Many kinds of work formerly made by the hammer and punch are now shaped by a few blows between suitable dies. As examples of these we may mention the ornamental work of gas-fittings, buttons, common jewelry, ornamental trays, dishes, boxes, small parts of firearms, etc. For such purposes a pair of dies is required—one in relief, the other in intaglio—and the metal is pressed between them. The astonishing cheapness of many of the metallic wares is mainly due to the use of dies for doing by a single blow the work that formerly required long and tedious manipulation.

**DIE**, in architecture, is that part of a pedestal which lies between its base and its cornice.

**DIE** (plu. *Dice*). See **DICE**.

**Diebitsch**, surnamed **SABALKANSKI** (HANS KARL FRIEDRICH ANTON), COUNT, a Russian general, born in Silesia May 13, 1785. He served at the battle of Austerlitz, 1805, and became a major-general in 1812. Having distinguished himself at the battles of Lützen, Dresden, and Leipsic, he was raised to the rank of lieutenant-general in 1813. He was appointed chief of the imperial staff about 1820. Having obtained command of an army in the war against the Turks, he took Varna in 1828, and became general-in-chief in 1829. He defeated the Turks and crossed the Balkan, hence his title **SABALKANSKI** ("Trans-Balkanian"). He was raised to the rank of field-marshal, and in Jan., 1831, took command of an army sent to subdue the Polish insurgents. After the indecisive battles of Praga and Ostrolenka, he died of cholera June 10, 1831. (See BELMONT, "Graf Diebitsch," 1830.)

**Die'denhofen**, a fortified town in Elsass-Lothringen, on the left bank of the Moselle, 14 miles below Metz. (See THIONVILLE.)

**Dieffenbach** (JOHANN FRIEDRICH), a skilful Prussian surgeon, born in Königsberg Feb. 1, 1794. He graduated in 1822, and began to practise in Berlin, where he gained a high reputation. He was a professor in the University of Berlin, and wrote, besides other works, "Die Operative Chirurgie" (12 vols., 1844-48). He made improvements in plastic surgery. Died Nov. 11, 1847.

**Dielec'tric** [from the Gr. *διά*, "between," and *electricity*], a non-conducting body which permits the force of electricity to act through it. For example, the interposition of thin glass plates does not prevent electric induction from taking place; hence glass is dielectric.

**Die'men, van** (ANTHONY), a Dutch naval officer, born at Kuilenburg in 1593. He served for many years in the East Indies, and became an admiral. He was appointed governor-general of the Dutch East Indies in 1636, and sent out in 1642 an exploring expedition under Abel Tasman, who discovered Van Diemen's Land. Died at Batavia April 19, 1645.

**Die'penbeck, van**, written also **Diepenbeke** (ABRAHAM), an eminent Dutch historical painter, born at Bois-le-Duc in 1599, was a pupil of Rubens. In 1641 he was chosen director of the Academy of Antwerp. He painted with facility on glass and tapestry, imitated Rubens with great freedom, and gained a high reputation by his skill in composition and coloring. Among his works is a series of fifty-eight designs called "The Temple of the Muses." Died Dec., 1675.

**Dieppe**, a seaport-town of France, in the department of Seine-Inférieure, is on the English Channel at the mouth of the river Arques, and at the northern terminus of the Rouen and Dieppe Railway, 33 miles N. of Rouen, and 143 miles by rail N. W. of Paris; lat. 49° 55' N., lon. 1° 5' E. It stands between two high ranges of chalk-cliffs, and is defended by a wall and a castle built on a high cliff. Vessels of 500 tons can enter the harbor at high water, but at low tide the harbor is nearly dry. Dieppe has a town-hall, theatre, and public library; also manufactures of watches, lace, fine linen, paper, and ivory wares. It was formerly the principal port of France, and is now one of the most fashionable watering-places of that country. Dieppe is a favorite landing-place of English tourists visiting France. Pop. in 1881, 22,003.

**Di'es I'rae**, a Latin hymn written about the year 1250 by a Franciscan friar, Thomas da Celano, commencing—

"Dies Irae, dies illa,  
Solvat sæculum in favilla,  
Teste David cum Sibylla."

Day of Wrath! On that dread day  
In ashes earth shall pass away,  
Attest the King's, the Sibyl's, lay.

The Western Church soon gave it a place in its offices as the "Sequence for the Dead," so called because in the Roman mass it is sung between the Epistle and the Gospel, following immediately after the Gradual Hymn, when that is sung. In an English form it has also been adopted into the hymn-books of the Church of England, and into the new Hymnal of the Protestant Episcopal Church of our country. It is chief among the "Seven great Hymns of the Mediæval Church," among which are "Jerusalem the Golden," "Come, Holy Ghost" (*Veni Sancte Spiritus*), etc. Of all these sacred lyrics none can compare in point of sublimity or touching pathos with the "Dies Irae." For centuries it has been the favorite alike of Roman and Protestant Christendom. The most renowned of modern poets, composers, and divines have bent in admiration at its shrine, and multitudes have essayed in vain to transfer its force and beauty to their own language. (*Amer. Ch. Rev.*)

The composition is evidently suggested by the words of Zephaniah, in the Vulgate: "*That Day, a Day of Wrath, a day of trouble and distress, a day of vastness and desolation, a day of darkness and gloominess, a day of clouds and thick darkness, a day of the trumpet and alarm against the fenced cities and against the high towers!*" which the opening stanza, already quoted, coupled with the third stanza—

"Tuba mirum spargens sonum,  
Per sepulcra regionum,  
Coget omnes ante thronum"—

forcibly renders, though, with poetical license, the *last* trumpet "*scattering a wondrous sound*" through "earth's sepulchres," and "*compelling* all before the throne" for judgment, is substituted for the battle-trumpet which "*alarms*" the "fenced cities." The translations and versions of this hymn in modern languages are numbered by scores, perhaps by hundreds; but the Latin verse of the Franciscan monk, simple and easy as it appears at the first glance, has in it a secret force which baffles the ingenuity and skill of translators. "After a close scrutiny, we must confess (says the "Amer. Church Review") that the version of Dr. Irons (the one adopted in 'Hymns Ancient and Modern,' 'The People's Hymnal,' and our new Hymnal) expresses most clearly the language and force of the original. The second best (which many rank as *the best*) has an historic interest attached to it; for it was the work of our own Christian soldier and statesman, Major-General John A. Dix, late governor of the State of New York, while in command of Fortress Monroe during the war with the South. As when, in the early days of the Christian Church, the Vandal legions encompassed his beloved city and diocese of Hippo, the holy Augustine found time and opportunity to compose his immortal 'City of God,' so, in the darkest days of a cruel war, the rhythms of Thomas da Celano found a fitting exponent in the person of one who was alike true to his country and faithful to his God." (*Amer. Church Review*, April, 1873.) The third best English translation is, according to the same authority, one by Dr. Abraham Coles, an American who has made thirteen excellent versions. The words of the "Dies Irae" constitute the principal subject of the music of the famous "Requiem" of Mozart, to which, from the circumstances under which it was composed, a mysterious interest is attached.

J. G. BARNARD.

**Di'esis** [Gr. *διεσις*, a "gradation," from *διά*, "through," and *ἵμμι*, to "send"], in music, an interval less than a comma. The harmonical diesis is the difference between the small and the great semitone, as from C to C sharp, and from C to D flat.

**Dieskau, von** (LUDWIG AUGUST), a German officer, born in 1701, entered the French service. He commanded a force which marched from Canada in 1755, and attacked Fort Edward in New York. Here he was wounded and taken prisoner by the British. Died near Paris Sept. 8, 1767.

**Diest**, a town of Belgium, in the province of South Brabant, on the river Demer, 17 miles N. E. of Louvain, is strongly fortified. It has manufactures of hosiery and woollen goods, and exports much good beer. It was taken by Marlborough in 1705. Pop. 7561.

**Diesterweg** (FRIEDRICH ADOLPH WILHELM), an eminent German teacher and writer, born at Siegen Oct. 29, 1790. He taught in Berlin, and published numerous educational works. Died July 7, 1866.

**Di'et** [from the Gr. *diæta*, "manner of living," "maintenance;" Lat. *diæta*], a term signifying in its popular sense the food and drink which are taken to maintain life. Originally, however, the term included all the conditions of living, such as clothing, shelter, and exercise. (See Food, by EDWARD SMITH, M. D., LL.B., F. R. S., London.)

**Di'et** [Lat. *diæta*; from the Gr. *diarâo*, to "govern"], the name of the assembly of the German states, which, originating at a very remote period, was reconstituted by the emperor Charles IV. in 1356. The sessions were made permanent at Ratibon in 1663, and were removed to Frankfurt by the Confederation of the Rhine in 1806.

**Dietary, Military.** See SUBSISTENCE OF ARMIES.

**Diet'erichs** (JOACHIM FRIEDRICH CHRISTIAN), a German veterinary surgeon and writer, born at Stendal in 1792. He published, besides several professional works, a treatise "On the Education of Horses" (1825) and a "Manual of the Practical Knowledge of Horses" (1834).

**Dieteri'ci** (KARL FRIEDRICH WILHELM), a Prussian political economist, born in Berlin Aug. 23, 1790. He became professor of political economy at Berlin in 1834, director of the national bureau of statistics in 1844, and member of the Berlin Academy. He published, besides other works, "Public Welfare in the Prussian States" (1846) and "Manual of the Statistics of the Prussian State," continued by his son (1858-61). Died July 29, 1859.—His son, FRIEDRICH DIETERICH, has published an Arabic grammar and edited Arabic writings. He was born July 6, 1821, and became professor at Berlin in 1850.

**Dietet'ics** [from the Gr. *diæta*, "manner of living"], that branch of medicine which treats of food and drink. In a wider sense it may treat of the recovery or maintenance of health by means of correct habits with regard to eating, drinking, exercise, the wearing of proper clothes, etc. (See Hygiene, by PROF. HENRY HARTSHORNE.)

**Die'trich, or Dietricy** (CHRISTIAN WILHELM ERNST), a German painter and engraver, born at Weimar Oct. 30, 1712. Among his works is an "Adoration of the Magi." Died April 24, 1774. (See monograph on his works, in German, by J. F. LINCK, Berlin, 8vo, 1846.)

**Dieu et mon Droit** [Fr., "God and my right"], the motto of the royal arms of England. It was the parole given by Richard I. at the battle of Gisors in 1198, and was assumed by him and his successors, but it did not appear on the broad seal until the time of Henry VIII. Queen Anne substituted "Semper eadem" for the old motto, but the latter was restored by George I.

**Diez** (FRIEDRICH CHRISTIAN), PH. D., a German philologist, was born at Giessen Mar. 15, 1794. He was appointed professor of modern literature at Bonn in 1830. He published "The Life and Works of the Troubadours" (1829), a "Grammar of the Romance Languages" (1842; new ed., 3 vols., 1850-60), and an "Etymological Dictionary of the Romance Languages" (1853; 3d ed. 1869). D. May 29, 1876.

**Difference** [Lat. *differentia*, from *dis* (for *dis*), "apart," and *fero*, to "bear"], in arithmetic and algebra, is the excess of one quantity over another, or the result of the operation of subtraction.

**DIFFERENCE**, in logic, is that quality which distinguishes the species from its genus, and is said logically to be part of the essence of the object; e. g. to the genus "animal" add the difference "having the power of articulate speech," and we obtain the species "man"—a species distinguished from all other animals by that peculiarity.

**Difference Engine**, the name given to calculating-machines which operate by the method of differences. Such are the calculating-machines of Babbage and Scheutz. (See CALCULATING-MACHINES.)

**Differences, Method of**, in algebra, a method of finding any distant term of a series, or the sum of a definite number of terms, by means of the differences between the initial terms, the differences of their differences, and so on.

A first order of differences is found by taking each term of the series from the next term following. Thus, if the series be  $a, b, c, d$ , etc., the first order of differences is  $b-a, c-b, d-c$ , etc.; and the first of these ( $b-a$ ) may be indicated by  $d_1$ . The second order of differences will be found by taking each first difference from the next following first difference, and the first of the second differences may be indicated by  $d_2$ . In like manner are found  $d_3, d_4$ , etc. If the law of the series be expressed by a formula in which the indices of the powers of the variable are integral, or which is capable of being transformed into such an one, the differences of the order denoted by the highest power of the variable will be equal, and those of higher orders will be zero. Thus, if this highest power be the  $m^{\text{th}}$ , there will be  $m$  orders of differences. Then, putting  $T$  for the  $n^{\text{th}}$  term after the first, or the  $(n+1)^{\text{th}}$  of the series,

$$T = a + nd_1 + \frac{n(n-1)}{1.2} d_2 + \frac{n(n-1)(n-2)}{1.2.3} d_3 + \dots + \frac{n(n-1)\dots(n-m+1)}{1.2.3\dots m} d_m.$$

To find the sum of  $n$  terms of the given series,  $a, b, c, d$ , etc., prefix zero to this series, and form a new series, of which each succeeding term shall be the sum of all the terms of the given series up to the term of the same name; as 0,  $a, a+b, a+b+c$ , etc. It is evident that the terms  $a, b, c, d$ , etc. of the given series form the first order of differences of the new; the first order of differences of the given series, the second order of the new, and so on. The  $(n+1)^{\text{th}}$  term of this new series will therefore be the sum of  $n$  terms of the given series; and representing this sum by  $S$ , we shall have,

$$S = na + \frac{n(n-1)}{1.2} d_1 + \frac{n(n-1)(n-2)}{1.2.3} d_2 + \dots + \frac{n(n-1)\dots(n-m)}{1.2.3\dots(m+1)} d_m.$$

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**Differen'tial**, a term belonging to mathematical analysis. When a variable quantity, as  $x$ , is taken in two states indefinitely near to each other, as  $x$  and  $x+h$ , the infinitely small difference,  $h$ , is called the differential of the variable, and is written in analysis,  $dx$ . If the given quantity is not  $x$  itself, but a function of  $x$ , say  $F(x)$ , then, when  $x$  becomes  $x+h$ ,  $F(x)$  becomes  $F(x+h)$ , and the differential is  $F(x+h)-F(x)$ , which may be written  $F'(x, h)$ . The analytic method which is founded on differences is called the differential calculus. (See CALCULUS.)

**Differential Calculus.** See CALCULUS, by GEN. J. G. BARNARD, U. S. Army.

**Differen'tial Coefficient**, in the calculus, is the value of  $F'(x, h)$  as defined in the last article, divided by  $h=dx$ , the differential of the variable. Putting  $u$  for  $F(x)$ , and  $u'$  for  $F(x+h)$ , then the differential of  $F(x)$ , which is  $F(x+h)-F(x)=u'-u$ , and is written  $du$ . Hence,  $\frac{du}{dx} = \frac{F'(x, h)}{h}$ .

is the only quite general expression for the differential coefficient of a function. But if the function is purely algebraic, more explicit forms may be found. Thus, let  $F(x) = x^m$ . And in the expression for the differential of  $F(x)$ , viz.  $du = F(x+h)-F(x) = (x+h)^m - x^m$ , develop the first expression, and we shall have,  $du = x^m + mx^{m-1}h + m \cdot \frac{m-1}{2} x^{m-2}h^2 + \dots + h^m - x^m$ .

Substituting  $dx$  for  $h$ , and then dividing by the same, i. e.  $dx$ , there results,

$$\frac{du}{dx} = m \cdot x^{m-1} + m \cdot \frac{m-1}{2} x^{m-2} dx + m \cdot \frac{m-1}{2} \cdot \frac{m-2}{3} x^{m-3} dx^2 + \dots + dx^{m-1};$$

in which all the terms multiplied by the infinitely small factor  $dx$  and its powers are of no appreciable value compared with  $mx^{m-1}$ , the first term. Consequently,  $\frac{du}{dx} =$

$mx^{m-1}$ , or the differential coefficient of any power of a single variable, is found by multiplying the given expression by the exponent of the power, and then diminishing this exponent by unity. The differential coefficient of an algebraic function consisting of more terms than one is the sum of the differential coefficients of the several terms. The differential coefficient of any algebraic function is identical with the derivative of that function. (See DERIVATIVE FUNCTION.)

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**Differen'tial Resol'vent**, a certain linear differential equation of the  $(n-1)^{\text{th}}$  order which is satisfied by each of the roots of an equation of the  $n^{\text{th}}$  degree, whose coefficients are functions of a single parameter.

**Differen'tial Thermom'eter** is a thermometer for indicating very slight variations of temperature. The instrument as here described was invented by Sir John Les-

lie. It consists of two glass bulbs connected by a narrow tube, which is usually bent in the form of a U. The bulbs are uppermost, and are filled with air, while the tube contains a column of mercury or sulphuric acid. The measurement is effected by the expansion of the air in one of the bulbs. This instrument is far more sensitive than mercurial and most other thermometers, owing to the greater expansive power of gases. It is estimated that a change not greater than the 6000th part of a degree Fahrenheit can be indicated by it. The differential thermometer has of late in a great measure been superseded for delicate measurements of temperature by the THERMOPILE (which see).

**Differentia'tion** is the operation in mathematics by which the differential of a function is determined. The allied operation, which leads to the determination of the derived function (or differential coefficient), is usually termed derivation. The partial differentiation of a function of two or more independent variables is the differentiation of that function, on the hypothesis that one only of these variables suffers change. "Finite differentiation" is the operation by which the difference of a function corresponding to a finite difference of the variable is determined. The term is also used to denote the process of development in plants and animals from simple to complex organizations.

**Diffraction** [from the Lat. *dif* (for *dis*), "apart," and *frango, fractum*, to "break"], in optics, a deviation or deflection which the rays of light undergo in passing very near any opaque body. It had been observed by Grimaldi, but Newton first explained its cause. Let a beam of solar light, reflected horizontally, be admitted into a dark chamber through a small round hole, and received on a white screen. If the hole have a sensible diameter, the image of the sun on the screen will suffer no sensible alteration of color; but if we place in the axis of the beam, and at a distance of five or six feet from the hole through which it is admitted, a metallic plate having a very fine puncture, and intercepting all other light than that which passes through the puncture, the appearance on the wall will be surrounded with several concentric colored rings, covering a space far exceeding in extent that which the solar beam would have occupied if its rays had followed their rectilinear direction. By substituting a very narrow slit for the puncture in the plate, or several punctures or slits close to each other, very beautiful phenomena are produced. (See OPTICS.)

**Diffusion of Gases.** See GAS.

**Digam'ma** [Gr. *διγάμμα*, "double gamma," from *di*, for *dis*, "double," and *γάμμα*, "gamma" (the third letter (Γ) in the Greek alphabet), so called from its shape (F)], an ancient aspirate or consonantal Greek letter, chiefly found in the Æolic dialect. It does not occur in extant literature, various substitutes having been employed for it, but its form and name have been preserved by the scholiasts. In many instances it disappeared altogether from the words where it was anciently employed; in others it became β, φ, υ, or ο, or took the form of a simple rough breathing. In Latin and in the Teutonic languages we find abundant traces of the Greek digamma. Thus, the old Æolic pronoun *Fa* (the Attic *oi*) is the Latin *qui*; the Latin name for the city *Velia* is given in the Greek as *Υέλια*, *Bélea*, and *Έλεα*; the Greek *oikos* is the Latin *vicius*; *oivos* is *vinum*; and the digamma lost from the Greek *vau* reappears in the Latin *navis*. The digamma is not found in the Homeric writings, but its influence is perceptible in the metre, as was first shown by Bentley. The Æolians called the digamma *Fau* (the Hebrew *Vau*), and it was used in Boeotian monumental inscriptions as late as 200 B. C. (See HEYNE, "Homer's Iliad" (1802), HERMANN'S "Review of Heyne" (1803), BOECKH, "On the Versification of Pindar" (1809), and the Greek grammars of BUTTMANN, KÜHNER, and HADLEY.) Digamma is the name of one of the most important definite integrals, now of extensive use in mathematics.

**Digby**, a seaport-town, capital of Digby county, Nova Scotia, is on R. R., the Bay of Fundy, and on Digby Neck, about 110 miles W. of Halifax. It is the seat of an academy. Mackerel and herrings of good quality are exported from this place. Shipbuilding and the lumber-trade are largely carried on. Pop. in 1881, 1879.

**Digby** (GEORGE), earl of Bristol, an English royalist noted for his instability and inconsistency in politics, was born in Madrid in 1612. Having been exiled during the civil war, he went to France and became a Catholic. He returned home in 1660, and rashly impeached Lord Clarendon in 1663. He enjoyed, however, the confidence of the king for a considerable time, and was much employed in the negotiations with the Spanish court concerning the Spanish-English marriage. He was the author of "Elvirah," a comedy. Died Mar. 20, 1677.

**Digby** (SIR KENELM), F. R. S., a learned English author,

a son of SIR EVERARD (born in 1581, and executed Jan. 30, 1606, for abetting the Gunpowder Plot), was born June 11, 1603. He was a gentleman of the bedchamber at the court of Charles I., and was a royalist in the civil war. In 1636 he was converted to the Catholic Church. He passed much time in France, and was an associate of Descartes. His wife was Venetia Anastasia Stanley, a well-known beauty. He wrote, besides other works, a "Treatise on the Nature of Bodies" (1644), "The Body and Soul of Man," "Chemical Secrets," a famous treatise on sympathetic cures, and "Private Memoirs of Sir Kenelm Digby" (1827). Died in London June 11, 1665.

**Digby** (KENELM HENRY), M. P., was born in Ireland in 1800, was educated at Cambridge, and, having become a Roman Catholic, devoted himself to scholastic theology and mediæval antiquities. He published "The Broad Stone of Honor" (1829), "Mores Catholici" (1840), "Comptum" (1851), and other works, which have many warm admirers, and are imbued by the nobler characteristics of Middle Age thought. D. Mar. 22, 1880.

**Digest**, in legal terminology, is a condensation or systematic arrangement of laws, statutes, or decisions. The name is sometimes applied to the Pandects of Justinian.

**Digester, Papin's** [named from Denis Papin, a French savant, who invented it in 1681], an invention by which bodies may be subjected to the action of high-pressure steam or water raised above its ordinary boiling-temperature to 400° F., and sometimes higher. The digester is a strong boiler made of copper or iron, with a tightly-adjusted cover furnished with a safety-valve. It has the power of dissolving even bones, and has been employed in France to a considerable extent in preparing soup from bones.

**Digestion** [Lat. *digestio*, from *di* (for *dis*), "apart," and *gero, gestum*, to "carry" (*digero*, the compound verb, often means to "distribute," to "dissolve"); Ger. *Verdauung*], a physiological process observable in all animals (with the exception of certain entozoa, which appear to have this work performed by proxy), and which constitutes one of the distinguishing marks of the animal kingdom. It is believed that vegetables absorb their nourishment without any process analogous to digestion; while it is regarded as certain that every animal requires to have its food undergo digestion—that is, a mechanical and chemical change, effected by the agency of the animal economy, preparatory to absorption and conversion into nutritive material. This process, in man and the higher animals, seems to commence before the food is swallowed. During mastication the saliva becomes mixed with the food, and immediately begins to convert the starchy parts into grape-sugar, a step preliminary to its absorption into the blood. This process is further carried on by the other secretions of the alimentary canal; and the sugar thus produced, together with that eaten in the form of sugar, is absorbed by the mucous membranes, and passes directly into the blood without change, except that cane-sugar and milk-sugar are changed (probably for the most part in the intestines) into grape-sugar before absorption.

The action of the stomach upon food is partly mechanical, partly solvent, and partly chemical. The chemical action is to some extent catalytic—i. e. not explicable by ordinary theories of chemical reaction. The gastric juice, the principal secretion of the stomach, contains two active elements—free acid (chiefly lactic acid) and pepsin. The most important part of their action is the solution of the nitrogenous parts of the food, and their conversion into albuminose (peptone). The albuminose is absorbed by the coats of the stomach, and passes directly into the portal circulation, while the sugar, much of the starch, and probably all of the fat, pass on to be subjected to the action of the pancreatic juice, the bile, and the intestinal fluids. The pancreatic juice has the power of digesting fats by converting them into a fine emulsion, which is absorbed to some extent by the veins, but principally by the lacteals. It also converts cane-sugar and starch into grape-sugar, which is rapidly absorbed by the intestinal veins. The pancreatic juice probably completes the digestion of such albuminous matters as have escaped digestion in the stomach, being assisted in this work by the intestinal secretion. The bile is believed to be auxiliary to the other secretions in the intestinal digestion, but its part in the process is by no means well ascertained. C. W. GREENE.

**Digges**, an English family, several members of which attained note as scholars and writers.—LEONARD, born at Barmham, was educated at Oxford, and died about 1573. He wrote "Tectonicon: Measuring of Land," etc. (1556), an arithmetic, and a military treatise entitled "Stratonicos," which was enlarged by his son THOMAS (died 1596), who edited his father's works and published "Celestial Orbs," "Pantometria," a geometrical work, etc.—SIR DUDLEY, son of



the last named (1583-1639), educated at Oxford, studied law, and was employed as ambassador to Russia and Holland, but afterward lost the favor of the king on account of his independence, and was even imprisoned for a short time. He was the author of "Right and Privileges of the Subject," a correspondence between Walsingham, Burleigh, and others concerning the marriage of Elizabeth and the duke of Anjou (1642), and the "Compleat Ambassador" (1655).—His son DUDLEY published "Unlawfulness of Subjects Taking up Arms against their Sovereign" (1643). Died in 1642.

**Dighton Rock**, a stone bearing a rude and unreadable inscription, which by some has been attributed to the Northmen, stands in the town of Berkley, Bristol co., Mass.

**Dig'it** [Fr. *doigt*, from the Lat. *digitus*, a "finger"], in arithmetic, one of the ten symbols, 0, 1, 2, 3, etc., by which all numbers are expressed. In astronomy the term is used in speaking of eclipses to denote the twelfth part of the diameter of the sun or moon. Thus the eclipse is said to be of ten digits if ten parts of twelve of the disk are concealed. It is also a measure of dimension equal to the breadth of a finger, and estimated at about three-fourths of an inch.

**Digita'lis** [from the Lat. *digitale*, the "finger of a glove"; Fr. *digitale*; Ger. *Fingerhut*], a genus of plants belonging to the order Scrophulariaceæ. With the exception of the common foxglove (*Digitalis purpurea*), which is a native of Great Britain, the species are mostly found in Southern Europe and different parts of Asia. *Digitalis purpurea* has narcotic and poisonous leaves and seeds, which are valued for their medicinal properties. The fresh leaves are cathartic and emetic, and when dried are administered in diseases of the heart, brain, and nervous system, in which they act as a powerful sedative. They contain a crystalline principle called digitalin. Several of the species are cultivated in gardens.

**Dig'itate** [Lat. *digitatus*, from *digitus*, a "finger"], a botanical term applied to compound leaves, the leaflets of which are all borne on the apex or tip of the petiole, as the clover and horse-chestnut. Such leaves are also called *palmate*.

**Digitigra'da**, or **Dig'itigrades** [from the Lat. *digitus*, a "finger," and *gradior*, to "walk"], a term applied to those carnivorous quadrupeds that walk on their toes. A group of Carnivora is so called in the system of Cuvier. Among the Digitigrada are included the cat, the dog, the hyæna, weasel, etc.

**Digna'no**, a town in Austria, province of Triest, in a fertile region. Pop. 6405.

**Digne** (anc. *Dinia*), a town of France, capital of the department of Basses-Alpes, on the river Bléone, 60 miles N. E. of Marseilles. It has a cathedral, a public library, and several tanneries; also a trade in almonds, prunes, grain, honey, wax, and hemp. It has given title to a bishop since 340 A. D. Pop. in 1881, 6771.

**Dig'nitary** [from the Lat. *dignitas*, "dignity" or "worth"]. In the canon law, this term signified originally an ecclesiastic of higher rank than an ordinary priest. To this class exclusively belonged all bishops, deans, and archdeacons, but it now includes also prebendaries and canons. Any officer of high rank may be called a dignitary.

**Digres'sion** [Lat. *digressio*, a "stepping aside," from *di*, "apart," and *gradior*, *gredior*, to "go," to "step"], the act of deviating or wandering from the main subject or argument in writing or oral discourse; in astronomy, the apparent distance of the inferior planets, Mercury and Venus, from the sun. Mercury is never seen at a greater distance than about 28° from the sun; this is called its greatest digression.

**Dihong'**, also called **Sanpoo'**, a large river of Asia, rises on the N. side of the Himalayas, traverses part of Tibet, and bursts through that mountain-chain near lat. 28° 15' N. It unites with another river to form the Brahmapootra.

**Dijon** (anc. *Dibio*), a handsome town of France, capital of the department of Côte-d'Or, is delightfully situated in a plain on the river Ouche, about 175 miles S. E. of Paris and 120 miles N. of Lyons, with both of which it is connected by a railway. Its environs are remarkably beautiful. Dijon was formerly the capital of Burgundy. It is well built, has spacious and clean streets, and is enclosed by ramparts. Among the principal public edifices are the palace of the princes of Condé; the cathedral, a Gothic structure founded in the thirteenth century; the noble Gothic church of Notre Dame; a theatre and town-hall. Dijon has a large public library, a botanic garden, and an *académie universitaire*; also manufactures of woollen cloth, blankets, hosiery, chemical products, and cotton fabrics.

Its prosperity is largely derived from the trade in Burgundy wines. Pop. in 1881, 55,453.

**Dike** [Dutch, *dyk*; Ger. *Deich*; Fr. *digue* or *levée*], an embankment or mound erected on the shore of the sea or of a river in order to prevent inundation. Such embankments raised along the Mississippi River are called *levées*. The coasts of Holland are protected against the encroachments of the sea by dikes constructed on a grand scale and in a systematic manner. A large part of that country is so low that it would be overflowed by the sea during high tides if it were not protected, partly by natural sandhills or dunes and partly by artificial dikes. The latter are also raised on the banks of the Rhine, Waal, and other rivers near their mouths. The dikes are broad at the base, and are usually of such magnitude that there is room on the top for a public road. The fabric is strengthened by willows, either growing or interwoven as wicker-work on the sides of the dike, which should present a very gradual slope towards the sea or river. The *Amnophila* and other creeping grasses are carefully cultivated on some of the dykes, and contribute much to their security. The base is often faced with masonry, and protected by vast heaps of stones (usually brought from Norway), and by rows of piles projecting six or seven feet above ground, connected by timber, and filled in with fascines weighted with stones. The most stupendous of these embankments are the dykes of the Helder and of West Kappel, at the W. extremity of the island of Walcheren. The term dike, as the equivalent of the Fr. *digue*, is also applicable to BREAKWATERS, JETTIES (which see), and also the stupendous *dams* of Holland constructed for engineering purposes, the most remarkable of which is the recent work by which the Y is isolated from the Zuyder Zee (see CANAL), and also that by which one of the outlets of the Maas has been obstructed. (See "Prof. Papers Corps of Engineers," No. 22.)

REVISED BY J. G. BARNARD.

**Dilapida'tion** [Lat. *dilapidatio*, from *di* (for *dis*), "apart," and *lapis* (gen. *lapidis*), a "stone"], originally the falling apart of the stones in a building, is used in ecclesiastical law where an incumbent of a benefice suffers the parsonage-house or outhouses to fall down or decay for the want of necessary repairs, or commits any wilful waste of the inheritance of the Church.

**Dilem'ma** [Gr. *δίλημμα*, from *δί* (for *dis*), "twice," "double," and the verbal noun *λήμμα*, an "assumption," from *λαμβάνω*, to "take"; Lat. *dilemma*] is a syllogism with a conditional premiss, used to prove the absurdity or falsehood of some assertion. A conditional proposition is assumed, of which the antecedent is the assertion to be disproved, and the consequent is a disjunctive proposition setting forth the supposition on which the assertion can be true. If the supposition be denied, the assertion must also be denied. Thus, if A is B, either C is D or E is F; but C is not D, and E is not F; therefore A is not B. The dilemma was called the *sylogismus cornutus* ("horned syllogism"), the two members of the consequent being the "horns of the dilemma," on which the adversary is caught. Since there may be more than two horns to the dilemma (giving us a trilemma, tetralemma, or polylemma), Hamilton proposes the term *hypothetica-disjunctive*.

**Dilettan'te** [from the Lat. *diligō*, *dilectum*, to "love"], an Italian term naturalized in England, France, and Germany, was originally synonymous with an amateur or lover of the fine arts. It is sometimes applied to a person who pursues an art without serious purpose or for mere amusement, and is often used as a term of reproach for one whose knowledge is superficial and affected.

**Dilettan'ti Soci'ety, The**, was established in Great Britain in 1760 to encourage a taste for the fine arts. They sent an expedition to the East in 1764, and published in 1769 the first part of the "Ionian Antiquities," the third part of which appeared in 1840. Chandler's "Travels in Asia Minor" came out in 1775, and his "Travels in Greece" in 1776. The "Unedited Antiquities of Attica" appeared in 1817, and "Antique Sculpture" in 1835. The society consists of fifty members.

**Diligence** [a Fr. word signifying "diligence," "speed," "promptness"], a four-wheeled public vehicle used in Europe. The French diligence is very strongly built, and drawn by four or six horses at the rate of six miles an hour. The front, called the *coupe*, holds three persons, the second compartment (the *intérieur*) six, and the *rotonde*, entered from behind, also holds six. Diligences are also used in Germany, Italy, Spain, and Russia; the German diligence (*Eilwagen* and *Postwagen*) is attached to the post-office. Diligences are much less used than formerly, owing to the facilities of railway travel.

**Dilke** (CHARLES WENTWORTH), an English editor, born Dec. 8, 1789. He purchased in 1830 "The Athenæum,"

which he edited with ability and success until 1846. He was afterward editor of the "Daily News," a liberal journal. Died in 1864.

**Dilke** (Sir CHARLES WENTWORTH), BART., an English republican politician, was born at Chelsea Sept. 4, 1843, educated at Cambridge, and called to the bar in 1866. He travelled through the U. S., Australia, and India, and on his return published "Greater Britain, a Record of Travel in English-Speaking Countries during 1866-67" (1868), which speedily passed through several editions, and procured the author's election to Parliament for Chelsea. He was re-elected in 1874, though violently opposed because in the mean time he had acknowledged himself a republican. In 1880 he was appointed under-secretary of state for foreign affairs, and in 1882 president of the local government board, with a seat in the cabinet. He succeeded his father and grandfather as proprietor of the "Athenæum."

**Dill**, a plant of the order Umbelliferae, having compound umbels, yellow involute petals, dorsally compressed lenticular fruit, and the border of the calyx minute and five-toothed. The common dill (*Anethum graveolens*), an annual or biennial plant, is a native of Southern Europe and Asia, and has long been cultivated for its stimulant and carminative seeds. It is also highly aromatic, and the leaves are used to flavor sauces, etc. Dill-seed is administered in the form of dill-water, obtained from oil of dill, a pale-yellow essential oil. The fruit of the *Anethum Sowa*, which grows in the East Indies, is used for flavoring.

**Dill'en** [Lat. *Dillenia*], (JOHANN JAKOB), M. D., a German botanist, born at Darmstadt in 1687. In 1721 he removed to London, where he edited Ray's "Synopsis of Plants" (1724). He obtained in 1728 the chair of botany founded by Sherard at Oxford. He published "Hortus Elthamensis" (1732) and a good "History of Mosses" (1741). Died April 2, 1747.

**Dillenia'ceæ** [from *Dillenia*, one of its genera, named after the above], a natural order of plants containing about 200 species, allied to the Ranunculaceæ and Magnoliaceæ. They are mostly trees or shrubs, and natives of tropical countries. They have thick, leathery leaves, without stipules, and generally alternate; flowers sometimes in racemes, sometimes solitary, with five persistent sepals and five deciduous petals; numerous stamens; fruit consisting of two to five carpels, and the seeds have an aril. They are generally astringent, and several species are valued as medicine, while others are excellent as timber. Many of the *Dillenas* are conspicuous for the beauty of their flower and foliage.

**Dill'ingen**, a town of Bavaria, in the circle of Suabia, on the Danube, 24 miles N. W. of Augsburg. It is enclosed by old walls, has a palace, three Catholic churches, a gymnasium, and a Catholic institution for deaf and dumb girls, with which is also connected, since 1869, an institution for cretins. The university, which was established in 1551, and was a chief seat of the Jesuits, was suppressed in 1809. The town has also manufactures of cutlery. Pop. 5450.

**Dill'ingham** (PAUL), was born in Shutesbury, Mass., in 1800, removed with his father to Waterbury, Vt., in 1805, was admitted to the bar in 1824, was a member of Congress (1843-47), and was governor of Vermont (1865-67).

**Dill'mann** (CHRISTIAN FRIEDRICH AUGUST), a German theologian and Orientalist, born Apr. 25, 1823, became prof. of exegetical theology at Tübingen in 1853, of Oriental languages at Kiel in 1854, of exegetical theology at Giessen in 1861, and at Berlin in 1869. He chiefly distinguished himself by his works on the Ethiopic language, among the most important of which are "Grammatik der Æthiopischen Sprache" (1857), "Chrestomathia Æthiopica" (1866), "Lexicon linguae Æthiopice" (3 parts, 1862-65), an edition of the old Ethiopic version of the Bible (1855-73) and of the apocryphal book of Enoch (1851), and author of the able article on the ETHIOPIC LANGUAGE in the present work.

**Dillon**, on R. R., capital of Beaver Head co., Mon. (see map of Montana, ref. 4-C, for location of county). Pop. in 1880 not in census.

**Dillon** (JOHN B.), an American author, born in Brooke co., Va., about 1807. His parents removed to Ohio in his infancy. He became a printer in his youth, and contributed poetical articles to various journals. In 1834 he removed to Indiana, where he became well known as a lawyer, a writer, and a friend of education. He published "Historical Notes" (1842) and a "History of Indiana" (1859).

**Dillon** (THEONALD), born in Dublin about 1743, died at Lille April 20, 1792. He was one of the many Irishmen who toward the close of the eighteenth century entered the French army. He was brigadier-general in 1791, but was massacred by his own soldiers, who had been seized by a panic at their first meeting with the enemy.

**Dilman'**, a town of Persia, in the province of Azerbaijan, 50 miles N. N. W. of Ooroomceyah. It is about 4 miles E. of an old ruined town of the same name. It is surrounded by gardens and orchards, and is described as a neat and healthy place, carrying on some trade and manufacturing industry. Pop. about 15,000.

**Dilu'vial** [from the Lat. *diluvium*, a "deluge"], a geological term applied to deposits that are the result of a flood, or accumulations of gravel and angular stones which have been produced by a sudden and extraordinary rush of water.

**Dilu'vium**, a Latin word signifying DELUGE (which see). This term was applied by the older geologists to certain gravels and comparatively recent deposits which appear to be the result of a deluge, in order to distinguish them from the fine sand and mud which is washed down by rivers, and is called *alluvium*. The term diluvium is now chiefly used to designate the gravels of one geological period—namely, that of the boulder clay.

**Di'ma**, a large town of Abyssinia, in Amhara, 150 miles S. E. of Gondar. It has a large church and many stone houses.

**Di'man** (REV. JEREMIAH LEWIS), D. D., was born at Bristol, R. I., May 1, 1831, graduated at Brown University, 1851, and at Andover Theological Seminary, 1856, spending in the mean time two years in study abroad. He was settled over the First Congregational church in Fall River, Mass., in 1856, and over the Harvard church in Brookline, Mass., in 1860. In 1864 he was elected professor of history and political economy in Brown University. He published numerous addresses and articles in the leading reviews, and was an accomplished scholar and orator. Died Feb. 3, 1881. Published posthumously "The Theistic Argument" (1881), "Orations and Essays" (1881).

**Dime** [from the Fr. *dime*, the "tenth part," a "tithe" (from the Lat. *decimus*, "tenth")], a silver coin of the U. S. equivalent to ten cents or one-tenth of a dollar. It was formerly written *dime*.

**Dimen'sion** [Lat. *dimensio*, from *di*, "apart," and *metior*, *mensus*, to "measure"], measure in a single line, extension. Dimensions, in the plural, signifies length, breadth, and thickness. In geometry, a line, whether straight or curved, has only one dimension—namely, length; a surface has two—length and breadth; and a solid has three dimensions—length, breadth, and thickness. In algebra, the term dimension is applied in nearly the same sense as *degree*, to express the number of literal factors that enter into a term.

**Dim'ick** (JUSTIN), an American officer, born Aug. 5, 1800, in Connecticut, graduated at West Point in 1819; colonel First Artillery Oct. 26, 1861. He served chiefly at seaboard posts 1819-59; at the Military Academy 1822; on ordnance duty 1834-35; in Florida war 1836 (brevet major), where he killed two Seminole savages in personal encounter; in suppressing Canada border disturbances 1838-39; in military occupation of Texas 1845-46; in the war with Mexico 1846-48, engaged at Palo Alto, Resaca de la Palma, La Hoya, Contreras, and Churubusco (brevet lieutenant-colonel), Chapultepec (brevet colonel), and the city of Mexico; in the Florida hostilities 1849-50 and 1856-57; on the Western frontier 1859; in command of the artillery school for practice 1859-61; in charge of Fort Warren dépôt of prisoners 1861-64; and governor of "Soldiers' Home," near Washington, 1864-68. Brevet brigadier-general U. S. A. Mar. 13, 1865, for long, gallant, and faithful services to his country, and retired from active service Aug. 1, 1863. Died Oct. 13, 1871, at Philadelphia, Pa., aged 71. GEORGE W. CULLUM.

**Dimid'iate** [from the Lat. *dimidius*, "half," from *di*, "through," and *medius*, the "middle"], divided into halves. In botany, a leaf which has only one side developed, and a stamen which has only one lobe, are called *dimidiate*.

**Diminuen'do** [the It. gerund of *diminuire*, to "diminish"], the same as DECRESCENDO (which see).

**Diminu'tion** [Lat. *diminutio*, from *minuo*, *minutus*, to "lessen"], the act of making or becoming less; decrease; in architecture, the gradual decrease in the diameter of a column from the base to the upper end. In heraldry, the word diminutions is sometimes used for differences, marks of cadency, and brisures indifferently.

**Dimin'utive** [Lat. *diminutivus*, from *di*, intensive, and *minuo*, to "lessen"; Fr. *diminutif*; It. *diminutivo*], a term applied to a derivative word, formed by the addition of one or more syllables in such a way as to soften its meaning or diminish its original force. All languages are susceptible of diminutives, but the Italian surpasses all others, both ancient and modern, in this respect.

**Dimitry** (ALEXANDER), LL.D. See APPENDIX.

**Dim'ity** [from *Damietta* in Egypt, where it was formerly manufactured], a cotton fabric of thick texture, and generally figured or striped. It was formerly much used for bed-hangings and window-curtains. The figure or stripe is raised on one side and depressed on the other, so that the two faces present reversed patterns. Originally, dimity was commonly white, or, at least, of one uniform color. Variegated dimities are now made.

**Dimor'phism** [from the Gr. *dis*, "twice" or "two," and *μορφή*, a "form"], the property of assuming two distinct crystalline forms. (See DIMORPHOUS.)

**Dimor'phous**, a term applied to a body which has the property of crystallizing in two distinct forms, as, for example, sulphur and some other solids. Sulphur, as found crystallized, naturally presents itself in crystals of the form of octahedra with a rhombic base, and thus belongs to the prismatic system; but when sulphur is heated to fusion, and then slowly cooled, prismatic crystals are obtained which belong to the oblique system. The latter form of sulphur is not permanent. Carbon affords another example of dimorphism.

**Di'naburg**, a strongly fortified town of Russia, is in the government of Vitebsk, on the river Düna, where it is crossed by the railway from Warsaw to St. Petersburg, about 120 miles S. E. of Riga. Another railway connects Dinaburg with Riga. It is an important military position, and has an active trade. Pop. in 1881, 52,261.

**Dinagepoor'**, a district of British India, province of Bengal, has an area of 3820 square miles. The surface is nearly level. Rice is the staple product of the soil. Pop. 1,501,924.

**Dinagepoor**, a city of India, the capital of the above district, 250 miles N. of Calcutta. It is meanly built. Pop. 13,042.

**Dinan**, an old town of France, department of Côtes-du-Nord, on the river Rance, 30 miles N. W. of Rennes. It stands on a hill of granite about 250 feet above the river, is enclosed by walls and defended by a castle. It has a handsome cathedral, a public library, a college, and a town-hall. Here are manufactures of linen and cotton fabrics, sailcloth, hats, beet-root sugar, etc. The Rance is navigable from its mouth to Dinan. Pop. in 1881, 6069.

**Dinant'** [Lat. *Dinantium*], a town of Belgium, province of Namur, is on the river Meuse, 15 miles S. of Namur. It is on the declivity of a rocky hill, and is surrounded by picturesque scenery. It has a Gothic cathedral, a town-house, and two hospitals; also manufactures of cutlery, paper, woollen goods, hats, and leather. Dinant was founded in the sixth century, was strongly fortified as early as the twelfth century, and has suffered much from sieges. Pop. 6428.

**Dinapoor'**, a town and important military station of British India, province of Bengal, on the right bank of the Ganges, about 12 miles above Patna. Here are spacious barracks, and about 3200 houses, mostly of mud.

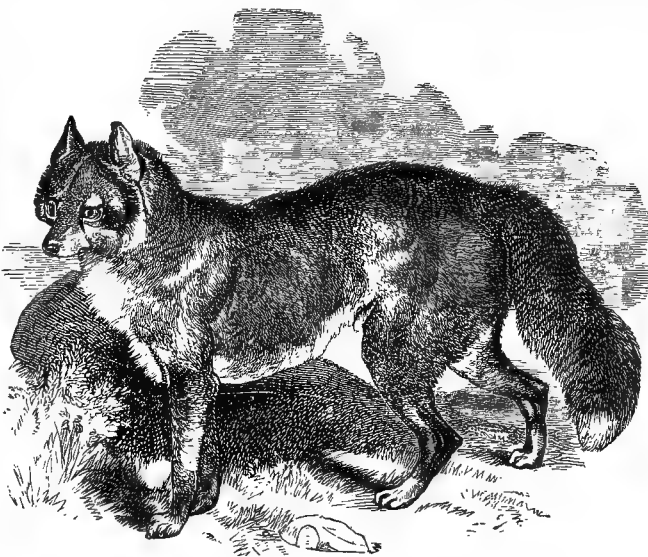
**Dinar'ic Alps** [Lat. *Alpes Dinaricæ*], the portion of the Alpine system which connects the Julian Alps with the western ranges of the Balkan, and occupies part of Croatia, Dalmatia, and Herzegovina. The highest summits are Mount Dinara and Mount Prolok, the former of which rises about 6000 feet above the sea. The rocks of this range are mostly limestone.

**Din'dorf** (WILHELM), a German philologist, born at Leipsic Jan. 21, 1802. He became professor of history and literature in Leipsic in 1828, but resigned in 1833 in order to devote himself to the publication of a new edition of the "Thesaurus" of Stephanus, which his brother Ludwig Din'dorf and Hase had begun in Paris. Along with this he prepared critical editions of very many classical authors; among them, an edition of Demosthenes for the University of Oxford (1849), and editions of Æschylus, Sophocles, Euripides, and Aristophanes, to which were added commentaries, and a work on the metres of the same poets; later he compiled a "Lexicon Sophocleum" and a "Lexicon Æschyleum." D. Aug., 1883.

**Ding'elstedt, von** (FRANZ), a German poet, born at Halsdorf, in Hesse, Jan. 30, 1814. He wrote popular political poems entitled "Songs of a Cosmopolitan Night-Watch" (1840). He was appointed librarian to the king at Stuttgart in 1843, intendant of the royal theatre of

Munich in 1850, director of the court opera at Vienna in 1867, and director of the burg theatre of Vienna in 1871. Among his works are "The House of Barneveldt," a tragedy (1850), a collection of poems called "Night and Morning" (1851), several novels, mostly humorous, travelling sketches, etc. Died May 17, 1881.

**Din'go**, an Australian dog, supposed to be a distinct species by some naturalists. It is sometimes found domesticated. The wild dingo is somewhat larger than a sheep-



Dingo.

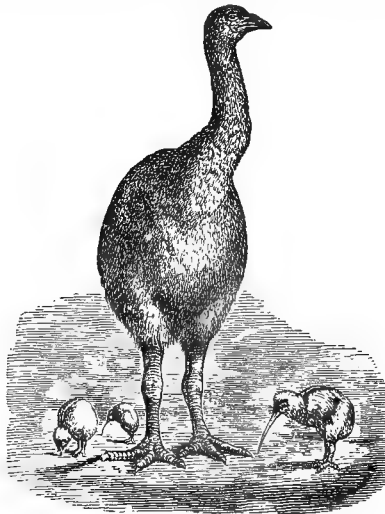
herd's dog, of a tawny color, with a large head, ears short and erect, and tail bushy. In its wild state it does not bark.

**Dinich'thys** [Gr. *δεινός*, "terrible," and *ἰχθύς*, "fish"], a remarkable placoderm fish found in the upper Devonian rocks of Ohio, and described by Prof. Newberry. It was allied to *Coccosteus*, but was very much larger; the head was three feet in length, the lower jaws two feet long and very massive, the central dorsal shield two feet in diameter, etc. One species was without proper teeth, but the jaws played on each other like huge shears.

**Dink'elsbühl**, a walled town of Bavaria, on the river Wernitz, 44 miles S. W. of Nuremberg, was formerly a free city of the empire. It has a Latin school and various manufactures. Pop. in 1881, 5186.

**Dinoceras**. See TINOCERAS.

**Dinor'nis** [from the Gr. *δεινός*, "terrible," and *ὄρνις*, a "bird"], an extinct genus of gigantic birds of the tribe



Dinornis (restored).

*Brevipennes*, of which the bones have been found in the most recent deposits of New Zealand. In the traditions of that country these birds are known by the name of moa. They are said to have been much esteemed, both

for their flesh and gaudy plumage, and are described as fat and stupid birds, incapable of flying, but feeding on vegetable food, and living in forests. Their bones, which appear to confirm this description, are not properly fossil or mineralized, but retain a great part of their animal matter. It is perhaps not impossible that some of the smaller species of *Dinornis* may still exist, but the larger ones are undoubtedly extinct. Some of the bones of these birds are at least twice the size of those of the ostrich. The framework of the leg is the most massive of any in the class of birds, and the bones are remarkable for their solidity, the toe-bones of *Dinornis elephantopus* almost rivalling those of the elephant. The bones of several species of *dinornis* have been described.

**Dinosauria** [Gr. *δεινός*, "terrible," or "wonderful," and *σαῦρος*, a "lizard"], the name of an order of extinct saurians found in the oolite, lias, and wealden. Their structure resembled the mammalian type more than others of their kind. They had four strong limbs, and the sacrum was composed of five amalgamated vertebrae. The *Megalosaurus*, *Iguanodon*, and *Hylæosaurus* are the principal genera of this order.

**Dinothérium** [Gr. *δεινός*, "terrible," and *θηρίον*, a "beast"], an extinct animal, the remains of which have been found in the miocene formations of France and Germany. It had long tusks like the elephant and walrus; these projected from the end of the lower jaw, which was bent downward at a right angle to the body of the jaw. Besides the two tusks, it had five double-ridged grinders on each side of both jaws, and the nasal cavity was large. As no bones of the body or limbs have been found corresponding with those of the skull, the position of the dinothérium has not been determined. De Blainville supposed it to be a herbivorous cetacean, while Cuvier regarded it as allied to the tapir, and others to the dugong.

**Dins'moor** (Gen. SAMUEL) was born at Londonderry, N. H., July 1, 1766, and graduated at Dartmouth in 1789. He was for many years general of militia and judge of probate, was a member of Congress (1811-13), and governor of New Hampshire (1831-34). Died at Keene Mar. 15, 1835.

**Dinsmoor** (SAMUEL), LL.D., a son of the foregoing, was born at Keene, N. H., May 8, 1799, graduated at Dartmouth in 1814, and became a lawyer. He was governor of New Hampshire (1849-53). Died Feb. 24, 1869.

**Dinwiddie** (ROBERT) was born in Scotland about 1690. He discovered, while a clerk to the collector of customs in the West Indies, the enormous frauds practised there. He exposed the frauds, and was made first a surveyor of the customs, and afterward lieutenant-governor of Virginia. His administration of the colony, however, was not a success. He was the first who suggested the idea of taxing the colonies to the British board of trade, and he left his office under a cloud, accused of having embezzled a considerable sum of money. He discerned the capacity of Washington, and appointed him adjutant-general of a military district. Died in Clifton, England, Aug. 1, 1770.

**Dinwiddie Court-house**, capital of Dinwiddie co., Va. (see map of Virginia, ref. 7-H, for location of county), is on Stony Creek, 35 miles S. by W. from Richmond. Pop. in 1880, not in census.

**Di'ocese** [from the Gr. *διά*, "through," and *οἰκῶ*, to "manage a household"], the name given to the district under the ecclesiastical jurisdiction of a bishop, was formerly used to designate the collection of churches under the care of an archbishop. Under Constantine the Great the Roman empire was divided into thirteen civil territories called dioceses, which were again subdivided into 120 provinces. These dioceses were governed either by prefects, proconsuls, or vicars, and the provinces by rectors. Before 400 B. C. the Church had a similar division, the dioceses being what are now termed patriarchates.

**Diocletian** [Lat. *Diocletianus*], or, more fully, **Caius Valerius Aurelius Diocletianus**, a Roman emperor, born of humble parentage in Dalmatia in 245 A. D. He served with distinction in the army under Aurelian and Probus. On the death of Numerianus, in 284, he was proclaimed emperor by the army at Chalcedon. In the year 286 he adopted Maximian as his colleague in the empire, which was disturbed by incursions of barbarians and menaced by the Persians. They suppressed revolts in Gaul, and in order to divide the labor of ruling so vast an empire chose Galerius and Constantius Chlorus as their assistants in 292 A. D., and gave them the title of *cæsar*. This was the beginning of the division of the empire into Eastern and Western. Diocletian reserved to himself Asia and Egypt; Maximian received power over Italy and Africa; Thrace and Illyricum were assigned to Galerius;

and Gaul and Spain to Constantius Chlorus. The supremacy of Diocletian (whose court was at Nicomedia) was acknowledged by the other three. After this distribution of power the Roman armies gained successes in Egypt, Persia, and Britain. Diocletian protected or omitted to persecute the Christians until 303 A. D., when a persecution was commenced at the instigation of Galerius. Diocletian abdicated the throne in 305 A. D. in favor of Galerius, and retired to Salona, in Dalmatia, where he devoted his time to horticulture. Died in 313 A. D. He was a ruler of superior talents. (See GIBBON, "Decline and Fall of the Roman Empire;" TILLEMONT, "Histoire des Empereurs;" VOGEL, "Der Kaiser Diocletian," 1857.)

**Diocletian Era** (called also the **Era of Martyrs**, on account of the persecution in Diocletian's reign) was used by Christian writers until the introduction of the Christian era in the sixth century, and is still employed by the Abyssinians and Copts. It dates from the day on which Diocletian was proclaimed emperor at Chalcedon, Aug. 29, 284 A. D.

**Dioda'ti** (JOHN), a Calvinistic theologian, born of an Italian family at Geneva June 6, 1576. He was appointed professor of Hebrew at his native place in 1597, and became professor of theology there in 1609. In 1618 he represented the church of Geneva in the Synod of Dort, where his reputation was so high that he was one of the persons appointed to write the articles of faith. He produced Italian and French translations of the Bible, and wrote several treatises against the doctrines of the Roman Catholic Church. Died Oct. 3, 1649.

**Di'odon** [from the Gr. *δις*, "double," and *ὄδον* (gen. *ὀδόντος*), "tooth," because all the teeth of each jaw are united into one], the name of a genus of marine fishes of the order Plectognathes, without distinct teeth, but having the jaws covered with an ivory-like substance, which is formed by the blending of the teeth into one. Some of them have the power of filling their stomachs with air and assuming a globular form, whence they are called globe-fish; others are designated porcupine-fish from their numerous spines, which stand out like those of a hedge-hog. Most of the diodons of our Atlantic waters are called balloon-fish. They are of several species.

**Diodo'rus Sic'ulus**, a Greek historian, born at Agrigium in Sicily, flourished about 50-20 B. C. He travelled in Europe and Asia in order to collect materials for a universal history, and afterwards became a resident of Rome. He expended many years in the composition of his history, which is entitled "Historical Library" ("Βιβλιοθήκη ιστορική"), in forty books. It is a history of the world from the earliest times to 60 B. C. As an historian he is deficient in critical judgment and other qualifications, but he has preserved important facts. Fifteen entire books of his work, and some fragments of the others, are extant. Among the best editions of his works are those by Bekker (4 vols., 1853-54) and by L. Dindorf (5 vols., 1867-68).

**Diog'enes** [Gr. *Διογένης*], a famous Cynic philosopher, born at Sinope in Asia Minor, flourished about 400-330 B. C. He was a pupil of Antisthenes at Athens. His habits were austere, eccentric, and frugal. He inured himself to extreme privations, and manifested or affected a contempt for the comforts of life, as well as for the customs of the world. According to tradition, he usually lodged in a cask or tub. He was a severe and caustic censor of the follies and vices of the Athenians, who allowed him a great latitude of comment and reproof. He was renowned for his witty and sarcastic sayings. He once received a visit from Alexander the Great, who inquired, "What can I do for you?" Diogenes replied, "Cease to stand between me and the sun." Having been captured by pirates, who offered him for sale in a slave-market of Crete, he was asked what he could do, and replied, "I can govern men; therefore sell me to some man who needs a master." He was purchased by Xenias, a citizen of Corinth, who was a kind master, and soon liberated him and employed him as tutor of his children. Diogenes died about 323 B. C. (See RITTER, "History of Philosophy;" GRIMALDI, "Vita di Diogene Cynico," 1777.)

**Diogenes Laer'tius** [Gr. *Διογένης ὁ Λαέρτιος*], a Greek compiler, born at Laerte in Cilicia. The period in which he lived is not known, nor is anything known of his personal history, except that he compiled "The Lives and Doctrines of the Ancient Philosophers." It contains interesting information and anecdotes, with extracts from lost works, but is destitute of critical merit, and is not well planned nor well digested. Among the best editions of it is that published by Hübner (Leipsic, 4 vols., 1828-33).

**Diogenes of Apollonia**, an ancient Greek philosopher, born in Crete, was a disciple of Anaximenes. He lived about 470 B. C., and taught philosophy at Athens.

He regarded air as the first principle of all things, and wrote a work on nature or cosmology, which is not extant.

**Diomedea.** See ALBATROSS.

**Di'omede Islands,** a group of three small islands in the middle of Behring's Strait, midway between Asia and America.

**Diome'des**, often anglicised **Di'omede** or **Di'omed** [Gr. Διομήδης], a brave Greek warrior and king of Argos, celebrated in the ancient legends as a son of Tydeus (hence he was called TYDIDES), and a favorite of Minerva. He fought with distinction at the siege of Troy, and, according to Homer, ventured to attack Mars, who defended the Trojans. Diomedes and Ulysses are said to have carried away the Palladium of Troy. Some writers relate that after the capture of Troy he settled in Italy.

**Diomedes**, a king of the Bistones in Thrace, is fabled to have fed his horses on human flesh. He was slain by Hercules.

**Di'on** [Gr. Δίων], an eminent statesman of Syracuse, born about 410 B. C., inherited an ample fortune from his father. He acquired great influence at the court of Dionysius the Elder, who had married Aristomache, a sister of Dion. He was a pupil and intimate friend of Plato, who taught at Syracuse. After the accession of Dionysius the Younger, Dion persuaded him to invite Plato to return to Syracuse. The virtue and austere morals of Dion rendered him obnoxious to the dissolute tyrant and his courtiers. He was banished, and took refuge at Athens, leaving at Syracuse his wife Arete, who was compelled to marry another man. In order to revenge himself and liberate his country, he raised a small body of troops in 357 B. C., and attacked Syracuse, which he occupied without much resistance. He expelled Dionysius, but was soon deprived of power by the intrigues of Heraclides. Dion was recalled by the people, but he was assassinated by Calippus about 354 B. C. (See "Life of Dion," by PLUTARCH, who compares him to Marcus Brutus; CORNELIUS NEPOS, "Dion.")

**Dion**, or **Dio**, surnamed **CHRYSTOSTOM** ("golden-mouthed"), a Greek sophist or rhetorician, born at Prusa in Bithynia about 50 A. D. He received a liberal education, which was perfected by travel. He became a resident of Rome in 96 A. D., and gained the favor of Nerva and Trajan. The latter esteemed him so highly that he permitted him to ride in the imperial chariot. Dion died about 117 A. D., and left numerous orations, of which eighty are extant. They are remarkable for beauty of style and Attic purity of language. Best edition by Emperius, Bruns., 1844.

**Dione'a** [a name of Venus], a genus of plants of the natural order Droseraceae, having five petals, calyx 5-partite, from ten to twenty stamens, and one style, with five united stigmas. One species only is known, *Dionea muscipula*, commonly called Venus's flytrap. It grows in moist sandy soil, and is indigenous only to the south-eastern part of North Carolina. The plant is perennial, with a rosette of root-leaves, from the midst of which a scape about six inches high arises, terminating in a corymb of white flowers. It derives its popular name from the singular irritability of its leaves. The elongated leaf-stalk is winged, and bears an orbicular leaf at its extremity, having the margin set round with long bristly hairs. On its upper surface are many small glands, and three slender irritable hairs on each side, so that an insect can hardly cross the leaf without touching one of them, when the two sides of the leaf instantly close together, the marginal bristles crossing each other, and thus preventing any possibility of escape. The leaf remains closed until the insect is dead, macerated in a juice secreted by the leaf, and the juice reabsorbed. That the plant feeds upon the captured insect can now hardly be doubted.

**Di'on Cas'sius, Dio Cassius**, or, more fully, **Cassius Dion Cocceia'nus**, an eminent historian, born at Nicæa in Bithynia about 155 A. D., was descended from

Dion Chrysostom. He became a Roman senator in the reign of Commodus, and was chosen consul (the second time) in 229, through the influence of Emperor Alexander Severus. He wrote in Greek a "History of Rome" in eighty books, from the arrival of Æneas to 229 A. D. Only eighteen books (from 36 to 54) have been preserved entire. As a historian he is commended for accuracy in dates, diligence in research, and elegance of style. Among the best editions of Dion Cassius are those of Sturz (9 vols., 1824-43), of Bekker (2 vols., 1849) and of L. Dindorf (5 vols., 1863-65).

**Dionys'ia** [Gr. Διονύσια] were great annual festivals in honor of Dionysus (Bacchus), and are said to have been introduced into Greece from Egypt in 1415 B. C. They were of four kinds—the rural or lesser, the Lenæan, the Anthestorian, and the great Dionysia. They were chiefly celebrated at Athens. (See Воевкн, "Abhandlung Berliner Akademie," 1816-17, pp. 47-124.)

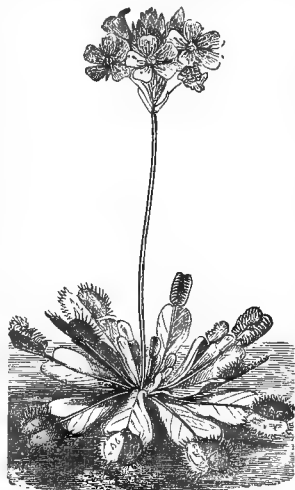
**Dionys'ius Exig'ius**, a learned monk, born in Scythia, was a friend of Cassiodorus. He lived at Rome, and wrote several works, among which is a collection of apostolical canons and decisions of councils. He fixed the year of the Incarnation as coincident with the year 753 of Rome. He was the first who computed the Christian era from the birth of Christ, instead of his death. His name Exiguus, "the little," refers to his small stature. Died about 556.

**Dionys'ius of Halicarnas'sus** [Gr. Διονύσιος ὁ Ἀλκαρνασσεύς], an eminent Greek historian and critic, born at Halicarnassus in Caria about 70 B. C. From his own writings we learn that he removed to Rome in 30 B. C., and passed more than twenty years in that capital in the study of Latin and in the composition of a history (in Greek) entitled "Roman Antiquities" ("Ῥωμαϊκὴ Ἀρχαιολογία"), in twenty books. Nine entire books, and fragments of the others, are extant. This work includes the period from the origin of Rome to 265 B. C. He is not considered a high authority as an historian, but he has a good reputation as a critic. Among his critical works are a "Treatise on Rhetoric" and "De Compositione Verborum." Died about 6 B. C. The best edition of his works is that of Reiske, 6 vols., Leips., 1774-77; text of Rom. Antiq. by Kiessling (4 vols., 1860-70).

**Dionysius**, SAINT, a native of Alexandria, was a disciple of Origen. He became patriarch of Alexandria in 248 A. D., and was driven out of that city by severe persecution in 260. In 257 A. D. the persecution was renewed, and Dionysius was banished to Libya, but he was restored in the year 260. He wrote many letters and religious treatises, which are not extant. Died in 265 A. D.

**Dionysius the Areop'agite** is mentioned in the Acts of the Apostles (chap. xvii. 34) as one of the persons converted at Athens by the apostle Paul. He is supposed to have been a member of the court of the Areopagus when Paul appeared before that tribunal. According to an early tradition, he was the first bishop of Athens, and, according to a later tradition, suffered martyrdom there. In France he has been confounded with the Dionysius who went as missionary bishop to Paris about the middle of the third century. The spurious mystical writings which bear his name appear to have had their origin in Egypt during the fifth century. In ninth century they were brought into W. Europe, and translated into Latin by Scotus Erigena.

**Dionysius** [Gr. Διονύσιος] the Elder, a celebrated tyrant of Syracuse, born about 430 B. C. He was in his youth an obscure private citizen, and became a general in the service of the republic of Syracuse when Sicily was invaded by the Carthaginians. In the year 405 he usurped the supreme power in Syracuse, which then ceased to be a republic. He suppressed several insurrections of his subjects, and in 397 B. C. commenced or renewed hostilities against the Carthaginians, who then held some towns in Sicily. His fleet was defeated by the Carthaginians, who besieged Syracuse, but their success was hindered by a pestilence, and Dionysius gained a decisive victory over them after they had lost great numbers by disease. He also captured several towns in Sicily, and made conquests on the Italian peninsula. He was an able ruler, displayed superior political talents, and was one of the most powerful princes of his time. At the request of Dion he invited Plato to his court, but the lectures of that philosopher offended the tyrant, who ordered the captain of a ship to take Plato away and sell him as a slave. He was ambitious of literary fame, and wrote poems and tragedies, some of which he sent to the Olympic games, but he failed to obtain a prize. It is stated that in the latter part of his life he was very suspicious, and took many precautions against the traitors and conspirators who (he imagined) intended to kill him. He died in 367 B. C., and was succeeded by his son Dionysius. (See GROTE, "History of



*Dionea*: Venus's Flytrap.



Greece," part ii., chaps. lxxxii.—lxxxiii.; THORKIL BADEN, "Res Gestæ Dionysii Syracusii recognitæ," 1795.)

**Dionysius the Younger**, tyrant of Syracuse, was a son of the preceding, whom he succeeded in 367 B. C. He was indolent, dissolute, and inferior to his father in political talents. He was persuaded by Dion to invite Plato to his court, but the eloquence and wisdom of that philosopher were unavailing to reform him. Dionysius banished Dion, who in 357 B. C. returned with a small army and expelled the tyrant. The latter fled to Locri, and became the despotic ruler of that city. He recovered power in Syracuse about the year 346, soon after which the oppressed Syracusans applied for aid to the Corinthians, who sent Timoleon with an army in 344 B. C. Dionysius was then deposed, and went as an exile to Corinth, where he is said to have taught school. (See GROTE, "History of Greece," part ii., chaps. lxxxiv., lxxxv.)

**Dionysus** [Gr. Διόνυσος or Διώνυσος], the original Greek name of the god of wine. (See BACCHUS.)

**Diophantine** [from ΔΙΟΦΑΝΤΟΣ (which see)] **Analysis**, a branch of algebra not reducible to systematic rule, which treats of indeterminate problems, principally such as involve square or cube numbers, or the relations of the parts of right-angled triangles; and in which integral or commensurable values are found for the indeterminates by means of artifices suggested by the nature or conditions of the problems themselves. Success in this rather fascinating but not particularly useful branch of investigation depends very much upon the ingenuity of the investigator. An example of a Diophantine problem is the following: To find three numbers such that the sum of their squares shall be a square. The numbers are 2, 3, and 6, or any equimultiples of these.

**Diophantus** [Gr. Διόφαντος], a Greek mathematician who lived at Alexandria, probably between 200 and 400 A. D. He is the author of the most ancient extant treatise on algebra, and is the reputed inventor of algebra, according to Lagrange and others. He wrote an important work called "Arithmetica," in thirteen books, of which only six are extant.

**Diop'sis** [from the Gr. διά, "through" or "across," also "apart," and ὄψις, "vision"], the name of a genus of dipterous insects remarkable for having the eyes and antennæ at the end of long, horny stalks growing from the sides of the head. In some instances the distance of the eyes from the head is almost as great as the length of the wings.

**Diop'trics** [from the Gr. διαφάνων, "anything which one looks through," a "transparent substance" (from διά, "through," and the obsolete verb ὥπτω, "to see"), that branch of geometrical optics which treats of the refraction of light, or of the changes which take place in the direction of rays transmitted from one medium to another (as from air to water, etc.), or through media of varying density. It is applied chiefly in the construction of telescopes, microscopes, and other instruments requiring the use of refracting lenses. (See OPTICS and LENS.) (See LITTROW, "Dioptrik," 1830; PRECHTE, "Practische Dioptrik," 1828.)

**Dioptric System**, an arrangement of lenses for condensing light in lighthouses, devised by Fresnel about 1819, based on the discoveries of Buffon, Condorcet, Brewster, and others. (See LIGHTHOUSE ILLUMINATION, by COL. PETER C. HAINS.)

**Diorama** [from the Gr. δι (for διά), "through," and ὅραμα, "that which is seen" (from ὁράω, "to see"), a mode of scenic display invented by Daguerre and Bouton, and first exhibited in Paris in 1822. The painting is viewed through a large aperture or proscenium, beyond which it is placed at such a distance that the light is thrown upon it at a proper angle from the roof, which is glazed with ground glass, and cannot be seen by the spectator, who is in comparative darkness, receiving no other light than what is reflected from the painting itself. By means of shutters or curtains the light may be diminished or increased at pleasure; and some parts of the picture being transparent, light may be admitted through it—an artifice which secures the advantages of painting in transparency without its defects.

**Dioscorea'ceæ** [from *Dioscorea*, one of the genera], a natural order of plants, ranked by Lindley among the DICTYGENS (which see), mostly natives of tropical countries. They are classed among endogenous plants by most botanists. They are twining shrubs with large tubers either above or under ground. The most important plants of the order are the species of *Dioscorea* or YAM (which see). The order comprises one British plant, the black bryony, and the *Dioscorea villosa*, which grows in many parts of the U. S.

**Dioscorides Peda'nus** [Διοσκουρίδης Πεδάνιος], a Greek botanist, born at Anazarba in Cilicia, lived between 50 and 200 A. D. He travelled in Asia Minor, Greece, and Italy to procure information about plants, and wrote a celebrated work on materia medica (in Greek), in which he describes or names more than 500 plants. This work was regarded as the highest authority for fifteen centuries or more, and was universally used by medical and botanical students. Best edition by Sprengel, 2 vols., Leips., 1829–30.

**Dioscu'ri** [Gr. Διόσκουροι]. (i. e. "sons of Jupiter"), a name given to CASTOR and POLLUX (which see).

**Dios'ma** [from the Gr. διασμος, "transmitting smell," or perhaps "having a strong smell" (from διά, "through," and ὀσμή, "smell"), a genus of plants of the natural order Rutaceæ and Linnæan class Pentandria. The buchu leaves are obtained from the *Diosma crenata* and other species.

**Diospy'ros** [probably the δίοσπυρον of Theophrastus, a name signifying in Greek the "wheat" or "bread of Zeus"], a large genus of trees of the ebony family, comprising about one hundred species, mostly natives of the tropical parts of the Old World. They generally have hard wood, and many of them yield edible fruits.

The persimmon tree of the Atlantic States and Mississippi Valley (*Diospyros Virginiana*) is well known for its fruit, which becomes edible late in autumn, and for its wood, which is used by makers of lasts for shoes. It is represented in Texas, and Northern Mexico by the *Diospyros Texana* (persimmon, ebony, or japote).

The pishamin or date-plum (*Diospyros Lotus*) grows in Europe as far N. as London, and its fruit is made into preserves or eaten without cooking. Other species are prized for their fruit in China, Africa, and Japan. The CALAMANDER-wood (which see) and several other Diospyri of Asia are greatly valued for their timber. Among these is the true ebony (*Diospyros Ebenum*), which grows principally in Ceylon. (See EBONY.) Remains of many fossil species are found in the eocene of the U. S.

**Dioszeg**, a town of Hungary, in the county of Bihar, on the Er. It exports wine and tobacco. Pop. 5774.

**Dip and Strike**. In geology, the angle of inclination of a stratum to the horizon is called its *dip* or *pitch*. Strata presenting this inclination must cut the surface in a line, and this line, called the *outcrop* of the rocks, has a definite direction, which in geological language is called the *strike* (from the German *streichen*, "to reach," "to extend"). The strike of rocks is therefore the compass direction of the intersection of their plane of stratification with the plane of the horizon. When strata are moderately regular, the line of strike is a very useful fact to determine, as it enables the geologist to follow the same bed, and when concealed, suggests the place where he should seek for it. The dip must be at right angles to the strike, for that is the direction in which the plane of the bed dips down towards the interior of the earth. Beds dipping at a high angle are soon lost sight of, being covered up with other deposits of newer date. In the direction opposite to that of the dip beds of older date come up from below, or "crop out." The inclination can be practically measured by the clinometer.

**Diphenylamine Blue**. See ANILINE COLORS.

**Diphthe'ria** [from the Gr. διφθέρα, the "skin" of an animal, in allusion to the false membrane described below], an acute disease, characterized by inflammation of the mucous membrane of the pharynx, attended by an exudation of lymph, often assuming the character of a false membrane, which may extend into the larynx and air-passages, into the œsophagus, and into the mouth, occasionally also appearing upon raw or mucous surfaces of other parts of the body; it is also attended by prostration and albuminuria, which may or may not be persistent. Diphtheria is not a new disease, but its nature having been investigated by Bretonneau (who gave it the name *diphtheritis*), it has of late received much attention, more especially from its present frequency and the terrible fatality which distinguishes it. Its duration and symptoms are variable, and the distinctive exudation is by no means of uniform appearance. In general, the mucous membrane is dark and congested, and the exudation growing from one or more centres if torn away leaves a bleeding and sensitive surface. The membrane itself frequently is the seat of a microscopic vegetable growth (*oidium*), believed by some to be an essential part of the disease itself. The prognosis is always grave, no case being free from danger. The mildest attack may be followed by paralysis or by fatal prostration. No routine treatment can be laid down for this disease. In mild cases it is permissible to use detergent chlorinated washes for the mouth, and the general treatment may be mainly expectant, provided the pulse is firm. Sulphate of quinia has the happiest effects upon many cases. The inhalation of vaporized water is an excellent measure. The

treatment of the various sequelæ of diphtheria requires the careful use of tonics, such as strychnia and iron, with the best hygienic conditions.

REVISED BY WILLARD PARKER.

**Diph'thong** [Gr. *δίφθογγος*, from *δι* (for *dis*), "double," and *φθόγγος*, "voice," "sound;" Lat. *diphthongus*] is the union of two vowels pronounced together in one syllable. A proper diphthong is one in which both vowels are sounded, as in *boil*, *out*. An improper diphthong is one in which only one vowel is sounded, as in *Cæsar*, *beat*.

**Diplacean'thus** [from the Gr. *διπλόος*, "double," and *ἄκανθα*, a "thorn" or "spine"], the name of a genus of ganoid fishes found only in the old red sandstone. They have small scales on the body, a large head, wide mouth, and two dorsal fins with a strong spine in front.

**Diplograp'sus** [from the Gr. *διπλόος*, "double," and *γράφω*, to "mark" or "write"], a genus of zoophytes existing in great numbers in the anthracite shales of the Silurian formation. They are marked with a double series of cells.

**Diplo'ma** [Gr. *δίπλωμα*, from *διπλώω*, to "double," or "fold;" Lat. *diploma*], a term formerly applied to every sort of royal charter or letter-patent. These were so called because under the Roman emperors charters were inscribed on two tablets of copper, joined together so as to fold in the form of a book. The charter by which a physician or surgeon is declared qualified to practise his profession is called a diploma. The term is also applied to the certificate of graduation given to every one who has taken a degree in a college or university.

**Diplo'macy** [from *diploma*, originally signifying "credentials" or "letters-patent" (see DIPLOMA)] is the art of conducting the official intercourse between foreign states, and is generally managed by ambassadors instructed in the policy to be pursued. The negotiation of treaties forms an important part of the duties of these envoys, but frequently they exercise a delicate and yet profound influence over the nation with which they are sent to deal. In receiving his instructions, much must sometimes be left to the discretion of the diplomatist. Very early in history heralds and ambassadors are found bearing messages from one power to another. Generally these messages were special. It is only in modern times that diplomatists are established permanently in foreign courts to watch the interests of their own governments. From the very necessities of the case, ambassadors have been held personally sacred, since, were it not so, it would be impossible for them to venture into unfriendly states. Even among barbarians their privileges were respected; and in our own times they are not subject to the municipal laws of the states in which they reside, but can be sent home for punishment if they offend those laws. When resident ambassadors first came to be employed they were looked on as spies, but as the usage became general its advantages were made manifest. It tends to bring nations nearer together, and to make them respect one another, when there are representatives of foreign states in each country; the community of nations is more vividly felt. Ambassadors become acquainted with the laws, institutions, and history of the land where they reside; they protect their countrymen who are there as travellers or residents; they foresee difficulties and are able to prevent them; they put their countries on their guard against the preparations for war of other states; and when they withdraw on account of war their absence causes the separation of the two countries to make more impression. Even the exchange of compliments, the opportunity of representing their country in expressions of friendship at public and festive gatherings, as well as by condolence and forms of sympathy,—these minor uses of resident ministers will not be despised by those who rightly estimate the effect of such things on national feeling.

The highest diplomatic office is that of ambassador. In the Roman Catholic states of Europe the legates and nuncios of the pope take rank with the highest class. The second grade includes ministers plenipotentiary, the internuncios of the pope, envoys ordinary and extraordinary, and all agents accredited directly to sovereigns. The third order are chargés-d'affaires, who are generally accredited to the department of foreign affairs. The appointment of diplomatic agents in the U. S. belongs to the President, but his choice must be confirmed by the Senate. The secretary of state superintends our diplomatic relations.

REVISED BY T. D. WOOLSEY.

**Diplomat'ics** [from the Gr. *δίπλωμα*, "something folded;" see DIPLOMA], originally the science of deciphering ancient writings. Previous to the fifth century writing was done extensively on papyrus. In that century parchment appears to have been generally used, and the oldest documents in our possession bearing the character of diplo-

mas have no higher antiquity. The science of diplomatics teaches the different styles and forms adopted in ancient public documents, the titles, rank, etc. of public officers whose names are subscribed to them, etc. Its origin is attributed to a Jesuit of Antwerp named Papebroeck, who about 1675 applied himself to the exposition of old diplomas. Mabillon, however, whose work "*De Re Diplomatica*" came out in 1681, was the first who established it on a sure foundation. The principles laid down in this work were more fully developed in the "*Nouveau Traité de Diplomatie*," by Toussaint and Tassin (1765). Among other valuable works on this subject may be named De Vainer's "*Dictionnaire Raisonné de Diplomatie*" (Paris, 1774) and Gatterer's "*Abriss der Diplomatie*" (Göttingen, 1798).

**Diplop'terus** [from the Gr. *διπλόος*, "double," and *πτερόν*, a "wing" or "fin"], a genus of ganoid fishes of the palæozoic age, having double dorsal and anal fins, heterocercal tails, scales perforated with small foramina, and a large and flattened head.

**Dip of the Horizon**, in navigation, is the difference between the altitude of a heavenly body, as observed from the deck of a ship, and the altitude of the same body observed from the level of the sea. If the height of the spectator above the surface of the sea be a feet, then the correction for dip =  $1.063 \sqrt{a}$ . Experiments, however, seem to show that refraction diminishes the amount of dip by about three-fortieths of itself; hence the common table of dip used in navigation may be computed from the formula =  $\text{dip } \frac{3}{40} \times 1.063 \times \sqrt{a} = 984 \sqrt{a}$ .

**Dip'per** (*Cinclus*), a genus of birds of the ouzel family (*Cinclidæ*), found in Europe, Asia, and America. They feed chiefly on mollusks and on aquatic insects and their larvæ, which they seek in clear lakes and streams, frequently diving with great facility, and moving about under water by means of their wings. They resemble the wren in their manner of dipping the head, accompanied with an upward jerking of the tail. The dippers build very curious nests of interwoven moss, having the entrance in one side.

**Dipping Needle**. When a magnetic needle is hung within a stirrup so as to move freely in a vertical direction, and the whole system is suspended by a thread, it will adjust itself in the magnetic meridian, and its pole will dip towards the north pole of the earth. Such a needle is called a *dipping needle*, and its deviation from the horizontal line is its *inclination*. When the needle is carried nearer the magnetic pole, the inclination increases. Sir James Ross in 1832 saw the dipping needle stand within one minute of a degree of the vertical position near Baffin's Bay. Approaching the equator, it becomes less and less inclined, until a point is reached at which it is quite horizontal. This point will be in the *magnetic equator*, or line of no dip, which is near, but not coincident with, the equator of the earth. When tracing the lines of equal dip on a Mercator's map, we find that they coincide in a remarkable manner with the isothermals or lines of equal mean temperature, indicating a close connection of the distribution of heat with that of magnetism, and seemingly a common cause for both.

The inclination, like the declination, is subject to periodic and secular variations. The last is shown in the following table:

*Inclinations observed in Paris.*

Year.	Inclination.	Year.	Inclination.
1671.....	75° 00'	1820.....	68° 20'
1780.....	71 48	1825.....	68 00
1798.....	69 51	1831.....	67 40
1814.....	68 36	1853.....	66 28

It appears from the table that since the year 1671 the inclination has steadily diminished at the rate of about three to five minutes a year.

ARNOLD GUYOT.

**Dipsa'ceæ** [from *Dipsacus*, one of the genera], a natural order of herbaceous exogenous plants, mostly natives of the south of Europe. They are nearly allied to *Compositæ*, from which they differ by having the stamens distinct. Among the plants of this order is the *Dipsacus ful-lonum* (fullers' teal). (See TEAZEL.)

**Dip'sas** [Gr. *δίψας*, the name of a venomous snake whose bite caused intense thirst, from *δίψα*, "thirst"], a genus of non-venomous serpents belonging to the *Colubridæ*. They are tree-snakes, greatly elongated in form, and having a broad, thick head. They are natives of the warmer parts of America and Asia. Some of them are of large size. Like many other modern scientific names, the designation of this genus is etymologically inappropriate.

**Dipsoma'nia** [from the Gr. *δίψα*, "thirst," and *μανία*, "frenzy"] is a term sometimes applied to DELIRIUM TRE-

MENS (which see), but of late more especially used to designate a morbid craving for alcoholic drinks, sometimes called *methomania*. Of late, this craving is looked upon as a disease, and it has been very successfully treated in "inebriate asylums" in various countries.

**Diptera** [Gr. *δίς* (for *δύς*), "twice" or "two," and *πτερόν*, a "wing"], an order of insects having for their distinguishing characteristic two wings only, corresponding to the anterior pair, instead of four. In addition they have two short clubbed appendages, called "halters" or balancers, probably rudiments of the posterior pair in four-winged insects. They are marked also by having the mouth in the form of a sucker, constructed of from two to six lancet-shaped, elongated scales, enveloping a canal upon the upper surface of a fleshy proboscis. The larvæ or maggots of dipterans generally have a membranous head, and always have the stigmata, or breathing-pores, placed in the second and terminal segments of the body. In some species of these insects the eggs are hatched within the body of the parent—for instance, the blow-fly; in others, as the forest-fly, the larvæ are metamorphosed in the parent's body, and the young are excluded as pupæ.

**Dipterocarpaceæ**, or **Diptera'ceæ** [from *Dipterocarpus*, one of the genera], a natural order of exogenous trees, indigenous only in the East Indies. It comprises about fifty known species, mostly beautiful and majestic trees, some of which are valuable for timber. They have simple, alternate leaves, with large stipules, and 1-celled, 1-seeded fruits. They abound in balsamic resin and resinous products, among which are camphor, copal, and dammar. The sal, one of the best timber trees in India, belongs to this order. (See *DIPTEROCARPUS*.)

**Dipterocarpus** [from the Gr. *δίτερος*, "two-winged," and *καρπός*, "fruit"], a genus of plants of the order *Dipteraceæ*, comprises several species of the noblest trees of India. They bear clusters of large fragrant flowers, and abound in a resinous juice which is used medicinally and for burning in torches. The fruit is furnished with two membranes like wings. The *Dipterocarpus turbinatus*, or goorjun tree, often attains a height of 200 feet, and has no branches except near the summit. The wood is hard, close-grained, and durable. From the trunk exudes a fragrant oil which is valuable for varnish, for an ingredient of paint, and for medicine.

**Dipterus** [from the Gr. *δίτερος*, "having two wings" or "fins"], a genus of ganoid fishes, two species of which are found in the old red sandstone. They have a large and flattened head, and double anal and dorsal fins, opposite to each other.

**Diptych** [Lat. *diptychum*, from the Gr. *δίς*, "twice," and *πτύξ* (gen. *πτύξος*), "fold" or "tablet"], a register used by the ancients at an early period. It consisted of two tablets of ivory or wood, covered with wax. Diptychs were of two kinds, sacred and profane, the latter being the more ancient form. The profane diptychs contained the name and titles of the consul, and were distributed by him among his friends on entering his office. On one side of the sacred diptych were inscribed the names of living, and on the other those of deceased, ecclesiastics and benefactors of the clergy, which were read during service by the deacon. They were often decorated with scenes from biblical history. Diptychs are still used in the Eastern churches.

**Diræ**. See *EUMENIDES*.

**Direct'or** [from the Lat. *dirigo*, *directum*, to "arrange" or "direct"; Fr. *directeur*], literally, "one who directs or manages," usually applied to one of a number of individuals whose duty it is to conduct the affairs of certain enterprises, such as banks, railways, insurance companies, etc. Directors are usually elected by the stockholders from their own number; they have the right of supplying casual vacancies, and may delegate their powers to committees of such number as they may judge expedient. The title is also usually given to the chief officer or superintendent of an astronomical or physical observatory.

**Directory** [Fr. *Directoire*], in French history, the name given by the constitution of 1795 to the executive body of the French republic. It consisted of five persons called Directors (*Directeurs*), who were selected by the Council of Elders from a list of candidates presented by the Council of Five Hundred. Their names were Barras, Carnot, Laréveillère-Lépau, Letourneur, and Rewbell. One of them retired every year, and was succeeded by another chosen in the same way. They came into power at a time when France was involved in war against nearly all Europe, and was distracted by domestic factions. The French armies gained many victories under this régime, but the home policy of the Directory was unpopular. The Directory was divided into two parties, and the majority, consisting of Barras, Laréveillère-Lépau, and Rewbell, re-

moved their adversaries by the *coup-d'état* of the 18th Fructidor (Sept. 4, 1797). In 1797 the directors were Barras, Ducos, Gohier, Moulins, and Sieyès. The Directory was abolished by the *coup-d'état* of the 18th Brumaire (Nov. 9, 1799), in which Bonaparte and Sieyès were the prominent actors. (See *BARANTE*, "Histoire du Directoire," 1855.)

**Directory**, a book containing the names of the inhabitants of a city arranged in alphabetical order, together with the numbers of the houses in which they reside. The first London directory, "A Collection of the Names of Merchants, etc.," came out in 1677. In the U. S. every town of importance has its own directory. In several States there are also published "State directories." In New York City the earliest published was in 1786—a small volume of 82 pages, printed by Shepherd Kollock, Wall street. The names of the individuals and firms include about 900, and occupy 33 pages, the remainder being filled with general statistics of the city, U. S. government, post-office regulations, etc. In his address the editor states that it was the "first directory ever attempted in this country." The New York Historical Society possesses a complete set from its first publication.

**Directrix**, plu. **Directrices** [the feminine of the Lat. *director*, a "guide"], a term in geometry applied to a line which serves for the description of a curve or surface. The directrix of a conic is a right line perpendicular to the axis, whose distance from any point on the curve bears a constant ratio to the distance of the same point from the focus. Quadric surfaces have also directrices possessing analogous properties. When a surface is conceived to be generated by the motion of a line, right or curved, which always rests on other fixed lines, the latter are sometimes called directrices, but more frequently directing lines or directors, the former being distinguished as the generator.

**Dirge** [a contraction of the first word of an ancient Latin funeral hymn, "*Dirige gressus meos*"]—"Direct my steps;" the word *dirge* is written "dirige" in old books, a hymn of a mournful character sung at funerals, much used in the services of the Roman Catholic Church. "Dirge" is used also by poets to characterize sad verses on the dead.

**Dir'schau**, a town of Prussia, in the province of Prussia, on the river Vistula, and on the railway from Berlin to Dantzic, 20 miles S. S. E. of Dantzic. It has machine-works, tanneries, etc., an enormous railroad bridge 2843 feet in length, and a transit trade by the river. Population, 7761.

**Dirt-Bed**, a name given to deposits of dark-brown or black earthy lignite situated in the lower Purbeck series in Europe, near the top of the middle secondary or mesozoic rocks. Through the beds, which are from twelve to eighteen inches thick, are distributed stones from three to nine inches in diameter, also the silicified trunks of cycadaceous trees like *Zamia*. For many miles this black earth may be traced, containing fragments of fossil wood. The name "dirt-bed" is also given by geologists to the strata in the carboniferous rocks, etc. in which fossil roots of trees are found *in situ*.

**Dis** [contracted from the Lat. *dives*, "rich"], a name of Pluto, sometimes applied to the infernal regions. (See *PLUTO*.)

**Dis**, or **Di**, a Latin particle signifying "apart" or "off," usually implying separation, as in "dismiss," "disjoin." It is sometimes equivalent to "un," being negative or privative, as in "displease," "disorder." The Greek particle *δύς* (or *δι*) usually means "twice" or "double."

**Disabil'ity**, in law, signifies a state which renders a person incapable of enjoying certain legal benefits or disables him from doing a legal act. The disability is either absolute, as in the case of outlawry or attainder, or it is partial, as in the case of infancy and coverture. It may arise from the act of God, of the law, of the person himself, or of his ancestor. (See *CAPACITY*, by PROF. T. W. DWIGHT.)

**Disband'ing** is the breaking up of a military organization and the discharge of soldiers from military duty.

**Disbar**, a term applied in England to barristers, who, in accordance with authority reposed in the benchers of the four inns of court, subject to an appeal to the common-law judges, may be expelled from the bar.

**Disc**. See *DISK*.

**Discharge**, from military service, is sometimes honorably obtained by non-commissioned officers and privates with the consent of the commanding officer; sometimes on a surgeon's certificate of disability. Soldiers are also discharged with ignominy for great offences, being in some cases stripped of their decorations and drummed out of the regiment.

**Disciples of Christ**, or, as they generally call themselves, **Christians** or **Church of Christ**, a body of

Christians frequently called **Campbellites**, taking the latter name from Alexander Campbell (see CAMPBELL, ALEXANDER), one of their most distinguished elders, and from his father, Rev. Thomas Campbell, a Scotch-Irish "Seceder," who came to the U. S. in 1807, and with his son began to labor in Western Pennsylvania for the restoration of Christianity to apostolic practice. In 1811 they organized the Brush Run church in Washington co., Pa. In 1812 this church adopted Baptist views, and in 1813 they, with other sister congregations, joined a Baptist association. But as the principles and practice of the Campbells and their followers were distasteful to many Baptists, much agitation followed, and in 1827 the Baptist churches generally withdrew from fellowship with the reformers, who consequently organized themselves anew, professing to reject all creeds, and to receive the Bible alone as their authority in faith and practice. They, however, though rejecting the Trinitarian terminology, are, in fact, in essential agreement with other evangelical Christians in their opinions with regard to the person and work of Christ and the future resurrection and judgment. They celebrate the Lord's Supper weekly, hold that repentance and faith should precede baptism, though, from the importance they attach to the latter ordinance, they are often charged with holding to baptismal regeneration. On all other points they allow and encourage independence of individual opinion. Their church organization is congregational. Their officers are of three classes: (1) elders, called also bishops, pastors, and presbyters; (2) deacons; and (3) evangelists, who are itinerants supported by the free offerings of the congregations. This denomination is distinguished for its efforts in behalf of education. They hold that the laborer is worthy of his hire, and teach the duty of the Church to provide amply for its ministers' support. They sustain several religious quarterly and monthly reviews and many weekly periodicals in the U. S., and several in Great Britain and her colonies. Among their numerous institutions of learning are Bethany College, in West Va., Hiram College, Hiram, O., the Northwestern Christian University, Indianapolis, Ind., Eureka College, Ill., Kentucky University, Lexington, Ky., and Oskaloosa College, Oskaloosa, Ia., besides a large number of seminaries and schools of a high grade.

REVISED BY B. A. HINSDALE.

**Dis'cipline** [Lat. *disciplina*, from *discipulus*, a "scholar"], education, training; the treatment suited to a learner or disciple; subjection to rules and regulations. It sometimes signifies punishment or chastisement. The term is applied figuratively to a peculiar mode of life in accordance with the rules of some profession or society.

**DISCIPLINE**, in military and naval affairs, is a general name for the rules and regulations proscribed and enforced for the proper conduct and subordination of the soldiers, etc.

**DISCIPLINE, ECCLESIASTICAL**, is a term used to designate the means employed by churches to maintain correctness of life among their members, orderly government in church affairs, and to prevent the spread of heresy in their ranks. In the Middle Ages discipline was either penitential (that is, inflicted on those who confessed their sin; see PENANCE) or punitive, which was, in theory at least, frequently administered by the civil power.

**Discipline, First Book of**, an important document in the ecclesiastical history of Scotland. It was drawn up in 1560 by John Knox and four others. It lays down rules for the election of ministers and other officers, but deals more especially with ecclesiastical discipline. Though subscribed to by many of the nobles, it was never acknowledged by an act of Parliament. The "Second Book of Discipline" was drawn up by a committee of the General Assembly in 1578. Andrew Melville took a leading part in preparing it.

The "Discipline" of the Methodist Episcopal Church is a volume containing all the doctrines, administrations, and ritual forms of that denomination, and is revised every four years, so as to include changes made by the quadrennial or General Conference.

**Disclaimer**, in law, a plea containing an express denial or renunciation of some claim alleged to have been made by the party pleading. This term is also applied to the act of one who renounces or refuses to accept a gift or devise made to him of land or other property, and generally to the waiver of any claim. In the law of landlord and tenant it means a denial by the tenant of the landlord's title, in such a way as to cause a forfeiture of the tenant's estate.

**Discob'oli** (plu. of **Discob'olus**), [Gr. *δισκόβολος*, from *δίσκος*, a "disk" or "quoit," and *βάλλω*, to "throw," also to "put" or "place," so called in allusion to the habit of the fish of placing its disk on some firm body], the name of a family of malacopterous fishes, having the ventral fins united to form a sucking disk on the under surface of

the body, by which the animal is enabled to firmly attach itself to a rock or other fixed body in order to obtain food. To this family belongs the lump sucker (*Cyclopterus lumpus*).

**Discontin'uous Function**, in mathematics, is a function which does not continuously increase or diminish when the independent variable increases uniformly. The function  $\tan. x$  is discontinuous; for though the arc  $x$  increases uniformly from  $0^\circ$  to  $360^\circ$ ,  $\tan. x$  changes abruptly from  $+\infty$  to  $-\infty$  at  $x = 90^\circ$  and  $x = 270^\circ$ .

**Discord** [Lat. *discordia*], want of concord; dissension, strife; a combination of sounds which have no harmonical relation. In music, a combination of notes more or less disagreeable to the ear. Discords are largely employed in musical compositions, being introduced by way of transition between successive concords, of which they serve, by contrast, to heighten the pleasing effect. They are, therefore, indispensable to the highest order of musical expression. The concord preceding a purposely introduced discord is called the *preparation*, and that which follows, the *resolution*.

**Discount** [from *dis*, "un" or "off," and *count*], an allowance or deduction made for cash or advanced payments. Thus, in mercantile transactions a bill purchased may amount to \$250. The seller allows the purchaser a discount of 15 per cent. for prompt or advanced payment, making the amount paid \$212.50; in other words, \$250—15 per cent. = \$212.50. Discount is a form of interest. To borrow \$100 at 6 per cent. for four months, and paying \$102 at the expiration of the time stated, is *interest*, but does not differ materially from taking \$98 at once, under promise to pay \$100 at the end of four months; this latter method is called *discounting*. The rate of discount is usually agreed upon by the parties directly interested.

**Discourse** [Lat. *discursus*], conversation, talk; the expression of ideas; a formal treatise or dissertation; in rhetoric, a series of sentences and arguments arranged according to the rules of art. In logic, this term is applied to the operation of the mind commonly called *reasoning*.

**Discovery**, in equity jurisprudence (see EQUITY), the act of disclosure by a defendant of facts to which he is required to answer by reason of a "bill of discovery" which has been filed against him. The court entertains such a bill to secure the due administration of justice. There must be an interest on the part of the plaintiff in the subject to which the discovery refers, and the information sought must appear to be material either to the prosecution of the suit or of some other suit or action then pending or which may be commenced. The defendant will not be compelled to make the discovery when disclosure would subject him to criminal proceedings or to a forfeiture. (The works on equity jurisprudence should be consulted for more full information: STORY, "On Equity;" ADAMS, on the same; SPENCE, "Equitable Jurisdiction," etc.) In a number of the American States, following the lead of the New York code of procedure, the bill for discovery is abolished. Either party to an action under that system may obtain an order from a judge to examine a party to an action before trial. The mode of examination is regulated by rule of court. This proceeding is a substitute for the former bill of discovery. T. W. DWIGHT.

**Discovery**, of countries. See INTERNATIONAL LAW No. I., by PRES. T. D. WOOLSEY, S. T. D., LL.D.)

**Discussion** of a problem or formula in mathematics, is the process of assigning to the arbitrary quantities which enter into it every reasonable value, and especially limiting values and interpreting the results.

**Disease** [from the Fr. *dés*, negative, and *aïse*, "ease;" Lat. *morbus*; Fr. *maladie*; Ger. *Krankheit*], a deviation from a state of health, consisting in most cases (if not in all) in some change, palpable or impalpable, of some one or more of the tissues, rendering such tissue (or the organ containing it) incapable of performing its proper part in the economy of the organism to which it belongs. In a less general sense, a particular form of ill-health is called a disease. Diseases are either *diathetic* (arising from the diathesis or predisposition of the patient) or *enthetic* (arising from without the patient). It is at present a favorite theory with many that enthetic diseases arise from minute organisms or disease-germs. (See GERM-THEORY.)

**Diseases, Distribution of**. See GEOGRAPHICAL DISTRIBUTION OF DISEASES.

**Disfranchisement**, the act of depriving a person of any privilege, liberty, franchise, or immunity—such as depriving a member of a corporation of his corporate rights. It is distinguished in this case from "amotion," which refers to the removal of an officer of the corporation from office, without affecting his membership. Another instance is the act of depriving a person of the rights and privileges of citizenship. This term is often applied to the act of de-

priving a person of the right to vote, and in England to the act which deprives a borough of the right of returning a member to Parliament.

**Dishon'or** [from the Lat. *dis*, "un," and *honor*, "honor"], in mercantile language, signifies to refuse or neglect to pay (or to accept) a draft or a bill of exchange. The act of drawing or indorsing such a bill or draft involves the drawer and indorser in an obligation to pay it in case the drawee dishonors the same. In order that the person in whose favor it is drawn may have recourse against the drawer and indorser, it is necessary that notice of the dishonor shall be given to these parties without unreasonable delay.

**Disinfection** [from the Lat. *dis*, "un," and *inficio*, *inficere*, to "stain," to "taint," to "poison"] is the destruction or removal of the causes of disease present in any locality or material. It may be applied therefore to the atmosphere, to sewage or other liquid or solid filth, to ships, houses, clothing, merchandise, etc. Cologne-water and other merely odorous substances, while they may disguise foulness of the air, do not really disinfect. The power of the substances commonly used for this purpose has been overrated; they seldom destroy the contagious or infectious materials which produce diseases, yet they often do good by removing the conditions which favor their increase and dissemination. Cheapest among disinfectants are dry earth, lime, charcoal, and tar; and they are all positively useful. Earth immediately destroys the odor of excrement covered by it, and prevents unwholesome emanations. The same is true also of lime. Charcoal is a very powerful absorbent of gases and purifier of liquid and semi-liquid substances. Common wood-tar has similar properties to a less degree, but its partial volatility enables it to act more favorably upon an impure atmosphere. Chlorine is probably equal to any other substance in destroying in the air moribund materials of organic origin. It is usually employed as it is given off from chloride of lime (bleaching-powder) or chloride of soda solution (Labarraque's liquid). Chloride of zinc, dissolved in water (Burnett's liquid), and proto- or sesquichloride of iron are serviceable for the disinfection of privies, sewers, etc. Solution of nitrate of lead (Ledoyen's liquid), by the affinity of lead for sulphur, decomposes sulphuretted hydrogen, the most common noxious ingredient in foul atmospheres. Protosulphate of iron is much used for the disinfection of sewage and of privies. Permanganate of potassa (Condy's liquid) as an oxidizing agent has analogous utility, but is more expensive. The crude permanganate will answer very well for this purpose. Sulphurous acid and nitrous or hyponitric acid, both gaseous, are available for the fumigation of unoccupied rooms; they are irrespirable. Iodine (solid) and bromine (liquid) have both been found practically similar, and perhaps equal, to chlorine for the disinfection of wards of hospitals. Carbolic acid (phenic acid or carbol) has of late years been the most popular of all disinfectants. It is obtained, along with cresylic acid, in the distillation of coal-tar. More than any other of the substances named, it is believed to have the power of destroying minute living vegetable and animal organisms in the air or elsewhere. Ozone is asserted by some experimenters to be a valuable disinfectant, but it has not yet been much employed for that purpose. Chloralum (chloride of aluminum) and bromochloralum have been recently introduced, and are under trial, with somewhat conflicting reports concerning their value.

The modes of action of the above-named disinfectant substances may be classified as follows: 1. By absorbing gases and preventing their emanation—dry earth, lime, charcoal. 2. Neutralizing sulphuretted hydrogen gas—nitrate of lead. 3. Decomposing sulphuretted hydrogen and dead organic matter—chlorine (by its affinity for hydrogen, setting oxygen free), iodine, bromine, permanganate of potassa. 4. Arresting decay and putrefaction (*i. e.* by antiseptic action) in vegetable and animal materials—sulphurous and hyponitric acid gases, chloride of zinc, protosulphate, protochloride, and sesquichloride of iron, wood-tar, coal-tar, carbolic acid (by its affinity for water, and by combining with and fixing albumen and similar principles). 5. Destroying minute organisms, vegetable or animal (disease-germs), in the atmosphere—carbolic acid; perhaps chlorine, iodine, and bromine.

Quantities of disinfectants for use may be thus stated. For privies or sewers, a pound of sulphate or chloride of iron or chloride of lime, diffused in a gallon of water, will answer for a very large amount of foul material. Burnett's liquid contains twenty-five grains of chloride of zinc in each fluidrachm of water. A pint of this in a gallon of water will be strong enough for use. For water-closets or bed-pans, Labarraque's solution of chloride of soda, a fluid-ounce in a quart of water; or permanganate of potassa,

ten grains to a quart of water; or carbolic acid, twenty grains to a pint. A 70-per-cent. solution of this last substance is often used also. Drinking-water is best purified by filtration through charcoal, but it may be improved, when containing an excess of organic matter, by a small amount of permanganate of potassa, enough to make it very slightly pink in color in a strong light. Articles of clothing may be disinfected by boiling them in a solution of the permanganate, an ounce to three gallons of water. Greatly contaminated garments or bedding, as from small-pox patients, should be burned. Occupied rooms may be disinfected by fresh chloride of lime, placed about in saucers in convenient places to give off chlorine.

Ledoyen's liquid is made by dissolving a pound of litharge in seven ounces of nitric acid and two gallons of water. Ridgewood's disinfectant consists principally of carbolic acid, lime, and fuller's earth. McDougall's (much used in England and India) contains the sulphites of magnesia and lime and carbolate of lime.

But the most effective, indeed the only certain, disinfectant agencies are *cold* and *heat*. Malaria (the local cause of ague and remittent fever) is disarmed of its noxious power by a single hard frost; and the same is true of the infection of yellow fever. Cholera disappears almost always in temperate climates with the approach of winter. The continuance, and even increase, of smallpox, typhus, and some other contagious diseases during cold weather is due to the closing up of houses to keep them warm, thus diminishing ventilation and concentrating the morbid poison. Yet no considerable use can be practically made of the disinfectant action of low temperature, on account of the difficulty of producing it at will on a sufficiently large scale.

*Heat* was known by the ancients to exert an influence antagonistic to infection. Fires were in early times burned in the streets of cities to dissipate the plague. Pliny wrote, "Est in ipsis ignibus medica vis"—"There is in fire itself a medicating power." Yet only latterly has this been clearly verified by science. Dr. Henry of Manchester, England, in 1824, performed a series of experiments, by which he proved that the contagious property of smallpox and of vaccine virus, and that of typhus and scarlet fever, are destroyed by a temperature of from 140° to 200° F., and that such a heat does not injure such fabrics as are commonly used for clothing. In 1851, Dr. von Busch of Berlin made a trial of this agent in a large lying-in hospital, in the wards of which puerperal fever had been very destructive. After all ordinary methods of fumigation and disinfection had failed to eradicate the disease, he had all the patients removed and the wards heated by stoves, for two days, up to the temperature of 150° F. The same class of patients being then reintroduced, not a single case of the fever followed. Dr. W. Ferguson, inspector-general of the British navy, and Dr. A. N. Bell of Brooklyn, N. Y., have reported equally satisfactory success in extirpating yellow fever from large vessels at sea or in port. Dr. Bell and Dr. E. Harris of New York also made use of superheated steam as a disinfectant, with good effect, in New York City during the cholera season of 1866. It is probably one of the most efficacious of all the means yet employed for this purpose.

HENRY HARTSHORNE.

**Disintegration** [from the Lat. *dis*, negative, and *integer*, "entire"], the separation of the integrant particles of a body; the destruction of cohesion; in geology, the gradual wearing away of a rock by ordinary atmospheric action, etc.; the process by which a solid rock is reduced and comminuted to sand, gravel, or soil. Soil or arable land is formed and prepared by the disintegration of rocks. The action of the weather is helped by frequent alternations of temperature above and below the point at which water attains its greatest density—*i. e.* 39° F.

**Disk**, or **Disc** [from the Lat. *discus* (Gr. *diskos*), a "disk" or "quoit"], in astronomy, the face of the sun, moon, or a planet, such as it appears to us projected on the sky. The forms of the celestial bodies being nearly spherical, their projections are circular planes. The fixed stars, when viewed through a telescope, present *spurious disks*, in consequence of the diffraction of light.

**Disk**, or **Disc**, in botany, is a fleshy expansion of the receptacle of the flower; a part of the receptacle, or a growth from it enlarged under and around the pistil; also the central part of a head of flowers of the order Compositæ, as the *Coreopsis*.

**Dislocation** [from the Lat. *dis*, "apart," and *loco*, *locatum*, to "place"], otherwise called **Luxation** [from the Lat. *lucio*, *luxatum*, to "loosen"], in surgery, is the displacement of a bone from its proper relation to another bone with which it is articulated. A "complicated" dislocation is the displacement of a bone, accompanied by a severe local lesion of the soft parts, or fracture of a bone.



"Congenital" dislocations are those which occur before birth. The restitution of a dislocated bone is called its "reduction." Reduction of recent luxations is usually a comparatively easy task to those who have the requisite knowledge and experience, but in old and long-neglected cases it is frequently a most formidable operation, and is liable to be followed by bad consequences to the patient.

REVISED BY WILLARD PARKER.

**Dismal Swamp**, a great morass in the counties of Nansemond and Norfolk in Virginia, and in Gates, Camden, and Pasquotank counties in North Carolina, is about 30 miles long and 10 miles wide. A large portion of it is covered with dense forests of juniper, cypress, white cedar, and gum trees, from which lumber is exported, while other parts are covered with a dense growth of reeds. Near the middle of the swamp is Lake Drummond, which has an area of about 6 square miles, and abounds with fish. A canal through the Dismal Swamp opens steam communication between Chesapeake Bay and Albemarle Sound. The Dismal Swamp is remarkable for its considerable elevation above the surrounding country; when it is full, it is 21 feet above the tide-water. The water of this swamp, known as "juniper water," is of a dark reddish color, and is carried in large quantities to Norfolk and Hampton Roads for shipping purposes. It is highly prized for its excellent quality, and is not liable to become corrupt by keeping.

**Dis'part** [etymology uncertain], in gunnery, half the difference between the diameter of the base-ring at the breech of a gun and that of the swell of the muzzle.

**Dispens'ary** [from the Lat. *dispensatio*, *dispensum*, to "distribute" (from *dis*, "apart," and *pendo*, to "weigh")], a charitable institution in which medical and surgical aid is gratuitously furnished to the poor. During the Middle Ages dispensaries were set up in the houses of the wealthy and in monasteries, and towards the end of the eighteenth century were established in their present form. They now are established in most or all large cities. The oldest in the U. S. was founded in 1795 in New York. The poor receive treatment and medicine in them free of charge.

**Dispensa'tion** [Lat. *dispensatio*, perhaps from *dis*, "apart," and *penso*, to "judge," frequentative of *pendo*, to "weigh"], in the Roman Catholic Church, is an exemption from some canon or other law. Bishops and priests grant dispensations in some cases, but the pope alone has the power of giving them in the more important ones. Papal dispensations were first granted in 1200 by Innocent III. After the English Reformation the dispensing power was assumed by the kings, but it was abolished by the Bill of Rights (1689). (See PARDON.)

**Dispens'atory** [for etymology see DISPENSARY], a book containing an account of the physical qualities and medicinal powers of different drugs, with their natural and commercial history, and their preparation and combinations. One of the most complete works of the kind is the "United States Dispensatory," by Wood and Bache (1833; 13th ed. 1870).

**Dispers'ion** [Lat. *dispersio*, from *dis*, "apart," and *spargo*, *sparsum*, to "scatter"], in optics, is the angular separation of the constituent rays of light when decomposed by the prism. Owing to the unequal refrangibility of the rays of different colors, a beam of light admitted through a small aperture in the shutter of a darkened room, and refracted by passing through a prism, forms an elongated image or spectrum; the red rays, which are the least refracted, occupying one end of the spectrum, and the violet rays, which have the greatest refraction, the other end. The rays after refraction are no longer parallel, so that the index of refraction (the ratio of the sine of incidence to the sine of refraction) is different for each ray; and the difference of the indices for the extreme rays is called the dispersion of the light. It had been supposed by Sir Isaac Newton that the dispersion was proportioned to the refraction, but it was soon found that although the colors in spectra formed by prisms of different substances are always arranged in the same order, they do not occupy the same relative amount of space; a prism of flint-glass giving, in proportion, less red and more violet than a prism of crown-glass, and that substances for which the index of refraction of the middle ray of the spectrum is nearly the same, produce spectra of different lengths. F. A. P. BARNARD.

**Disposi'tion** [Lat. *dispositio*, from *dispono*, *dispositum*, to "dispose," to "put in order," to "arrange"], in architecture, one of the six essentials of the art. It is the arrangement of the whole design by means of the ichnography (plan), orthography (section and elevation), and scenography (perspective view), and differs from *distribution*, which signifies the particular arrangement of the internal parts of a building.

**Disposition**, a musical term employed in organ-building, and referring to the combination and arrangement of the stops on the rows of keys and pedals, with the pitch of each stop or length of the lowest CC pipe.

**Disra'eli** (BENJAMIN), created Viscount Beaconsfield, 1876, an eminent English statesman and novelist of Jewish extraction, born in London Dec. 21, 1805, died there Apr. 19, 1881. Educated at home by his father and private teachers, he entered a solicitor's office, but had no taste for legal business, and finally took to literature. His principal novels are "Vivian Grey" (1826), "The Young Duke" (1830), "Contarini Fleming" (1832), "Henrietta Temple" (1836), "Coningsby" (1844), "Lothair" (1870), some of which were successful—not so much, though, on account of any great literary merit as on account of their close reference to actual circumstances. He began his political career as a radical, and offered himself as a candidate for Parliament in 1831, but was defeated. Having become a Tory, he was again repulsed by the electors of Taunton in 1835, but was elected a member of Parliament for Maidstone in 1837. His maiden speech was so pretentious, and uttered with gestures so extravagant, that he excited the laughter of the House, and closed abruptly, saying, "I shall sit down now, but the time will come when you will hear me." He married in 1839 the widow of Wyndham Lewis. Having gradually acquired skill as a debater, he became about 1842 the leader of the "Young England Party" and an opponent of Sir Robert Peel, whom he denounced with unsparing invective because Peel advocated the repeal of the Corn laws. In 1846 he was returned to Parliament for Buckinghamshire, which he represented for many years. He succeeded Lord G. Bentinck, who died in 1848, as leader of the protectionist party in the House of Commons. He was chancellor of the exchequer in the conservative ministry of Lord Derby for nearly nine months in 1852. About the end of that year he resumed the post of leader of the opposition in the House of Commons. Early in 1858 he was again appointed chancellor of the exchequer in the new conservative Derby-Disraeli ministry. In 1859 he introduced a bill for parliamentary reform, which was rejected by a majority of the House of Commons. He therefore resigned with his colleagues in June of that year. He opposed the electoral Reform bill of Russell and Gladstone, which was defeated in June, 1866. The liberal ministers then resigned, and the conservatives formed a new cabinet, in which Disraeli was chancellor of the exchequer. He also became the leader of the House of Commons, and the most prominent minister except the premier, Lord Derby. He was the principal author and manager of the Reform bill which became a law in Aug., 1867, and extended the right of suffrage to every householder in a borough. This bill enfranchised nearly a million of men, mostly workmen, and was considered a dangerous innovation by the conservatives. Disraeli succeeded Lord Derby, who resigned the place of prime minister in Feb., 1868. He opposed the resolutions or bill which Mr. Gladstone introduced to disestablish the Irish (Episcopal) Church. After a long debate, Mr. Gladstone's resolutions were adopted by the House of Commons on the 1st of May, 1868, by a majority of 64. Disraeli, though defeated on this important question, resolved not to resign office, but to wait for the result of the general election which occurred in the next November. The liberal party having secured a large majority in the new Parliament, he and his colleagues resigned Dec. 2, 1868, and Mr. Gladstone then became prime minister. He was chosen lord rector of the University of Glasgow, 1873, and became prime minister again in 1874. During this his last term of power he was principally occupied with the foreign policy of the country. He created the title of empress of India, established the "scientific frontier" against Afghanistan, acquired Cyprus, subjugated the Zulus, etc. He went out of office again in 1880. (See his "Life" by PLITCHMAN, London, 1878, 2 vols.)

**Disraeli** (ISAAC), D. C. L., an English *littérateur*, the father of the preceding, was born at Enfield in May, 1766. He studied in Amsterdam and Leyden, and spent some years in France. Inheriting a fortune from his father, a Hebrew merchant originally from Venice, and belonging to one of the Jewish families who escaped to Venice from the Inquisition in Spain in the fifteenth century, he devoted himself to the study of literary history. His principal works are "Curiosities of Literature" (1790), "Calamities of Authors" (1812), and "Amenities of Literature" (1841). Died Jan. 19, 1848.

**Disrup'tion** [from the Lat. *dis*, "apart," and *rumpo*, *raptum*, to "break"], a term generally applied to the schism in the Church of Scotland which occurred in the year 1843. (See FREE CHURCH OF SCOTLAND.)

**Dissei'zin** [from *dis*, "un," and *seizin*], in law, a

term signifying an unlawful ejection of one who is seized of a freehold in lands, so as to deprive him of the seizin and place it in another. The modern equivalent for this word is "adverse possession." There is also "disseizin by election," where a person chooses to consider himself disseized, though he is not so in fact, in order to avail himself of legal remedies applicable to a true disseizin. (See SEIZIN, by PROF. T. W. DWIGHT, LL.D.)

**Dissent'ers** [from the Lat. *dis*, "apart" (or "differently"), and *sentio*, to "think"], or **Non-Conformists**, the name given to English Protestants who differ in their views from the Church of England. After the act of Uniformity was passed (1662), about two thousand clergymen seceded, and were called Dissenters. All who refused to take the oaths of allegiance and supremacy, and the Eucharist according to the rites of the Established Church, were excluded by the Test act (1673) from government employment. By the Toleration act (1689), Dissenters obtained legal security in celebrating their worship, and the Corporation and Test Repeal act (1828) enabled them to accept public employment without taking the Eucharist. In 1836 they were first authorized to solemnize marriages in their own places of worship or at a registrar's office. The "General Body of Protestant Dissenting Ministers of the Three Denominations" is the official name of the union of the three boards of Presbyterian, Independent, and Baptist ministers resident in and about the cities of London and Westminster. This union was organized July 11, 1727, and has always taken a leading part in the struggle for the disestablishment of the Church of England. In some European countries Dissenters are called Dissidents. (See also NON-CONFORMISTS, by REV. BEVERLY R. BETTS.)

**Dissep'imént** [Lat. *dissepimentum*, from *dis*, "apart," and *sepio*, to "hedge," to "enclose"], a botanical term applied to the partitions that are formed in the ovary by the united sides of the cohering carpels. Sometimes dissepiments meet in the centre, and divide the ovary or fruit into cells; in other cases they are partial, and leave the ovary one-celled.

**Dissidents.** See DISSENTERS.

**Dissocia'tion, or Disassocia'tion** [*dis*, "apart," and *socius*, "a companion"], in chemistry, is applied to the investigation of the influence of heat and pressure on chemical action. The word was first introduced into chemical nomenclature by Henry St. Claire Deville, who presented a paper to the French Institute Nov. 23, 1857, "On the Dissociation or Spontaneous Decomposition of Bodies under the Influence of Heat." Deville says in this paper: "When heat acts upon any body it produces an expansion which we attribute to a force called the repulsive force of heat. By selecting a proper compound and heating it sufficiently, the distance between the molecules can be increased to such an extent that they will separate into their elementary condition. This is a spontaneous decomposition, not determined by any chemical action. I propose to call it the *dissociation* of compound bodies."

A very full discussion of the subject of dissociation by Mène may be found in the "Revue Hebdomadaire de Chimie," vol. iii., 1871. See also the researches of Graham, Debray, Grove, Regnault, Lamy, Isambert, Frankland, and Clausius.

CHARLES A. JOY.

**Dissolu'tion** [from the Lat. *dis*, "apart," and *solvo*, *solutum*, to "loosen"], literally, the act or process of dissolving; the separation of any substance into its component parts; the liquefaction of a solid body in a menstruum. The term is also applied to the breaking up of a partnership or of a political or legislative assembly. Thus we speak of the dissolution of Parliament when the members are dispersed without the Parliament being regularly adjourned.

**Dissolv'ing Views** are the enlarged images of transparent pictures thrown upon a screen by means of two magic lanterns placed side by side, with their lens tubes a little convergent, so that the projected images may be superposed. By means of mechanical contrivances, which differ in different forms of the apparatus, one of the images is gradually extinguished while the other is similarly developed. At the middle point the two are confusedly intermingled, and afterwards one seems to swallow up the other. (See MAGIC LANTERN.)

**Dis'sonance** [from the Lat. *dis*, negative, and *sono*, to "sound"] is the opposite of *consonance*, and is applied to those intervals in music whose relative proportions are unsatisfactory to the ear. In a special sense, the term is applied to a dissonant interval purposely introduced by the addition of a dissonant note to a concord, or by the substitution of a dissonant for a concordant note. The foundation of dissonance is generally allowed to be more æsthetic than intellectual. Dissonance is not a necessity of

musical composition, and persistent dissonance would be a blemish; but its introduction transitionally, in passing from concord to concord, is a source of richer and more pleasing effects than could be produced by any succession of perfect harmonies. (See DISCORD.)

**Dis'taff** [Ang.-Sax. *distæf*], an implement formerly used in spinning flax or wool, which was fastened on a staff from which the thread was drawn by the fingers. The Fates are represented as spinning the thread of life from the distaff. The distaff is at present not much used except in rude and barbarous countries; but no spinning-wheel, much less any machinery driven by water or steam, has ever produced work which can compare in delicacy with the finest products of the distaff.

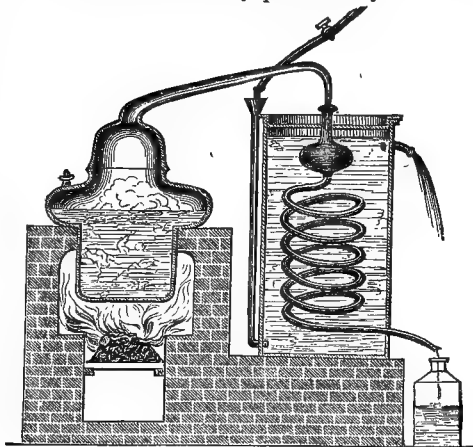
**Distance**, in music, is the interval between two notes. In astronomy, "real distance" is an interval between two heavenly bodies expressed in terrestrial measures, as miles, metres, etc.; "mean distance" is a mean between the perihelion and the aphelion; "curtate distance" of a planet is the distance from the sun or earth to that point where a perpendicular let fall from the planet meets with the ecliptic. "Line of distance" in perspective is a straight line from the eye to the principal point of the plane. The "point of distance" is that point in the horizontal line which is at the same distance from the principal point as the eye is from the same. "Distance" in navigation is the number of miles from point to point in a ship's course. The arc of a rhumb line between two places is the "nautical distance." "Distance" in horse-racing is the last 250 yards of the course. Any horse not reaching the distance-post before the winning horse has reached the end of the course is said to be distanced.

**Distem'per** [Fr. *détrempe*; It. *tempera*], a method of painting in which the pigments are ground up with size and water, with gum-water, or similar vehicles. It is employed in scene-painting and in the preparation of wall-paper. Distemper was the ordinary method of painting in the higher departments of art before the invention of painting in oil. The rapidity with which the vehicle dries renders it difficult to blend the tints in distemper.

DISTEMPER, the name of certain diseases of animals. (See DOG DISTEMPER and HORSE DISTEMPER.)

**Dis'tich** [Gr. *δίταχος*, from *δι* (for *δύς*), "twice" or "two," and *ταχος*, a "row," a "verse"], a couplet of verses. In the Greek and Latin languages this term is applied to a poetical sentence consisting of two lines in hexameter and pentameter verse. The distich was much used by the Greeks and Romans in the expression of single thoughts and sentiments, and in the composition of epigrams.

**Distilla'tion** [Lat. *destillare*, from *de*, "down," and *stillo*, *stillatum*, to "drip"], in chemistry and the arts, a process by which substances which are vaporized at different temperatures are separated from each other, or substances which can be vaporized are separated from those which cannot. When the vaporized substance assumes a solid form after distillation, the process is called "sublimation." Distillation is usually performed by means of a



Distillation Process.

boiler for raising the vapor, and a condenser for reducing the vapor to a liquid or solid form. The condenser is often a spiral tube or "worm," which is kept cool by water while in use. Various instruments for distilling are used in the laboratory of the chemist. "Dry" or "destructive" distillation is the production of new compounds by submitting substances of organic origin to a high but carefully regu-

lated heat. These products are often complex, but sometimes perfectly definite. "Fractional" distillation is the separation of one volatile substance from another, by keeping the mixture at that temperature at which the most volatile will pass over into the condenser.

To produce spirits two distinct operations are required: one to convert vegetable principles into alcohol; the other the separating of the alcohol from the several substances with which it is united while being produced. Sugar is the principle which is necessary to the formation of alcohol, and is used *directly* when molasses and similar saccharine products are submitted to quick fermentation; and *indirectly* when sugar is produced from the starch which certain grains contain, and afterwards converted into alcohol. The latter method is commonly employed in distilleries, and grains of various kinds, generally with some malt, are *mashed*. To accomplish this, a mixture is made of the ground grain and crushed malt, and infusion made in hot water, constantly shaken, in the mash-tun, after which the wort is run off and water added until the soluble matter of the grain is extracted. While in process of mashing, sugar is formed from the starch, and changes into alcohol while fermenting; the mash gradually becomes thinner in consequence, and as soon as the proper state is reached, which the hydrometer determines, in order to prevent acetic fermentation it should be distilled.

Much skill and care in mashing, fermentation, and distilling is necessary to the successful production of the greatest possible amount of alcohol from a given quantity of grain, fruit, or other raw material. According to Hermstadt, about 51 pounds of alcohol and 49 of carbonic acid may be obtained from 100 pounds of sugar: 100 pounds of starch yield 35 pounds of alcohol, and the same quantity of the following grains yields a spirit containing 45 per cent. of alcohol—namely, wheat, 40 to 45 pounds; rye, 36 to 42; barley, 40; oats, 36; buckwheat, 40; maize, 40.

REVISED BY CHARLES W. GREENE.

**Distilled Water** (*aqua destillata*) is the condensed product obtained by the distillation of water, which separates from it all saline matter and impurities, and also most of the air which it had previously contained. On this account it is flat and vapid to the taste. It is much used in chemical and pharmaceutical operations. In some points on the Gulf Coast of the U. S., as at Brazos Santiago, Tex., where streams are unknown and springs scarcely exist, water is procured for drinking and other economical purposes by distillation from the sea. On some sea-going steamers the product of the condensers of the low-pressure engines is utilized for cooking, washing, etc., and is used for drinking to some extent.

**Distillery**, an establishment fitted up with the necessary apparatus for the distillation of spirits. (See DISTILLATION.)

**Distress', or Distrain'**, in English law, is the taking of a personal chattel without process of law out of the possession of a wrong-doer, by way of pledge for redress of an injury or for the performance of a duty, as for non-payment of rent or taxes, etc.

**Distribution of Species.** See GEOGRAPHICAL DISTRIBUTION OF SPECIES.

**District** [from the Lat. *distingo*, *districtum*, to "bind," also to "divide"], a territorial division; a defined portion of a state or city, which is divided into districts for judicial, fiscal, or elective purposes. In the U. S. each State is divided into Congressional districts, which are nearly equal in population, and elect each one member of Congress. Every State is also divided into senatorial districts, each of which sends a member to the senate of that State. Townships in many parts of the U. S. are divided into school districts, each of which maintains and manages one or more public schools. There are also military and other districts.

**District Attorneys of the United States.** The name of these officers does not indicate their duties or the extent of their official jurisdiction. Formerly, in England, and now in some of the American States, a district of country embracing several counties was assigned to a judge, in which he held criminal courts called Oyer and Terminer—to "hear and determine." An attorney to represent the Crown or State was necessary to enter upon trials. As he was selected to proceed through the whole district, he received the appellation of "district attorney." In the Federal courts, and in many of the States, the duties of this officer have become local, confined to a particular county or place of holding a single court. But the name of the officer continues the same as formerly, when there was reason for its application to him. District attorneys represent the U. S. in all their business in the circuit and district courts, both civil and criminal. In civil suits they stand in the same relation to

the government that other attorneys do to their clients. They also represent the U. S. in the prosecution of all crimes and misdemeanors. This office is one largely sought for by lawyers. The position is considered highly respectable, and is often exceedingly profitable. The district attorneys receive a nominal salary of two hundred dollars, and the residue of their compensation is mainly derived from fees prescribed by an act of Congress. When they defend officers and others at the instance of the government, their remuneration is not regulated by law, but depends upon agreement. The district attorneys are required by law to report to the attorney-general an account of their official proceedings, and the state and condition of their offices, at such time and in such manner as he may direct. (See "Federal Government," by R. H. GILLET.)

**District Courts of the United States.** See COURTS, by GEORGE CHASE, LL.B.

**District of Columbia** is bounded N., N. W., E., and S. E. by Maryland, and W. and S. W. by the Potomac River and Virginia. Area, 64 square miles. Originally its area was 100 miles, consisting of a tract lying on both sides of the Potomac, 10 miles square, ceded to the U. S. by Maryland and Virginia 1788-89. The Virginia portion, with the city of Alexandria, was retroceded to Virginia by Congress July 9, 1846.

The soil of the district is a light sandy loam, well watered in most parts. It belongs geologically to the cretaceous formation, with deposits of marl underlaid by gneiss, the surface exhibiting sandstone, limestone, pebbles, clay, gravel, sand, and loam. The fauna and flora are generally identical with those of Eastern VIRGINIA and MARYLAND (which see). The Potomac River abounds in shad, herring, black bass, perch, rockfish, sturgeon, etc.

**Climate.**—The temperature has a wide range, suddenly rising or falling many degrees, but the climate is as equable as is common in the Atlantic States, and generally healthy, though miasma prevails near the Potomac flats. The mean temperature of summer is 76°, of winter 36°, and of the whole year 56°. Average rainfall, 90 inches a year. The snows of winter rarely lie long on the ground. Storms seldom last twenty-four hours.

**Farms and Products.**—In 1880 the number of farms in the District was 435, comprising 12,632 acres, valued at \$3,632,403, or nearly \$300 an acre on the average. Value of farm products sold or consumed, \$514,441.

**Manufactures** are limited, numbering 971 establishments in 1880, with capital of \$5,552,526, employing 7146 hands, receiving \$3,924,612 in wages; total value of products, \$11,882,316. Printing and publishing showed the largest aggregate product, \$2,896,312; flour mills the next, amount \$1,172,375.

**Finances.**—The assessed value of property in the District in 1880 was: Real estate, \$87,980,356; personal property, \$11,421,431. Besides this, the value of U. S. government property (exempt from taxation) was estimated at about \$110,000,000. The amount raised by taxation (1½ per cent.) was \$1,469,254 in 1880. By law one half the total expenditure for the District of Columbia is borne by the general government, the other half being taxed on private property. The net public debt of the District was \$22,675,459, mainly created by the vast street improvements carried out by the short-lived territorial government and board of public works in 1871-74.

The commerce of the District is trifling, though Georgetown is a port of entry, and the Potomac is navigable for large vessels to the navy-yard on the E. branch, and to the head of tidewater at Georgetown.

**Banks, etc.**—In 1881 there were 1 national bank and 6 private bankers, with capital of \$616,000; circulation, \$207,600; and deposits, \$4,732,027. There are 8 fire insurance companies, capital \$800,500; assets, \$1,601,233; also 1 life insurance company, with \$1,000,000 capital; net assets, \$865,452; risks written in year, \$997,598; risks in force, \$14,272,153.

**Education.**—The public schools of the District have an enrolment of 27,299 pupils, out of a population of 43,558 children of the school age (six to seventeen years), with average attendance of 20,730. Amount expended for free schools, 1881, \$527,312, of which \$295,668 was for teachers' salaries. Private schools for both sexes are numerous and well attended. There are 5 seminaries and colleges, with 52 instructors and 581 students. Value of college grounds, buildings, and equipment, \$900,000. Georgetown College, founded 1789 (Roman Catholic), Columbian University (1814), and Howard University (colored) have each law, medical, and collegiate departments. The SMITHSONIAN INSTITUTION (which see) and the National Museum, which occupies a large edifice erected in 1880 especially for exhibition purposes, are free public institutions, amply endowed, and afford the means of scientific culture

through their extensive collections in zoology, antiquities, geology, ethnology, and natural history generally.

**Churches.**—Of these there are 172 in the District, the Methodists having 54 churches, 12,182 members; Baptists, 40 churches, 10,042 members; Presbyterians, 18 churches, 3618 members; Lutherans, 10 churches, 2100 members; Episcopalians, 22 churches; Roman Catholics, 13 churches; Congregationalists, 4; Jewish, 2; and Christian Disciples, Unitarians, German Reformed, Friends, Swedenborgians, and Universalists, 1 each.

**Government.**—A territorial government was created by Congress for the District of Columbia in 1871, repealing the charters of the cities of Washington and Georgetown, and merging them into the same government. This was abolished in 1874, and the affairs of the District, including those of Washington, are now managed by three commissioners under the direct legislation of Congress for the levying and disbursement of taxes and for all public improvements. The citizens have no vote, either in District or national affairs. Justice is administered by a supreme court of District of Columbia, having six judges, and by a police court, presided over by a single judge.

**Population.**—In 1860, 75,080; in 1870, 131,700; in 1880, 177,624. A. R. SPOFFORD.

**District Schools.** See COMMON SCHOOLS, by JOHN D. PHILBRICK, LL.D., J. U. D.

**Ditch, or Fosse** [Lat. *fossa*], in fortification, a deep trench or excavation around a fort, serving as an obstacle to the enemy and supplying earth for the parapet or rampart. It is generally dry, but is sometimes filled with water. In permanent works, such as the regular fortifications of a town, the rampart and ditch are the most important; the former being inside the latter, and formed of earth excavated from it. The ditch is often 100 feet wide, and twelve feet deep below the natural level of the ground.

**Dithyramb** [Lat. *dithyrambus*; Gr. *διδύραμβος*; etymology doubtful], a kind of lyric poem sung in honor of Bacchus. It was of a lofty but often inflated style; hence the term *dithyramb* is frequently applied to any lyric of a wild and boisterous character, such as might be supposed to be composed in a state of intoxication.

**Ditmarschen**, or, as its Scandinavian name reads, **Ditmarsken**, is a district of Western Holstein stretching along the North Sea from the mouth of the Elbe to the mouth of the Eider, and comprising an area of about 500 square miles, with a population of about 75,000 souls; its original name was *Thiadmarsesgūho*—that is "Dietmar's Gau." At present it forms no independent community; it is merely a portion of the Prussian province of Holstein. But it has had quite an interesting history. It was inhabited by Frisians in the two coast-marks, Norderstrand and Süderstrand, and by Saxons in the two inland marks, Norderhamme and Süderhamme; but a strongly marked community in all the principal conditions of life seems very early to have obliterated the tribal differences. Charlemagne claimed authority over the country and conferred the authority upon the archbishops of Bremen, but some form of self-government had already developed in that corner of the world, and the pretensions of the archbishop remained mere vain-glory. The Danes defeated the Ditmarschers toward the close of the twelfth century, but the authority they established in the country was seldom acknowledged, and could never be enforced.

**Dit'tany** [from the Gr. *διδάμνος*; Lat. *dictamnus*, so named from Mount Dictæ in Crete, where it grew in abundance], a genus of plants belonging to the order Rutaceæ, with the calyx 5-partite, five petals, unequal, ten stamens, and five one to three-seeded follicular capsules. The *Dictamnus Frazinella* (*ruber* or *albus*) is a perennial indigenous in Southern Europe, and is often cultivated in gardens. It has red or white flowers, of a powerful spicy fragrance. In the U. S. the name of dit'tany is given to the *Cunila Maritima*, of the order Labiata. It is probable that the dictamnus of the ancients was the *Origanum Dictamnus*, a labiate plant to which the old authors ascribe the most marvellous powers.

**Dittee'ah, or Duttee'ah**, a town of Hindostan, in Bundelcund, 125 miles S. E. of Agra. It is enclosed by a stone wall thirty feet high. It is the capital of a rajahship of its own name. Pop. about 50,000.

**Dit'ton** (HUMPHREY), an English mathematician, born at Salisbury May 29, 1675, was minister of a dissenting church at Tunbridge. He was befriended by Sir Isaac Newton, who procured his appointment as mathematical master of Christ's Hospital. He wrote able works entitled "Laws of Nature and Motion" (1705), a "Treatise on Fluxions" (1706), and "Synopsis Algebraica" (1709). Died Oct. 15, 1715.

**Di'ua**, a fortified seaport of Hindostan, on the Arabian

Sea, and on an island of its own name near the coast of Guzerat. It has a tolerably safe harbor, and the remains of a famous Hindoo temple. It has been possessed by the Portuguese since 1515. Area of the island, 64 square miles. Pop. 12,303.

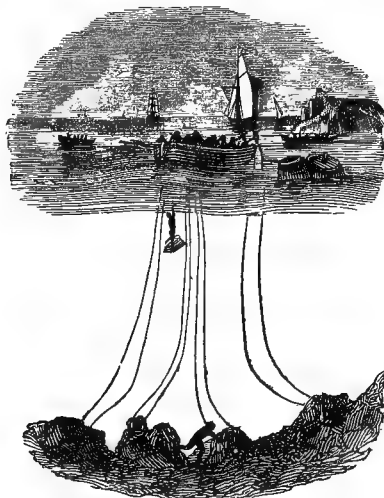
**Diurnal** [from the Lat. *diurnus*, "daily," from *dies*, a "day"], as an adjective, is employed either to designate that which pertains to the day as opposed to the night (thus, "diurnal insects" are those which are abroad in the day, while "nocturnal" ones fly by night), or more frequently it is applied to events which occur every day of twenty-four hours. "Diurnal" is also a name sometimes given to the Roman Catholic breviary.

**Divan, de-van'** [Persian *divân* or *diwân*; Fr. *divan*; Ger. *Divan*; It. *divano*; Sp. *divan*], a word common to several Oriental languages. It is employed by the Persians to denote a collection of poems by one author, as the *divân* of Saadi and the *divân* of Hafiz. The term is also applied to a muster-roll or military day-book. The Turkish *divan* is the great council of the empire or supreme judicial tribunal. The word *divân* is also among the Turks a common appellation for a saloon or hall which serves for the reception of company. Along the sides of this saloon are arranged low cushioned seats or sofas; hence the name has been given in Western Europe to a kind of sofa.

**Diver** (*Colymbus*), a genus of birds belonging to the family Colymbidæ. The bill is straight, strong, and pointed, tail and wings short, and the toes webbed. They dive with great facility, and pursue the fish on which they live under the water. The principal species are the loon or great northern diver (*Colymbus glacialis*), the black-throated diver (*Colymbus arcticus*), and the red-throated diver (*Colymbus septentrionalis*).

**Divergent (or Diverging) Series**, in mathematics, a series in which each succeeding term is greater than the term before it. Thus, a series constructed on the formula  $x^2 + 2x$ , by substituting for  $x$  each of the natural numbers in their order, increasing successively, which would give 3, 8, 15, 24, 35, etc., is a diverging series.

**Di'vers** (in the pearl-fishery) descend through the water



Divers in the Pearl-fishery.

to the bank round which the oysters are clustered, placing their feet, to secure greater rapidity, on a stone attached to the end of a rope, the other end of which is made fast to the boat. They carry with them another rope, the extremity of which is held by two men in the boat, while to the lower part, that descends with the diver, there is fastened a net or basket. Besides these, every diver is furnished with a strong knife to detach the oysters or serve as a defensive weapon in case he should be attacked by a shark. As soon as the diver touches bottom, he gathers the oysters with all possible speed, and having filled his net or basket, he quits his hold of the rope with the stone, pulls the rope which is held by the sailors in the boat, and rapidly ascends to the surface of the sea. Sponges are obtained by a similar process. (*Johnson's Natural History*, vol. ii., p. 525.)

**Divertimen'to** [an Italian word signifying a "diversion"], or **Divertissement** [Fr. for the same], a kind of musical composition arranged for one or more instruments. It has generally no fixed character, and may be classed between the *étude* and the *capriccioso*. The term is also

applied to a ballet, or songs introduced between the acts of an opera.

**Dividend** [Fr. *dividende*, from the Lat. *divido*, to "divide"], in arithmetic, the number or quantity given to be divided; also the sum apportioned to creditors from the realized assets of a bankrupt's estate. The term dividend is also applied to the annual or half-yearly interest on the public funds or national debt, and to the distributed profits of joint-stock companies, which are paid annually or half-yearly to each stockholder.

**Dividers** are instruments for "dividing" or marking off distances, or for drawing circles, ellipses, and other curves. They sometimes consist of two or even three bars or legs, joined at one end by a hinge. Sometimes two movable points are arranged to slide along a "beam" or straight bar. "Proportional dividers" are made of bars crossing each other and pointed at both ends. By means of a sliding joint at the point of union, dimensions included between one of the pairs of points may be made greater or less than those included between the other at the same time in any proportion.

**Dividing Engine**, a machine for marking the divisions of scales of measurement in scientific, mathematical, and astronomical instruments. Scales for mechanics' work were formerly divided by hand, but it is impossible to attain accurate results by such methods, while by a carefully made engine a most surprising degree of precision is reached. The engines are of various kinds. Their success depends upon the skill, patience, and mathematical knowledge of the constructor. Test-plates for the microscope have been ruled by Mr. F. Nobert of Barth, Pomerania, with divisions only  $\frac{1}{250000}$  of a French inch asunder.

**Divi-di'vi** (*Cesalpinia Coriaria*), a leguminous shrub of tropical America, is valued for its pods, which contain tannin and gallic acid. It grows to the height of twenty feet, and the pod is three inches long. It is used principally for tanning leather and dyeing cloth, and large quantities are exported from Savanilla, Rio Hache, and Maracaibo.

**Divina Comme'dia** [It.], or **Divine Comedy**, the name of one of the most remarkable productions of the human mind, a poem composed by Dante Alighieri. (See DANTE.) It is not known when or where it was composed, but from the poet's having given "the middle of the journey of his life" (i. e. about 1300) as the date of the opening of his story, there can be no doubt that it was written after that time, and in all probability after his banishment, which occurred in 1302. The "Divine Comedy" describes a vision in which Dante visits in succession Hell, Purgatory, and Paradise. The structure of the poem consists of three great divisions—"L'Inferno," Hell; "Il Purgatorio," Purgatory; "Il Paradiso," Paradise. The Inferno is related in thirty-four cantos, but each of the other divisions in thirty-three, so that the whole poem contains one hundred cantos in all. The poet's conception of Hell makes it a vast, irregular, funnel-shaped abyss opening directly under Mount Sion, on which stands Jerusalem, and having its apex at the centre of the earth. The sides of this pit are not smooth, but broken by terraces or platforms, each of which extends round the whole circle, and is separated from those above it and from those below it, so that entrance and exit are impossible except to those who, like the poet, are divinely guided. Owing to the funnel-like shape of the pit, these circles necessarily grow smaller and smaller as they descend. Commentators have exercised their ingenuity in calculating the width and depth of the pit, the widths of the different platforms, and the distances that separate one from the other, but no common reckoning has been arrived at. We must imagine the platforms, or "circles," as they are usually called, to be not narrow ledges or steps, but regions of vast extent, and varying greatly in character. In one the ground, or at least a part of it, is covered with fresh, green grass; in another there is no footing, but Dante and his guide look out from the edge of the abyss to where the spirits are whirled about in air dark as pitch, like troops of starlings before the wind; another circle welters in darkness and cold, with hail and mud and snow, and the earth gives out a stench; another is a marsh, in which the sinners are immersed, and through it runs a river on whose opposite bank rises the city of Dis. In other circles are rivers of blood; here is a vast plain filled with tombs like those of the cemeteries at Arles and Pola; in another is a lake of pitch, and in another a vast forest where the trees contain the souls of sinners. In one place the ground is covered with hot sand, while a continual rain of fire falls upon those who tramp wearily along; in another the plain is honeycombed with pits, into which the sinners are plunged head-foremost; and in another still they are frozen in a lake of ice.

It seems obvious that we must argue from the implied

vastness of the circles to the dimensions of the whole funnel-pit of the Hell, and not, by limiting ourselves to certain measurements of the breadth and depth of the pit, run the risk of belittling the platforms themselves. Yet this is what naturally results from the measurements given by the commentators, for we are told that "the latest calculation gives 245 miles as the diameter of the abyss at its opening, which reduces the different platforms to a size comparatively small." But no one can read the poem and think of the platforms as anything but vast, and any reasoning that ends by making them small must be wrong reasoning.

Dante is conducted through the Hell and through the Purgatory by the poet Virgil (representing human wisdom), who has been sent to his aid by Beatrice (representing heavenly wisdom), she herself having been despatched to Virgil with this commission by Lucia (enlightening grace), who had been sent by a gentle lady (Divine Mercy) to the aid of Dante, lost in a dark wood in the middle of his life's journey, and terrified by the aspect of threatening wild beasts. Under Virgil's guidance he begins his memorable journey. The events we have thus hinted at occupy the first and second cantos, which are merely introductory. In the third, after passing through the gate of Hell, Dante and his guide find themselves in a region where are the souls of those who, when on the earth, lived for themselves alone. They were mixed with the angels who in the war with Satan stood for neither side—hateful to God and to his enemies. "Do not let us talk about them," said Virgil, "but look at them, and pass on." They then come to the river Acheron, over which we are to infer that Charon ferries them, since Dante says that he fell asleep after a discussion with the grim ferryman as to his right to pass over with the condemned souls, and that when he awoke he was with Virgil in the First Circle. In this First Circle, however, it is not sinners who are punished, but the whole world of the unbaptized and of those who lived before the birth of Christ. This is the Limbo into which the legends make Christ to have descended, and from which he released certain souls. The doom of these is sorrow without torment; Dante hears no lamentations, but only sighs, with which the air trembles. With the Second Circle and the fifth canto begin the true punishments of sinners, the sins deepening in guiltiness as the pit descends, and the punishment growing more intense, painful, and horrible as the circles decrease in size. All the circles, beginning with the second, are included in three great divisions, each set of circles separated from the others by wide spaces. These divisions, to name them after the sins punished in them, are I. Incontinence; II. Malice; III. Bestiality. The sinners whose punishments are included in the first of these great divisions, that of INCONTINENCE, are—1. The carnal; 2. The gluttonous; 3. The avaricious and prodigal; 4. The angry and the sullen. In the circle of the sullen are included the heretics. The second division, that of MALICE, includes—1. The violent against their neighbors; 2. The violent against themselves; 3. The violent against God, or against Nature, the daughter of God, or against Art, the daughter of Nature. The third division, of BESTIALITY, has two subdivisions. In the first are seducers, flatterers, demoniacs, soothsayers, barrators, hypocrites, thieves, evil-counsellors, schismatics, falsifiers. In the second are traitors to their kindred, traitors to their country, traitors to their friends, traitors to their lords and benefactors. (Longfellow, "The Divine Comedy," vol. i., p. 170.) On reaching the bottom of the pit Satan is found, a monster with three heads and champing a sinner in each bloody mouth. These sinners are the three arch-traitors, Judas Iscariot, who betrayed his God, and Brutus and Cassius, who betrayed Rome. Satan is plunged up to his middle in the vortex of the pit, and the two poets, Virgil leading, climb down his shaggy body, holding by his fell of hair, until they reach the monster's haunches, when they turn and climb up the legs, until at length they find themselves at the foot of a gloomy cavern up whose sides they mount with difficulty, and emerge at the foot of the Mount of Purgatory, a lofty cone that rises in the exact antipodes of Mount Sion on an island in the Southern Ocean. Around it are seven terraces, on which are punished those who have committed the seven mortal sins. These are pride, envy, anger, sloth, avarice and prodigality, gluttony, and lust. From the first canto to the ninth the action is outside the entrance to Purgatory. From the ninth canto to the twenty-eighth the seven circles are described, and from the twenty-ninth to the end the Terrestrial Paradise at the summit of the Mount of Purgatory. When the poets have reached the summit of the mountain they are met by Beatrice, who has descended from Heaven for the purpose, and returning draws Dante after her. The Paradise or Heaven is founded upon the Ptolemaic system, which was the one accepted in Dante's time. Beatrice leads Dante in succession to the seven planets—namely, the Moon, Mer-



cury, Venus, the Sun, Mars, Jupiter, and Saturn. From thence they mount to the sphere of the fixed stars, then to the primum mobile, and finally to the empyrean, where, after a vision of Christ and the Virgin, the poet has a glimpse of the Creator, and the poem closes.

This is the bare skeleton of a work which holds an eternal place in the heart, the intellect, and the conscience of the world, and which numbers now more students and admirers than in any preceding time. It must be closely read and studied to be in any degree understood, and so abstract, or even analysis, of it would be of much service to a person who had not read with deliberate care the whole poem from beginning to end.

The name "Comedy" was given to the poem by Dante himself. In a letter which he wrote to Can Grande, and of which an abstract and partial translation is given by Dr. J. A. Carlyle in the introduction to his admirable prose translation of the *Inferno*, we find that he says: The title of this work is, "Begins the Comedy of Dante Alighieri, a Florentine by birth, but not by manners" (Incipit Comedia Dantis Alagherii, Florentini natione, non moribus). He then gives the definition of the words Comedy and Tragedy from their supposed etymologies, and says that Tragedy "speaks in a style elate and sublime, and at the beginning is admirable and quiet—at the end or exit fetid and horrible; while Comedy begins with the asperity of a subject, and ends prosperously, and speaks in a remiss and humble style;" from which he concludes it will be easy to see why the present work is called a comedy. For if we consider the subject thereof, at the beginning it is horrible and fetid, being Hell; at the end prosperous, desirable, and grateful, being Paradise. And if we consider the style of speech, that style is remiss and humble, being the vulgar speech, in which even the women talk with one another. Wherefore it is evident why the work is called a Comedy. As for the word "Divine" prefixed to the title, it is not known just when it began to be used. The first printed edition with the title "*DIVINA COMMEDIA*" is said to be the one printed at Venice in 1516 by Bernardino Stagnino de Monferra. Dr. Carlyle says that this edition being very scarce he has not been able to verify this assertion, but he finds the title "*Divina Commedia*" in the edition printed by Gabriel Giolito di Ferrarii in Venice in 1555. Whoever may be responsible for the word, it is so appropriate, both from the argument of the poem and from its beautiful style, that it can never be separated from the title.

The "Divine Comedy" exists in a great number of manuscripts. Of these the most are in Italy, but there are several in England, and others in France and Germany. There have been over 300 editions printed, and it has been translated into every European language. The earliest printed edition is that of Johanni Numeister, Fuligno, 1472. Dr. Carlyle, in speaking of the edition of Vendelin da Spira, printed at Venice in 1477, says that in some verses at the end is found the epithet "Divine" applied to Dante (*divo* Dante alighieri Fiorentina poeta), and that "later editions speak of the *exceleso, glorioso, divina, or venerabile* poeta Fiorentino long before they begin to apply the title of Divine to the poem itself." The earliest Florentine edition is that of 1481, to which was added the commentary of Cristoforo Landino. Leaving these earliest editions, we find others following in an irregular way, of which Dr. Carlyle gives this brief summary: "Fifteen authentic editions, besides five of doubtful authenticity, were printed within the last thirty years of the fifteenth century; forty-two in the sixteenth; four in the seventeenth, or poorest century of Italian literature; forty in the eighteenth; and in the present century more than one hundred and fifty." The earliest of all the many commentaries upon the poem is that of Jacopo, Dante's son, written in the year 1328. Later came the comment called generally the *Ottimo* or *Best*, but also the *Anonimo*, *Buono*, *Antico*; then the comment attributed to Pietro, another of Dante's sons. This was first published by Lord Vernon in sumptuous style, at his own expense, at Florence in 1845. It was written in 1340. In Aug., 1373, the republic of Florence established a professorship of Dante, and Boccaccio was the first lecturer. The salary was 100 gold florins. He began his lectures in the church of San Stefano in Oct., 1373, and continued them till his death in 1375. Other valuable comments are those of Benvenuto da Imola, Boccaccio's pupil and friend; of Landino, one of the successors of Boccaccio, who lectured on Dante from the year 1457; Bernardino Daniello of Lucca, printed at Venice in 1568—this last especially well spoken of by Dr. Carlyle. Merely to name the translations of the "Divine Comedy" would overrun the limits of our article. The best are in England, Germany, and America. In England, Cary's translation of the whole poem is reckoned the standard one; Wright's is also a valuable translation. W. M. Rossetti has published a good translation of the *Hell*, but by far the best

translation is that of Dr. J. A. Carlyle, which unfortunately is only of the *Hell*, though it has been reported that the other parts are to be translated by the same hand. This version is in prose, but prose so strong, so idiomatic, and so choice that it seems to give back the original almost in its own noble music. The introduction and notes, too, are almost models of what such illustrations should be.

In speaking of the comments upon Dante, we should have mentioned the "*Commento Analitico*" of the late Gabriele Rossetti, professor of the Italian language and literature in King's College, London. In this comment, and in his book "*The Antipapal Spirit of Dante*," the author endeavors to prove that Dante's poem was purely allegorical, and intended as a masked attack upon the Romish Church. Professor Rossetti was the father of the W. M. Rossetti mentioned above; and a daughter has recently published a useful guide to the study of the "*Divine Comedy*," called "*A Shadow of Dante*."

In Germany there are excellent translations and several editions of value. Kaunegiesser's translation is praised (3 vols., Leipsic, 1814-21); so is that of A. Kopisch (1 vol., Berlin, 1842). The first is a remarkable piece of work in the measure and rhyme of the original; the second is in blank verse, following the Italian line for line. But by far the best German translation is that by the late King John of Saxony, just dead in 1873. He translated the *Inferno* in 1839; the *Paradise* did not appear until ten years later (1849). His translation appeared with the *nom-de-plume* "Philaethes." The best German edition is that of Karl Witte; it was published in Berlin in 1862.

In America the "*Divina Commedia*" has been translated by H. W. Longfellow, and the *Hell* by Dr. T. W. Parsons, who is intending, however, to translate the whole, and has in fact nearly completed it.

It may not be amiss to mention the fact that illustrations of Dante's poem have been published by John Flaxman, William Blake, and in our own day by Gustave Doré. (See BATINI'S "*Bibliografia Dantesca*," Prato, 2 vols., 1845-48; also "*Bibliographia Dantea ab anno 1865, inchoata*." Edidit Julius Petzholtz, Dresdæ, 1872; LEIGH HUNT, "Stories from the Italian Poets," a useful sketch, but injured by much childish animadversion.) CLARENCE COOK.

**Divination** [Lat. *divinatio*, from *divino*, *divinatum*, to "foretell," to "divine"], the art of foretelling future events by superstitious experiments, etc., by observing the flight of birds, the planets, clouds, and also by the alleged influence of spirits. Among the ancient Romans divination was practised in various forms, and is supposed to have originated among the Etruscans. The Israelites were forbidden by the law of Moses from performing divination of any kind. Among the ancient Greeks divination was extensively practised, but it flourished especially in Chaldaea and Egypt.

**Divine Right (of Kings)**, a term used to express the doctrine, probably of very ancient origin, that a monarch was the immediate representative of Deity, by whom alone he could be held responsible for his actions. It would appear that the idea was never clearly developed and systematically advocated till the early part of the seventeenth century, when the great controversies arose in England between the royalists and the parliamentary or commonwealth parties. The doctrine was maintained by Hobbes, Sir Robert Filmer, and others; it was opposed by Milton and Algernon Sydney.

**Diving Bell**, a hollow, bell-shaped chamber, open at the bottom, used by divers to descend into deep water for the purpose of conducting various subaqueous works or explorations. A kind of kettle is said to have been used by divers in the time of Aristotle. John Taisnier (born 1509) makes in his works the earliest mention of the practical use of the diving bell in Europe. In 1665 it was used to raise portions of the Spanish Armada. Though of clumsy dimensions and imperfect in the manner of supplying air, it was similar in construction to those of the present day. Dr. Halley's plan for supplying fresh air was introduced about 1715. His diving bell consisted of a wooden chamber open at the bottom, where it was loaded with lead to keep it perpendicular in its descent. Light was admitted through glass set in the upper part. Air was supplied by means of a hose attached to casks filled with air and weighted with lead, which were let down lower than the bell. In the year 1779, Smeaton first applied the diving bell to engineering purposes, and in 1788 he contrived to supply it with air by the use of the force-pump. He constructed a diving bell of cast iron, its greatest thickness being at the lower part, that it might not overturn. It sinks by its own weight. In shape it resembles a square chest, and it affords room for two men, being four and a half feet long, the same in height, and three feet wide. This construction of the diving bell gives those within it

no power to raise or sink it. The blows of a hammer on the inside of the bell can be heard by those above the water, and in this manner the divers communicate with the assistants by a series of concerted signals. On account of the cumbrousness of this apparatus; it is little used except for heavy works of subaqueous engineering. For most operations carried on beneath the water a "submarine armor" or diving dress is employed, described in the following article.

**Diving Dress**, the name applied to a waterproof dress worn by divers, enabling them to walk and work under water. An aquatic armor, consisting of a leather dress and a helmet, is described in Schott's "Technica Curiosa," published in 1664. An India-rubber cloth diving dress has been more recently used, with a metal helmet having in front pieces of plate glass. Attached to the helmet are two tubes—one to admit fresh air in the same manner as for the diving bell, the other to carry off the waste air. Lead weights are attached to the diver, enabling him to descend and walk about. Communication can be carried on with those above by means of a cord running between the diver and the attendants. The diving dresses in use at present make the diver independent of any connection with persons above the water. They are elastic and hermetically closed. The diver carries upon his back a reservoir containing air compressed to thirty or forty atmospheres, which is supplied to him for breathing by a self-regulating apparatus at a pressure corresponding to his depth. When he wishes to ascend, he simply inflates his dress from this reservoir. Still other forms of diving dress are in use. (For full information on the subject of this article and the preceding, see PRES. BARNARD'S "Report on the Paris Exposition of 1867.")

**Divining Rod** [Lat. *virgula divina*], a forked branch of wood used for discovering mines, treasures, or water under ground. This use of the divining rod is a superstition of very great antiquity. In Europe it is usually a forked branch of the rowan tree. The favorite in the U. S. appears to be the witch-hazel.

**Divinity**. See THEOLOGY, by PRES. E. G. ROBINSON, D. D., LL.D.

**Divisibility** [from the Lat. *divido, divisum*, to "divide"] is that quality of bodies through which they may be separated into parts. The question whether matter can be infinitely divided or not has often been discussed by philosophers. The subdivision of matter in nature is beyond calculation, nor can it be appreciated by our senses. A tube of glass has been drawn out by the blowpipe to the fineness of a silk fibre, still preserving the form of a tube. In the gilding of buttons five grains of gold, applied as an amalgam with mercury, are allowed to each gross, so that the coating left must amount to the 110,000th part of an inch in thickness. A single grain of blue vitriol will tinge five gallons of water. The divisibility of matter is best illustrated in the case of odors. The particles which impress the sense of smell must fill the whole atmosphere for hundreds of cubic feet, and yet a grain of musk may perfume a large apartment for years with scarcely a sensible loss of weight. (See CHEMISTRY.)

**Division** [Lat. *divisio*, from *divido, divisum*, to "divide"], one of the four fundamental rules of arithmetic, its object being to find out how often one number is contained in another. The dividend is the number to be divided; the divisor, the number of parts into which it is to be divided; and the value of one of these parts is the quotient; or the divisor may be one of these parts, and the quotient the number of them in the dividend. Division is an inverse process, whose effect is annulled by the direct operation of multiplication. It is necessary in dividing a number to have recourse to tentative processes, suggested by previous knowledge, and the accuracy of the procedure may be tested by multiplication.

Division in logic is the enumeration of the species which make up a given genus; thus tree is divided into oak, elm, etc.

DIVISION in military language signifies—1, two or more brigades under a general officer; 2, two guns of a battery of artillery, with their equipment, etc.; 3, two companies of a battalion arranged in column of two companies.

DIVISION in music is the separation of the interval of an octave into a number of lesser intervals.

**Division of Labor**, in political economy, designates the plan by which a mechanic or laborer, instead of finishing the whole of any piece of work, is kept employed upon one special department of that work. Many persons are in some trades employed in turning out a piece of work which would formerly have been finished by one man. The first result of the division of labor is the great increase of production, for ten men, each employed upon a special

branch of work, will turn out more and much better work than the same ten men would do if each began and finished an entire piece of mechanism. It is objected, on the other hand, to the division of labor that it tends to diminish the versatility and excellence of individual workmen; and this objection is not without force. Division of labor is extending with the advance of civilization. Even the learned professions are influenced by it. Lawyers more and more devote themselves to particular departments of their professional work. Medicine is becoming divided into specialties. No one man is equally expert in every branch of a great science like chemistry, some giving their attention, for example, to organic chemistry, some to toxicology, others to analysis, etc. The general result will undoubtedly be beneficial to society.

**Divorce** [Lat. *divortium*, from *di*, "apart," "away," and *vorto*, an old form of *verto*, to "turn"] is the dissolution of a marriage by a court of law, or, in some cases, by a legislative or parliamentary act. In heathen nations divorces have generally taken place at the will of the parties concerned, and even the ancient Romans, during the later period of the republic and under the emperors, allowed the greatest license in this respect. Divorce existed to some extent among the Greeks, more especially at Athens. Easy divorce, which had prevailed among the Hebrews, was restrained and discouraged, though not done away with, by the laws of Moses. Among Christian nations marriage is for the most part looked upon as possessing at once a religious and a civil importance. The Roman Catholic Church denies the possibility of divorce, although there are cases in which, according to the canon law, the union is declared to have been illegal from the first, and in reality never to have existed at all. In English law, the word divorce has been applied to two distinct classes of cases—one where the marriage is by competent authority declared to be void from the beginning; the other, where it is conceded to have been valid in its origin, but for some cause subsequently arising it is dissolved or suspended. The first instance is sometimes termed a case of nullity—the second, a case of dissolution or of judicial separation. Sentences of nullity and of judicial separation, not amounting to dissolution, might take place in the ecclesiastical courts. A marriage could only be dissolved by act of Parliament. In the year 1857 an act was passed establishing the "Court for Divorce and Matrimonial Causes," in which was vested the power previously exercised by the ecclesiastical courts as well as by Parliament. In the U. S., as there are no ecclesiastical courts in the English sense, matrimonial jurisdiction is established by statutes in the different States, enumerating the causes of divorce, which are by no means uniform. These, as a rule, are more numerous in the Western States than in the Eastern. The power to grant divorces is in general exercised by courts having equity jurisdiction, though it exists in the legislature, unless taken away by the State constitution. This is the case in a number of the States, and among them New York.

REVISED BY T. W. DWIGHT.

**Dix** (DOROTHEA LYNDE), an American philanthropist, born at Worcester, Mass., about 1794, was a school-teacher in her youth. She devoted much time to the work of ameliorating the condition and treatment of prisoners, lunatics, and paupers, for which purpose she visited nearly every State of the Union. She efficiently promoted the establishment of lunatic asylums in New York, Pennsylvania, North Carolina, Illinois, Indiana, and other States. She published several books for children and tracts for prisoners. By petitions to Congress she induced that body in 1854 to appropriate 10,000,000 acres of public land in order to endow hospitals for the insane, but President Pierce vetoed the bill, chiefly on the ground that the general government has no constitutional power to make such appropriations. During the war she rendered service in the hospitals near Washington. She published anonymously "The Garland of Flora" (1829), "Prisons and Prison Discipline" (Boston, 1845), and other works.

**Dix** (JOHN ADAMS), LL.D., an American statesman and general, born at Boscawen, N. H., July 24, 1798. He entered the army in 1812, and became a captain in 1825, but soon resigned and studied law. He removed to Coopers-town, N. Y., joined the Democratic party, and was elected secretary of state in 1833. After he had passed several years in private life, he was elected to the Senate of the U. S. in 1845, to fill a vacancy. He advocated in the Senate the principles of the Free-Soil Democrats, whose candidate for governor he was in 1848. He was chairman of the Senate committee on commerce. His term expired in Mar., 1849, and he was then succeeded by Mr. Seward. Having visited various countries of Europe, he published a "Summer in Spain and Florence" (1855). He was secretary of the treasury of the U. S. for two or three months from Jan.

to Mar., 1861, and as such issued this famous order: "If any man attempts to haul down the American flag, shoot him on the spot!" In May, 1861, he became a major-general of volunteers, and in July, 1862, he took command of Fortress Monroe. He was appointed commander of an army corps in Sept., 1862, and ascending York River in June, 1863, cut Gen. Lee's communications. He was minister to France in 1867-68, and chosen president of the Union Pacific R. R. In 1872 he was elected governor of New York by the Republicans. D. at New York City Apr. 21, 1879.

**DIX (MORGAN)**, S. T. D., a son of General J. A. Dix, noticed above, an Episcopalian divine, was born in New York City Nov. 1, 1827, and educated at Columbia College. He became in 1862 rector of Trinity church, New York; he is also president of the standing committee of the diocese of New York, vice-president of the New York Protestant Episcopal public school, and holds various other offices. Among his works are "Commentaries on Romans, Galatians, and Colossians," "Lectures on Pantheism," "Lectures on the Two Estates," a brochure on "Christian Art," and numerous sermons, pamphlets, etc.

**Dix'ie**, a name popularly applied to the Southern States of the Union. The name originated from a well-known song in praise of the charms of "Dixie's Land," a Utopian region so named, it is said, by slaves in honor of a gentleman named Dixie, who was celebrated for his kindness to his servants.

**Dix Island**, 10 miles S. by E. from Rockland, Me., contains about 55 acres, not of land but of rock, the very best of granite. The Treasury building at Washington was built of this stone. The U. S. post-office and court-house building in the City Hall Park, New York, which cost over \$5,000,000, is built of granite obtained on this island; the stones were all fitted and marked for their place, and were made ready before they were sent. There are about 1200 men on the island, besides about 100 women and children.

**Dixon**, in Silveyville township, Solano co., Cal. (see map of California, ref. 4-B, for location of county), on R. R., 21 miles W. by S. of Sacramento. Pop. of township in 1870, 1583; in 1880, 1921.

**Dixon**, a city and R. R. centre, capital of Lee co., Ill. (see map of Illinois, ref. 2-E, for location of county), on Rock River, 98 miles W. of Chicago and 40 miles E. of Clinton, Ia. It has a seminary, and good water-power with flouring-mills, plough and other factories. Pop. in 1870, 4055; in 1880, 3658.

**Dixon**, capital of Webster co., Ky. (see map of Kentucky, ref. 4-D, for location of county), about 62 miles E. N. E. of Paducah. Pop. in 1870, 330; in 1880, 515.

**Dixon (JAMES)**, D. D., an English Methodist minister distinguished as a preacher and thinker. He occupied important pulpits in his denomination, was the president of its conference in 1841, and its delegate to the American Methodist General Conference in 1848. He wrote, besides other works, "Methodism, its Origin, Economy, and Present Position," and a "Tour in America." Died in 1872.

**Dixon (JAMES)**, an American statesman, born at Enfield, Conn., Aug. 5, 1814, graduated at Williams College in 1834, became a lawyer, was a member of Congress from Connecticut (1845-49), and U. S. Senator (1857-69). Died at Hartford, Conn., Mar. 27, 1873.

**Dixon (JOSEPH)**, an eminent inventor, born about 1798, was a printer in his youth, and afterwards a wood-engraver. He made important improvements in photography, lithography, banknote-printing, lens-grinding, steel-refining, etc. Died at Jersey City, N. J., June 14, 1869.

**Dixon (WILLIAM HEPWORTH)**, an English author and critic, born in Yorkshire June 30, 1821, of dissenting parents, commenced life in a counting-house. He settled in London in 1846, and contributed to the "Daily News." His articles on "London Prisons," which subsequently appeared, revised and enlarged, in book form, in 1850, were the precursors of Mayhew's inquiries into the condition of the London poor. In 1849 he published a "Life of John Howard," which was successful. His reputation was established by "William Penn, an Historical Biography" (1851), in which he set right the mistaken animadversions of Macaulay on the character of the philanthropical Quaker. He became the chief editor of the "Athenæum" in 1853, and vacated the editorial chair in 1869. Among his other works are a "Personal History of Lord Bacon" (1861), "The Holy Land" (1865), "New America" (1867), "Spiritual Wives" (1868), "Her Majesty's Tower," "Free Russia" (2 vols., 1870). D. Dec. 27, 1879.

**Dixon's Entrance**, a strait on the W. coast of North America, is 100 miles long. It separates Queen Charlotte Island from the Prince of Wales Archipelago.

**Dixwell (JOHN)**, one of the famous English regicides,

was a wealthy gentleman of Folkestone, Kent, born about 1608. He was an active Parliamentarian, and a colonel under Cromwell. Having been a member of the high court which condemned Charles I., he fled, after the Restoration, to Germany, but finally became a resident of New Haven colony in New England, where he died Mar. 18, 1689.

**Djemil Pasha**, or **Jemeel Pasha**, a Turkish statesman, born at Constantinople in 1827, was the eldest son of the late Resheed Pasha. He was educated at Paris and London, and was for many years a public officer, especially in diplomatic affairs. In 1866 he was appointed ambassador to Paris. D. Sept. 22, 1872.

**Dmit'rof**, a town of Russia, in the government of Moscow, 40 miles N. of Moscow. It has seven churches, one college, and manufactures of cotton and silk goods. Pop. 8042.

**Dmitrovsk'**, a town in Russia, in the government of Orel, 28 miles S. W. of Orel. It has various manufactures. Pop. 7603.

**Dniep'er** [the *Borysthenes* of the Greeks, the *Danapris* of the Romans, the *Uzi* of the Turks, the *Elice* of Visconti's map (1381), the *Lerene* of Contarini (1437)], a river of Russia, and, next to the Volga and the Danube, the greatest and most important river of Europe, rises in the government of Smolensk, at the foot of the Valdai Hills, near the sources of the Volga and the Dwina, in lat. 55° 52' N. It flows nearly southward to Kief, below which its direction is south-eastward to Ekaterinoslaf. It afterwards runs south-westward, and enters the Black Sea on the N. side. Its length, including windings, is about 1170 miles. The greater part of it is navigable, but numerous rocky rapids occur below Ekaterinoslaf, where the river has to make its way through the granitic offshoots of the Carpathian Mountains. These obstructions have been partly removed by blasting, partly by the construction of canals. During the last years, however, navigation has been much impeded because the river has been unusually low, but it is expected that the draining of the Pinsk marshes will remedy the evil. At Kief the river is free of ice 267 days in the year; at Ekaterinoslaf, 274; and at Kherson, 280. The fisheries are insignificant in the upper part of the river, but very important in the estuary, where they employ between 2000 and 3000 persons. The Borysthenes was known to the ancient Greeks, who regarded it as the greatest river of the globe, next to the Nile. Its principal tributaries are the Berezina, the Pripiet, the Merea, the Sozh, the Borona, and the Desna, all of which are navigable.

**Dnies'ter** (anc. *Tyras*, afterwards *Danaster*), a river of Europe, rises in the Carpathian Mountains in Galicia, and flows south-eastward into Russia. It forms the boundary between Bessarabia on the right and Podolia and Kherson on the left, and enters the Black Sea near Akerman, about 30 miles S. of Odessa. Its total length is about 760 miles. The chief towns on its banks are Mohilef, Bender, and Akerman. The navigation of it is difficult. Besides frequent shallows, the Yampols rapids, caused by a granitic spur of the Carpathian Mountains, obstruct the course. For ordinary river-craft the passage of these rapids has been made possible, though not free from danger, by an artificial channel. There are two periodical floods in the river, one in February-March and the other in the middle of June. The former is the most sudden and dangerous. It raises the level of the water 20 feet, and pours along so violent a current that large blocks of stone are drifted from their position, gardens and vineyards are submerged toward the mouth of the river, and the surface of the stream measures from 4 to 6 miles wide. The latter is of a more manageable character.

**Doab'** (i. e. "two waters"), a name applied in Hindostan to a tract between two rivers, and especially to that between the Ganges and the Jumna. This doab extends from Allahâbâd to the base of the Himalayas, a distance of 500 miles or more.

**Doane (GEORGE WASHINGTON)**, D. D., LL.D., an American bishop and poet, born at Trenton, N. J., May 27, 1799. He graduated at Union College in 1818, was ordained as an Episcopalian clergyman in 1821, preached in New York City, and was chosen bishop of New Jersey in 1832. He published a volume of poems (1824) and several works on theology. Died April 27, 1859.—One of his sons, WILLIAM CROSWELL DOANE, was on Feb. 2, 1869, consecrated bishop of Albany.—A second son, GEORGE H. DOANE, is a Roman Catholic priest, and was in 1873 appointed vicar-general of the diocese of Newark.

**Dob'bin (JAMES COCHRANE)**, an American politician, born at Fayetteville, N. C., in 1814. He became a member of Congress in 1845, and was appointed secretary of the navy by President Pierce in 1853. Died Aug. 4, 1857.

**Dobbs Ferry**. See APPENDIX.

**Dobell'** (SYDNEY), an English poet, born at Peckham Rye in 1824, was a son of a wine-merchant. He began his literary career by "The Roman," a poem (1850). Among his other works are "Raldar" (1854), "England in Time of War" (1856), and "England's Day" (1871). His poems exhibit a mixture of the philosophical and poetical spirit. Died Aug., 1874.

**Döbeln**, a town of Saxony, on the Mulde, a railway station, 36 miles S. E. of Leipsic. It has a hospital, a realschule, and manufactures. Pop. in 1880, 11,802.

**Do'brizhoffer** (MARTIN), a Jesuit, born at Gratz, in Styria, in 1717. He went as a missionary to Paraguay in 1749, and published at Vienna in Latin a "History of the Abipones" (3 vols., 1784), which was translated into English by Sara Coleridge. Died July 17, 1791.

**Dobrow'ski** (JOSEPH), a Bohemian author and philologist, born near Raab Aug. 17, 1753. He was liberally educated, joined the Jesuits, and distinguished himself by his researches into the language and literature of the Slavonic nations. His most important works are a "Grammar of the Bohemian Language," a "History of the Bohemian Language and Literature" (1792), and a "German and Bohemian Dictionary" (2 vols., 1802-21). But he has also published a number of minor essays. Died Jan. 6, 1829.

**Dobrud'scha**, or **Dobrujda**, a name given to the N. E. portion of Bulgaria, which is separated from Moldavia and Wallachia by the Danube. It is bounded on the E. by the Black Sea.

**Dob'son**, capital of Surrey co., N. C. (see map of North Carolina, ref. 2-E, for location of county), about 55 miles W. N. W. of Greensborough. Pop. of Dobson township in 1870, 1254; in 1880, 1747.

**Dobson** (WILLIAM), an English painter of portraits and history, was born in London in 1610. He succeeded Van Dyck as court-painter to Charles I. He was reputed the best English portrait-painter of his time. Died in 1646.

**Do'ce, Rio** (i. e. "sweet river"), a river of Brazil, rises in Minas Geraes, flows north-eastward, and enters the Atlantic 60 miles N. of Victoria. Length, including windings, about 500 miles. Its navigation is obstructed by rapids.

**Docetæ** [from the Gr. *dokein*, "to appear," to "seem"], an heretical sect which arose in the first century, denying the incarnation of God in Christ. Some of the Docetæ affirmed the body of Christ to be a mere deceptive appearance; others only denied its fleshly character. Docetism was a form of Gnosticism (which see).

**Docimacy** [Fr. *docimasia*; Gr. *δοκιμασία*, from *δοκιμάω*, to "test," to "examine" or "prove"], or **Docimastic Art**, the art of assaying minerals or ores with a view of determining the quantity of metal they contain.

**Dock**, a perennial herbaceous plant of the order Polygonaceæ and genus *Rumex*, found chiefly in temperate cli-

mates. They have large ovate or lanceolate leaves, and greenish flowers in panicles. They increase rapidly from the seed, and having long tap-roots become very troublesome as weeds. The roots of several species are valued in medicine for their astringent properties; they are also used in dyeing. The yellow dock (*Rumex crispus*) is esteemed in the U. S. as an alternative.

**Dockery** (Gen. ALFRED), born in North Carolina Dec. 11, 1791, was many years a prominent Whig politician and office-holder in his native State, from which he was elected to Congress in 1845 and 1851. He opposed the Democratic party after the close of the civil war. Died in Richmond co., N. C., Dec. 4, 1873.

**Dock'et** [from *dock*, to "cut off"], a summary, an abridged entry of a proceeding on a piece of paper or parchment. Exemplifications of decrees in chancery, flats in bankruptcy, and other instruments are thus *docketed* for purposes of reference. The word *docket* is frequently employed to designate an abridged entry in a book, as in the case of judgments of courts, in order to make them a lien upon land. *Docket* also denotes a list or calendar of causes ready for hearing or trial, prepared for the use of courts.

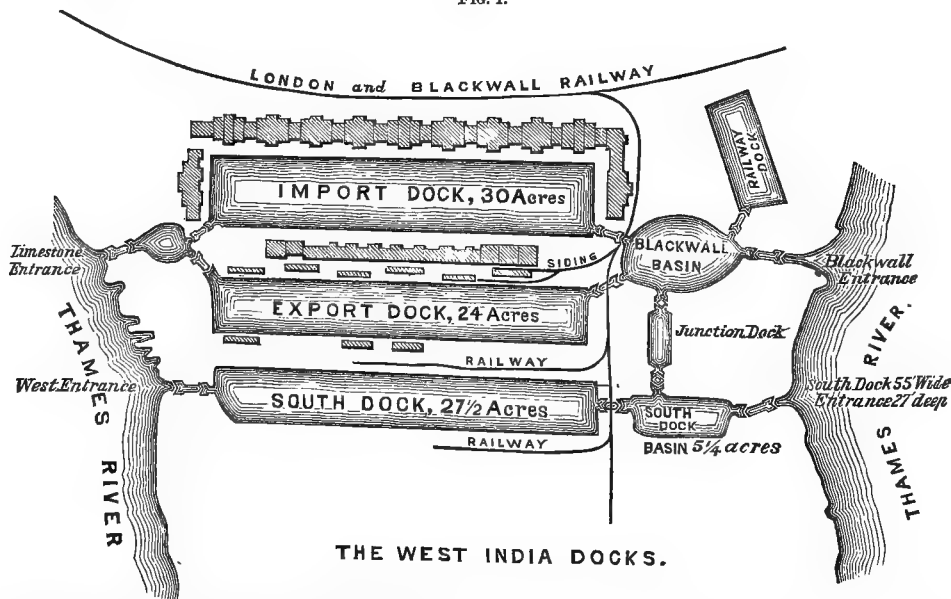
**Docks** are artificial basins for the reception of ships, and are of two kinds, wet and dry. A *wet dock* is a large basin in which the water is kept at a certain level by means of walls, so as to be unaffected by tidal changes, in order to facilitate the loading and unloading of cargoes. A *dry dock* is intended for the repairing and examination of ships, the water, after the entrance of the vessel, being removed by pumps or other means.

In ports where vessels would be naturally much exposed during rough weather, or where the changes in the tide are very great, the necessity of secure and well-sheltered docks or artificial basins, in which ships may be safely moored and kept at one level, is especially manifest. In the northern parts of Europe the rise and fall of the tides are so great that every port which has any pretensions to a first-class mercantile harbor is necessarily supplied with one or more wet docks; at most of the ports of England, and especially at those of Liverpool and London, docks have been constructed on a truly magnificent scale.

Notwithstanding the obvious importance of wet docks to the vast trade of London, it was not until a few years previous to the beginning of the nineteenth century that plans for docks on anything like an adequate scale were, at the request of a parliamentary committee, submitted by Messrs. Telford and Douglas, among other plans for the improvement of the port of London. The act authorizing the construction of the West India Docks was passed in 1799; work was begun in Feb., 1800, and in 1802 they were so far completed that a homeward-bound vessel entered them.

These, the first docks of London, with their entrances

FIG. 1.



and basins, extend across the isthmus (at low water) of the island formed by the Thames on the Middlesex side of the river, and called the "Isle of Dogs." They originally consisted of an Import Dock containing an area of 30 acres,

and an Export Dock with an area of 24 acres; connecting at both ends by basins and locks with the Thames. They were constructed of brickwork and timber. There was a canal on the S. side of the docks which has recently been

converted into a new dock called the South Dock. The retaining walls of this new dock, which is one of the finest basins of the West India Docks, are 34 feet 10½ inches in height from the bottom of the dock to the top of the coping, where the width is 11½ feet, spreading downward with a batter of 1 in 24; the face and back of the wall are of brick, the former 3 feet 4½ inches, the latter 18 inches thick, connected by vertical transverse walls 2 feet 3 inches in thickness, and placed 10 feet apart, the pockets thus formed being filled with concrete; upon a foundation of which, 3½ feet in thickness, the wall stands. The bottom of the dock is covered throughout with a layer of puddle 18 inches in thickness. On the N. side are sixteen jetties, projecting into the dock, of timber, 130 feet in length, furnishing accommodations for thirty-two vessels, and opposite each jetty is a buoy for mooring vessels. The area of the South Dock is 27½ acres.

The general plan of these docks, with their entrances and connections, entrance-basins, locks, warehouses, railway connections, etc., is shown in the figure. The cost of the South Dock, with the machinery, railway extension, dock-basins, warehouses, etc., was \$2,850,000. It will be seen from the plan that an incoming vessel can pass directly into the Import Dock, unload her cargo, and then, without being locked out into the Thames, when the tide permits may pass into the Export Dock to receive her outward-bound cargo.

The West India Docks proved a very successful undertaking; all West India vessels frequenting the Thames were, for twenty years after their completion, obliged to use them. After declaring annually a dividend of 10 per cent. they had in 1819 an accumulated fund of \$2,500,000. Since then their monopoly has expired, and their dock-rates have been reduced from time to time, so that their profit has been greatly diminished.

The East India Docks, which are a short distance to the eastward of the above, were at first intended exclusively for ships in the East India trade, but are now open to vessels from all parts. Their area is 27 acres, exclusive of entrance-basins, and their depth of water is never less than 23 feet. They belong now to the same company as the West India Docks, and have attached to them magnificent warehouses for tea, indigo, drugs, spices, etc.

The London, the St. Katherine, and the Victoria London Docks, also on the N. side of the Thames, are under the control of one company. The London Docks have a water-area of 34 acres, the St. Katherine Docks a water-area of 11 acres, and the Victoria London Docks, situated immediately below the East India Docks, have an area of 74 acres in the inner dock alone, exclusive of 16 acres in the tidal basin. The depth of water in the inner dock varies from 24½ feet to 26½ feet. The entrance to this dock from the Thames is by means of a lock 320 feet in length, 80 feet in width, and with a depth of water on the sill of 28 feet. The jetties, with the sides of the dock and of the basin, provide a length available for quay-room of nearly 3 miles.

On the Isle of Dogs, S. of the West India Docks, are the Millwall Docks, recently constructed, and comprising two basins, one having a water-area of 25 acres, the other of 10½ acres. The Surrey Commercial Docks, intended for ships with bulky commodities, are upon the S. side of the Thames, and have a water-area of 176 acres.

The warehouses belonging to the different dock establishments are of immense size; that of the London Docks, intended for the storage of tobacco, is one of the largest, best-arranged, and finest buildings of its kind in the world. It will contain 24,000 hogsheads of tobacco, and covers nearly 5 acres; the vaults under this and the other warehouses of these docks have an area of 18½ acres of storage space. On five of the jetties of the Victoria Dock are extensive warehouses, and on the N. side of the dock are several large ones, one of which has an area of 4 acres of flooring. In some cases the warehouses are built close to the water's edge, so that goods may be hoisted into them direct from the hold of the vessel; while generally railway connections are made with the dock, so that goods may be taken to any part of the kingdom without change of carriage. The docks are also provided with cranes and other appliances, worked by steam or hydraulic power, for the rapid transfer of cargoes.

The dock establishments of Liverpool are not excelled in extent and arrangement by those of any port throughout the world. Though the number of vessels belonging to this port is less than that of London, yet the fact that they cannot lie with safety or ease in the Mersey on account of its rapid current and exposed situation, and the great rise and fall of the tides (21 feet at neap and 31 feet at spring tides), require the dock accommodations to be of sufficient extent for the entire trade of the port; while at London the Thames affords a secure and convenient berth for a great number of vessels.

The Liverpool docks have, on the side next the river, a sea-wall of 5 miles in extent, which, when considered in connection with the obstacles to be overcome, is one of the greatest works of modern times. In most cases docks are formed by excavations made on the bank of the river, but at Liverpool they have been formed in the river itself by enclosing, within the wall referred to, a portion of the beach of the Mersey, and afterwards excavating the part thus reclaimed to a proper depth. The wall is 11 feet in thickness and 40 feet in height from the foundation, the more modern parts being faced with granite. There are between thirty and forty docks, having a water-area of 239 acres, exclusive of 19 acres of entrance-basins. The quay-space is over 18 miles. Most of the docks have a separate entrance from the Mersey, and communicate with each other, so that ships may pass from one to another without the necessity of being locked out into the river and back again into the docks. They are also connected with the different railways entering the town, and by a series of locks with the Leeds and Liverpool Canal.

The whole of this immense dock estate is vested in the Mersey Docks and Harbor Board, who enforce strict rules for the maintenance of good order and prevention of fire and depredation. Every precaution is taken to prevent the injury of the docks from the accumulation of mud, by the use of steam dredging-machines. The income of the Mersey Docks and Harbor Board for 1867 was \$4,430,000. The revenue of this board, after paying expenses and interest on money borrowed, is applied to the reduction of the dock rates.

The present importance of the port of Liverpool may be said to be chiefly owing to these magnificent docks; for, though it is the emporium of a district rapidly increasing in manufactures and population, the advantages given to commerce and navigation by them have brought to it the greater part of its business and wealth.

Birkenhead, on the Mersey, directly opposite to Liverpool, has a water-area of 165 acres of docks and subsidiary basins; among them are two large docks, one of 52, the other of 59 acres. The quay-space is between 10 and 11 miles in length. Here are also warehouses with their appurtenances, planned on the most approved principles, for loading and unloading ships, safe storage of cargoes, etc. At Bristol about three miles of the old channel of the river was converted into a dock, about 55 acres of which are available for large vessels. Hull has five docks with a water-area of 49½ acres. Grimsby, Lincoln county, has, in addition to the old works, a new dock of 25 acres, with a tidal basin of 15 acres; the new dock is entered from the basin by two locks of massive masonry, furnished with double sets of gates for ebb and flood tides, the largest of which is constructed to admit the largest class of war-steamer. At Southampton there are docks surrounded by quays, and bonded warehouses, and provided with powerful shears for shifting boilers, heavy machinery, masts, etc. Among other ports of the British Islands which possess large docks may be named Glasgow, Leith, Newcastle-on-Tyne, Tyne, Cardiff, Belfast, and many more.

At Havre, where the rise of the tides is from 20 to 27 feet, there are capacious docks. At Antwerp, where in 1803 Napoleon I., who intended to make it a great naval establishment, undertook the construction of docks on a grand scale, new and convenient ones with warehouses have been opened. At Bremen and Amsterdam docks have been constructed and recently improved.

To give an idea of the importance attached in England to dock accommodations may be mentioned the Barrow Docks at Barrow-in-Furness, a town of 20,000 inhabitants, on the sea-coast opposite the Isle of Man. These docks, opened in 1867, comprise 1½ miles in length of stone quays and 100 acres of wharf-area. The entrance-basin is closed by gates in the usual manner, while the dock is closed by a caisson placed across the entrance and held by a groove in the masonry on both sides. The caisson, when filled with water to the higher water-level, remains standing upon the dock-sill and closes the passage, but when water is allowed to escape from the caisson, so as to fall to the lower level, it floats, and can be drawn to one side, so as to leave the entrance clear. The water maintained in the dock is 22 feet above the dock-sill, the tide outside varying from 25½ feet at spring tides to 18 feet at neap tides.

The new Hendon Dock at Sunderland has been constructed on land wholly reclaimed from the sea; and from the exposed character of the coast, great depth below the surrounding works, the great head of water constantly standing in the old docks in close proximity to the new works, and the exceedingly porous nature of the strata, the difficulties presented to the engineer were of unusual magnitude. The work was enclosed in sections, with barriers formed of timber planking and piling filled with well-puddled clay, and protected with heavy limestone blocks.



The rock was porous and crumbling, and the greatest care was necessary to prevent the water from penetrating and impoverishing the masonry before it set. In the case of the entrances the whole surface of the rock was covered with a watertight platform of brickwork set in the best Roman cement, filling up every crevice in the rock; and upon this the masonry of the walls and sills was laid.

This new dock is 11 acres in extent; the entrance is provided with two pairs of gates, and is crossed by a wrought-iron railway bridge, balanced and turned upon a water-centre, the usual rollers and turntable being entirely dispensed with. The gates and sluices are worked by hydraulic machinery, and there are hydraulic pumps to remove the water between the two pairs of gates, so as to maintain a head of water upon the outer or sea gates during stormy weather, and thus prevent their movement. The entrance is further protected at such periods by booms reaching from side to side, which, by means of a crane fixed on the pier-heads, are dropped into grooves in the masonry fitted for their reception. The walls of the entrance are faced with large blocks of freestone, ashlar masonry, none of the courses of which are less than 2 feet in thickness, backed up by rubble masonry composed of large flat-bedded stones built in the best blue lias *pozzuolana*. The width of the entrance is 60 feet, and the depth of water above the sills at high water of spring tides is 26½ feet.

In many ports throughout the world—such, for example, as that of New York, where the harbor is naturally protected, and as also in the Mediterranean, where the rise and fall of the tides is so small as not to obstruct the loading and unloading of ships—wet docks are not an absolute necessity to commerce, though there is no doubt that the excellent appendages which are attached to them, such as the wharf-room, the magnificent quays and warehouses, the railway connections, cranes, etc. of the docks of Liverpool and London, and, by no means least of all, the excellent police arrangements for effecting order and safety from fire and depredation, would most certainly greatly promote the commercial prosperity of any port.

But, though in many cases wet docks may be dispensed with, all first-class ports need dry docks for the examination and repair of those parts of a ship which are usually immersed in water. Dry docks may be separated into two classes—the *stationary dry dock*, to which the name *graving dock* is generally applied; and the *floating dock*, of which there are several varieties, to be described hereafter.

In ancient times, where there was no rise and fall of the tides, vessels were hauled up on the beach and “careened;” where the tides permitted they were grounded at high water, so as to be exposed at low. Sometimes the heaving-down plan was adopted; this was to attach ropes to the heads of the masts of the vessel and to the mooring rings of a quay, or to the deck of another vessel, so as to haul the ship over into a nearly horizontal position on the water, the ballast or weights being removed or shifted. It was while undergoing this very dangerous operation that the Royal George foundered at Spithead in 1782, with 600 persons on board.

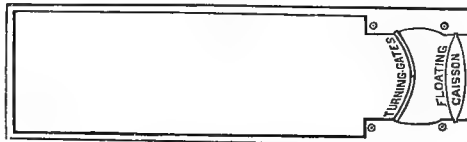
This method was supplanted by the *graving dock*, generally constructed of stone, though sometimes of timber, and usually of such dimensions as to contain only one vessel at a time. The sides are formed in steps or altars, so that the form of the dock is somewhat similar to that of the vessel which it is to contain, but sufficient space is left around it to enable the workmen to get at every part of the bottom of the vessel, and to afford sufficient light for their work. The entrance is closed by gates, which open sideways, like a lock or fall, upon the bed of the entrance, or by caissons; the latter, since the introduction of iron for shipbuilding purposes admits of their being made of that material, are almost universally adopted for large docks, and have the advantage of affording the means of retaining the water inside the dock, as well as of keeping it out; which is of importance, where the tide is ebbing rapidly, in allowing time to adjust the vessel before it settles down on the keel-blocks. The vessel is floated into the dock at high water, the gates closed, the sluices opened, and the water allowed to run out with the ebb of the tide, or, where the fall of the tide will not permit, is pumped out, leaving the dock perfectly dry; the vessel being supported on timber struts and shores resting upon the steps already mentioned as forming the sides of the dock.

The U. S. naval graving dock at the Brooklyn navy-yard is, in its dimensions and workmanship, one of the finest in the world. It also possesses many features and improvements that at the time of its construction were unequalled by any other graving dock. Owing to the nature of the soil selected for its site, the excavation for the foundation was attended with many obstacles, and afforded opportunity for the display of great engineering skill. This

lower soil was an almost impalpable quicksand, becoming semi-fluid when saturated with water; and before the required level for the foundation had been reached springs coming from a great depth burst up through it, rendering necessary measures to overcome it. This was finally done by driving piles into the cavities formed by the springs, on which a flooring of plank was laid; upon this bricks were laid in hydraulic cement, and upon the brick floor concrete masonry; the whole being done with the greatest despatch; vent-holes for the water were left until the permanent foundations were completed, but in this manner the flow of sand was checked.

The floor, from 4 feet to 6 feet in depth, is an inverted stone arch, to strengthen it against the pressure of water from below. The masonry foundations are 400 feet in length and 120 feet in breadth. The facing of the masonry is of granite, the side walls being laid up with English bond—that is, alternate courses of headers and stretchers; the courses are generally 2 feet thick, a few near the bottom being 27 inches. The facing stones, averaging 6000 pounds in weight, were backed up with a course of scabbled stone, the interior and rear of the walls being laid up with coursed rubble. The mitre-sills and the keystone are massive granite blocks. The whole was laid in mortar made of the best hydraulic cement and sand. The gates, of iron, are supported on friction rollers, and, with the machinery for turning them, weigh near 200 tons. The caisson is an iron vessel, with keel and stems made to fit the grooves in the masonry at the entrance of the dock. It is 50 feet in length at the keel, and 68 feet 8 inches in length at the rail; its breadth at the centre of the top is 16 feet, at the keel 7 feet. The grooves in the masonry, in which the stems and keel of the caisson fit, are 26 inches in width and 12 inches in depth, from the top to the bottom of the side walls and in the floor. By admitting water into the chambers of the caisson it settles into these grooves and closes the entrance; it is removed by pumping out sufficient water to float it clear of the grooves. Its weight is nearly 218 tons, exclusive of ballast. It is used when greater length of dock may be required, when the turning-gates need repair, or to partially relieve the strain upon them. The engine and pumps are of very large capacity, and will relieve the dock of water in about two hours. In order that the bottom may be dry and free from water, there is a slight inclination in the bottom of the dock, and a gutter is car-

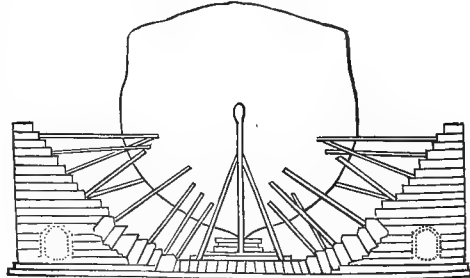
FIG. 2.



Plan of Dry Dock at Brooklyn Navy-yard.

ried across at the lower end, leading into a culvert which passes entirely around the dock, from which the water is constantly pumped. Several flights of steps are provided in the different parts of the dock for the use of the workmen, by which they are enabled to reach any part of the vessel with great facility. The main chamber of the dock is 286 feet in length and 30 feet in breadth at the bottom; 307 feet in length and 98 feet in breadth at the top; by using the caisson an additional length of 52 feet may be

FIG. 3.



Section of Dry Dock at Brooklyn Navy-yard.

obtained, giving a total length of 359 feet. The height of the walls is 36 feet, and the sills are 26 feet below high water. The total cost, including all machinery and appurtenances, was about \$2,000,000; the work was completed in 1851.

The naval graving dock at Boston, built of granite and completed in 1833, is 253 feet in length and 86 feet in width inside the chamber; the turning-gates and the caisson are

of timber and composition fastened with copper bolts; the caisson being 60 feet in length, 30 feet in height, and 16 feet in width amidships. The total cost of this dock was about \$700,000. The naval graving dock at Norfolk is almost precisely similar in style and dimensions to that at Boston, and cost about \$950,000.

The cost of the construction of graving docks depends greatly upon the situation selected. In some places they are simple to construct and maintain, as at Birkenhead, where they are hewn out of the solid rock, a red sandstone, which is sufficiently hard and homogeneous to support the heavy weights, and at the same time soft enough to be worked. At this place (Birkenhead) five graving docks, having an aggregate length of 1690 feet, were hewn out of the rock at a cost of \$430,000. The materials of which the docks are constructed also affect the cost; most of those belonging to the governments of different countries being made of finely-dressed ashlar masonry in a manner involving a considerable expense, while many of the most successful docks on the Thames have been built of timber and brick at a cost which is trifling by comparison. A heavy item of expense in those places where the fall of the tide is not sufficient to empty the dock is the cost of the large engines and pumps needed to remove the water.

In addition to her magnificent wet docks, Liverpool possesses a large number of graving docks, there being on the side of the Mersey on which that city is situated no less than sixteen, having an aggregate length of over 1½ miles; of these, the Sandon Graving Docks, six in number, are each 540 feet in length at the bottom, with entrances of from 45 feet to 70 feet in width. On the Birkenhead side are six docks, of which four belong to Laird Brothers.

Among the largest graving docks are the double dock at Brest, 721 feet in length, 92 feet in width, with a depth of 55 feet of water over the sill; and the double dock at Portsmouth, England, 644 feet in length by 80 feet in breadth. Portsmouth has besides nine single graving docks, the largest of which is 406 feet in length at the bottom. Devonport has five, Cherbourg eight, Sheerness five, Toulon six, Brest four. There are several on the Thames, and many other ports have one or more. Southampton has three; one of which, the Eastern Dock, is 425 feet in length, with a width of entrance of 80 feet, made in 1854 of brickwork with Portland copings, and is stated to have cost \$260,000.

At the Southampton Docks, 692 vessels were docked during the seven years ending in 1867, average tonnage being 1400 tons per ship. The cost of docking, including

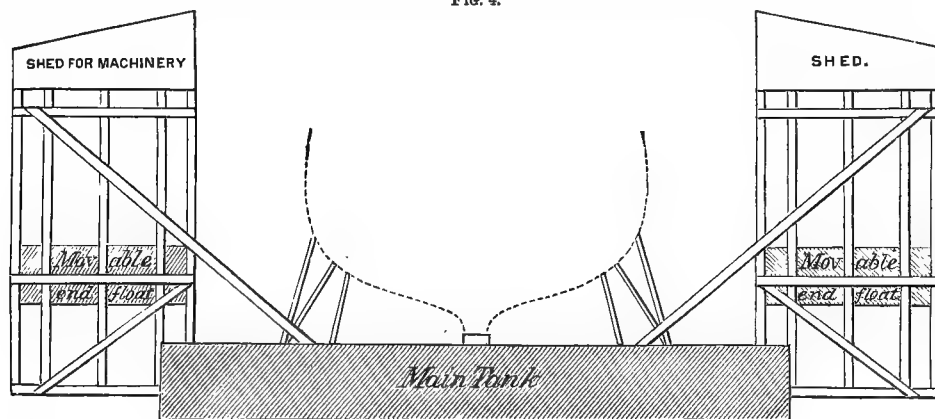
pumping, labor, and repairs to the docks, was, on an average, \$65 per ship, while the average sum paid for each vessel, for docking and for the use of the dock during the time it remained in it, was \$275. Total amount earned during the seven years, about \$192,000; expenses, \$39,000. The capital of the Graving Dock Establishment at Southampton has been taken at \$750,000, but this sum is considerably over the cost of the docks. As regards speed of working at Southampton, on one occasion three large ships of more than 2000 tons required to be docked in a hurry; two were docked and undocked, and the third docked and placed on the blocks, between daylight and dark.

One of the largest and deepest single graving docks is the Somerset Dock, constructed by the British government at Malta. The length on the floor is 428 feet, at the coping line 468 feet; the width of the floor is 42½ feet, and between the copings the width is 104 feet; the width of the entrance is 80 feet; the length of the entrance from the caisson in the centre is 256 feet; the depth of the entrance and floor is 33½ feet below the average sea-level. The caisson is 83 feet in length on the dock, 41 feet in height, and 12½ feet in width. The upper deck forms a roadway between the two sides of the dock-entrance, and the caisson is arranged to go into a camber when the entrance is to be opened. The caisson differs from those previously constructed in the fact that it is worked by steam, and not by hand. In excavating for this dock it was found necessary to cut a tunnel through the solid rock 230 feet in length, for the purpose of removing the excavated material. During the work fissures were met with discharging into the excavation large quantities of water charged with black mud, which gave great trouble. The inner or exposed lining was formed of ashlar masonry of the hard crystalline limestone of the Maltese Islands; the backing was from an inferior quality of the same rock, some of which came from the excavation. There being but little change in the tides, the dock is emptied by large pumps worked by two powerful engines. The engines and pumps are placed in a cast-iron tank sunk in the rock.

Of the floating dock there are several distinct varieties: the sectional dock, such as is in use in the Philadelphia and San Francisco navy-yards; the *Gilbert balance dock*, in use in the Portsmouth and Pensacola navy-yards; the *iron floating dock* of the Bermuda dock pattern; *G. B. Rennie's patent iron floating dock*, of which the Cartagena dock is an example; and *Edwin Clark's hydraulic lift dock*, in use in the Victoria London Docks.

The sectional floating dock in the Philadelphia navy-

FIG. 4.



Sectional Floating Dock.

yard is made in nine separate and independent sections, differing only in their widths. Each section consists of a pontoon or tank, watertight, 105 feet in length, 30 or 32 feet in width, and 11 feet in depth; two end-frames, and two end-floats. Together, the sections form a floor of over 300 feet in length and 105 feet in width. At each end of each section is an open frame in which is a float, connected with the four posts of the framework, which is raised and lowered by machinery—raised to assist in sinking the main tank to the depth required, or lowered into the water to give it greater buoyancy.

When the dock is to be used a sufficient number of these sections are joined together to give the length required, and firmly connected by beams so arranged that they may be placed from 6 inches to 6 feet apart, though they are not generally farther apart than 3 feet. They are then connected by means of shafting with the engines, of which there are four. At each end of each section are three

pumps. When the vessel is ready to be docked the main tanks or pontoons are filled with water, the end-floats raised by machinery upon the end-frames until the dock is sunk to the proper depth. The ship is then hauled over the dock, and the end-floats depressed into the water until its keel has a bearing upon the keel-blocks; the shores or supports for the vessel are then adjusted, and the water is pumped from the tanks, the end-floats being used, if necessary, to preserve the proper equilibrium.

This dock, as well as Gilbert's balance dock, is used in connection with a basin and railways. The basin in the Philadelphia navy-yard is 350 feet in length by 226 feet in width. The floor, of granite 10 inches in thickness, is laid upon a pile and concrete foundation, and is perfectly level; on three sides of this floor are granite walls 14½ feet in height. The "bed-ways" are two, and each consists of three "ways"—one to support the keel, and two to support the bilges; each is 350 feet in length and 26 feet in

width. The basin and "ways" are used thus: the dock, with the ship upon it, drawing from 8 feet to 10 feet of water, is hauled into the basin by means of capstans; the line of the ship's keel is brought into the line of the "bed-ways," water is admitted to the tanks, and the dock settled firmly upon the stone platform of the basin. The vessel, by means of hydraulic power and a cradle, is slid upon the bed-ways, and the dock may be immediately used for another vessel. The dock without the basin may be used for repairing a vessel. This dock was completed in 1851 at a total cost of about \$814,000. Its lifting power is near 6000 tons.

The California sectional dock is composed of ten sections, 100 feet in length, 32 feet in breadth, and 11 feet 9 inches in depth.

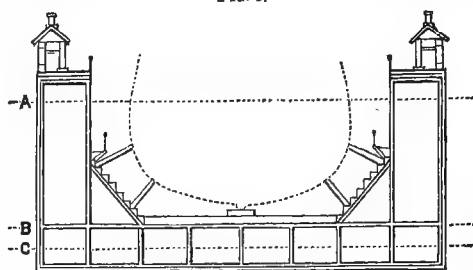
The *balance floating dock* was invented by Mr. John S. Gilbert of New York City. Like the sectional dock, it is constructed of timber, and consists of a pontoon bottom with two side walls, possessing sufficient displacement to carry the whole weight of the dock and the vessel to be raised. The side walls are hollow and of considerable width, serving, like the floats in the sectional dock, to preserve its stability in rising and sinking. The outside of these walls is vertical, while the inside is sloping, so as to conform to a certain extent to the shape of the ship. Port-holes are made in the walls for ventilation. The walls also afford the means of shoring up the ship, as in a stone dock; on the top are the engine-house, pumps, and working platform. There are sometimes gates at the ends for enclosing the dock, which are used only when vessels of great weight are to be lifted. Of this description is the Portsmouth navy-yard dock, which is 350 feet in length, 38 feet in depth, and 90 feet in inside width. This dock, with the basin and railways, cost \$733,000. The Pensacola dock, which is similar, cost \$923,000. There are also balance docks at New York, Charleston, Savannah, Mobile, and New Orleans. Mr. Gilbert constructed a balance dock for the Austrian government at Pola, a naval station on the Adriatic, with a width inside of 211½ feet, and a length of 311½ feet. There are also a basin and two railways for hauling vessels upon, each of 700 feet in length.

The *iron Bermuda dock* (or iron camel, as it is sometimes called) is made of wrought iron; the transverse section is U-shaped; the bottom and sides are hollow, and 20 feet through; the ends are closed by caissons 25½ feet through; the length of the dock over all is 381 feet, between the caissons, 330 feet; breadth over all, 124 feet, inside of the dock, 84 feet; depth over all, 72 feet. It is divided into six longitudinal compartments or chambers, watertight and distinct from each other, these compartments having transverse divisions. The weight of the dock without the caissons is about 8200 tons. This huge vessel, if it may be so called, was completed in the latter part of the year 1868, and in the summer of 1869, with two vessels on either side and two ahead, was towed down Sheerness harbor to the Nore. It was then taken under the stern of the Northumberland, and made fast to one of the immense hemp hawsers, 30 inches in circumference, made for the purpose; a second hawser was passed from the Northumberland to the Agincourt's stern and secured, the Terrible taking her position at the stern of the dock to assist in steering. These vessels took the dock to Madeira, where the Warrior and the Black Prince took the places of the Northumberland and the Agincourt, and proceeded directly to Bermuda. The voyage, a distance of 4000 miles, was successfully accomplished in thirty-six days. The caissons were sent out in sections. This dock is lowered by filling some of the chambers by means of pumps on the top of the dock, and by opening some of the valves; water is also allowed to run into the dock itself, and when the proper depth is reached, the caissons are taken out, the ship brought in over the blocks and shored, and the caissons put in place; the water in the dock is then allowed to run into some of the chambers, which have been kept empty; in which state the dock remains until the vessel is ready for undocking. By means of the admission or exclusion of water into or from the different chambers, the dock can be balanced in any position, and even be heeled over on one side, so as to expose the bottom for examination and repair. This dock is capable, without the caissons, of taking in the largest vessel afloat except the Great Eastern, and can lift and lay completely dry a vessel weighing 8000 tons.

An *iron floating dock*, after the patent of Mr. G. B. Rennie, an English naval architect, has been constructed for the Spanish naval yard at Cartagena; it is 320 feet in length; 105 feet in breadth outside; breadth inside, 79 feet; height outside, 48 feet; height inside, 36½ feet; weight, 4400 tons. This dock, possessing many points of resemblance to Gilbert's balance dock, may be described as an oblong rectangular box or trough, without top or

ends; walls and bottom hollow, and divided into several independent chambers; the side walls act as floats to prevent the dock from sinking too rapidly, and eventually from being entirely submerged. The operation of docking is performed thus: Water is admitted to the base compart-

FIG. 5.



End Elevation of Rennie's Dock.

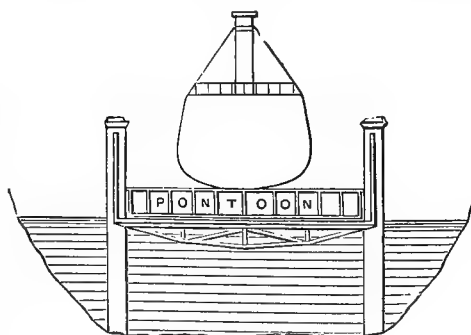
- A. Level of water when ready to receive a ship.  
B. " " " with ship docked.  
C. " " " when light.

ments by sluices and pipes; the dock gradually sinks to a depth sufficient to admit the vessel, which is then hauled in and shored in the usual manner; the engines and pumps then discharge the water from the base compartments until the floor of the dock is out of water.

Among the largest vessels which this dock has lifted is the Spanish iron-clad *Numancia*, of 21½ feet draught and weighing 5600 tons. This vessel remained supported eighty days without damaging or straining the dock. The draught of water of the dock, with the *Numancia* in, and with 800 tons of water in the chambers, was 11½ feet; without a load the draught of the dock is 4 feet 7 inches. Mr. Rennie has also constructed at Cartagena a basin and railways similar to those used with the American floating docks.

*Clark's Hydraulic Lift Dock.*—This style of dock was first constructed by Mr. Edwin Clark at the Victoria Docks. The vessel to be docked is raised by hydraulic power, the dock (or rather the "lift") being formed of two rows of cast-iron columns placed at a sufficient distance apart to admit a vessel between them. Each column encloses a hydraulic press, the ram of which is connected by chains with a transverse beam extending to the opposite column. These transverse beams form a platform, upon which is floated a shallow pontoon of sufficient size to accommodate the vessel to be docked; the platform and pontoon are then sunk, and the vessel floated into its proper position over the latter. The pumps of the hydraulic presses are then set to work, the platform is raised, and with it the pontoon and the vessel, the latter being supported upon the keel-blocks

FIG. 6.



Clark's Hydraulic Lift Dock.

and the sliding bilge-blocks, which are hauled into their places by chains. When the pontoon is lifted clear of the water, the latter flows out through the valves in the bottom, these being closed when the pontoon is emptied; the platform is then lowered until the pontoon, with the vessel upon it, is afloat. Thus in about thirty minutes a vessel drawing 20 feet of water is left afloat on a shallow pontoon drawing only 4 or 6 feet, and may be taken into the shallow dock prepared for its reception. These docks are surrounded by workshops and tools, with shelter for the men close up to the bulwarks of the ship. The vessel is, in fact, brought bodily into the centre of a convenient workshop. It is taken to the smiths', the carpenters', or the machine shops, according to the nature of the repairs required, and is moved easily from one to the other. In the

Victoria Docks the shallow berths to which the pontoons are floated are only 6 feet in depth; there are in all eight berths, each 60 feet in width, and from 300 to 400 feet in length.

The pontoons are very shallow, and, being open-topped, do not possess any great amount of rigidity, but Mr. Clark considers this flexibility an advantage; and from the results of the practice at the Victoria Docks it certainly seems that it is not so excessive in amount as to do any harm. One great advantage of Mr. Clark's plan is, that by a single lift, in connection with a great number of pontoons, an equal number of vessels can be floated in shallow water at a comparatively slight expense. It seems particularly applicable to situations which are sheltered, where the tidal changes are not great, and where a foundation can be readily obtained for the columns. A dock on this plan has been recently constructed by Mr. Clark at Malta.

A plan has been proposed by a Mr. Zanicki before the French Society of Engineers for a floating dock composed of a number of pontoons from which the water is driven by compressed air; stability being given to the pontoons by lateral moving floats. SAMUEL H. SHREVE.

**Dock-yards** in Great Britain are government establishments corresponding to the U. S. navy-yards. There are dock-yards at Portsmouth, Devonport, Sheerness, Chatham, Woolwich, Deptford, Plymouth, Pembroke, Haulbowline, Gosport, etc.

**Doc'tor** [Lat. *doctor*, a "teacher," from *docere*, *doctum*, to "teach"], a title of honor which was applied in early times to teachers of doctrine in the churches, and in more recent times conferred by universities; at first as the equivalent of "master" (*magister*), and afterwards as a still higher degree. Four of the Greek Fathers (Athanasius, Basil, Nazianzen, and Chrysostom), and three Latin Fathers (Jerome, Augustine, and Gregory the Great), were distinguished as "doctors of the Church." Thomas Aquinas, Bernard of Clairvaux, Bonaventura, and others bore the same title in later days. The distinction is usually conferred after death. The title "doctor" was given later in the Western Church to prominent teachers of scholastic theology. Many of these titles were conferred by their followers, and had an additional epithet, designed to be expressive of some special excellence. Thus, William Hales was called "Doctor Irrefragabilis"—the "irrefutable doctor;" William Ockham was called by his admirers "Doctor Singularis"—the "pre-eminent doctor," a title given to several others. Doctor of laws, LL.D.; or J. U. D. (*doctor utriusque juris*, "teacher of both laws," i. e. the civil and the canon law), was the first title of the kind conferred by the universities. Bologna appears to have been the place where this title was first conferred, but the University of Paris soon followed, first giving this degree in 1145. Doctors of laws (except when bearing a merely honorary title) long had a certain jurisdiction in the courts, which is even now scarcely extinct in England. (See article DOCTORS' COMMONS, and also Shakespeare's "Merchant of Venice," act iv., scene i.) In the English universities the doctorate in law is given in course at Oxford under the form D. C. L., and at Cambridge and London under the form LL.D. At the two former universities it is occasionally conferred as honorary. The degree of S. T. D. (*Sacrosanctę Theologię Doctor*, i. e. "Teacher of Sacred Theology"), or D. D. (Doctor of Divinity), otherwise written T. D. (Doctor of Theology), is still given at all the European universities after examination in the regular university course. It is also conferred in many cases as an honorary title. The popes and archbishops of Canterbury have long claimed and exercised the right of conferring the doctorate both in law and divinity. The degree of doctor in medicine has been traced back to 1384, and that of doctor of music is nearly or quite as old. Ph. D. (Doctor of Philosophy) is the title conferred at German and other European universities after examination by the faculty of philosophy, chiefly on students of philosophy. It is also conferred at several American colleges. The doctorate of literature, or of letters (*literarum humaniorum doctor*), written L. H. D., is conferred by the regents of the University of the State of New York, at Albany, as their highest honor. Besides the above there are several other doctorates, mostly of recent origin. (See ARTS, DEGREES IN.)

The word "doctor" as used in the New Testament is taken in its primitive Latin meaning, "teacher," and corresponds to the Hebrew word *mori* ("teacher") or to the title *rabbi* ("master"), which was conferred during the centuries immediately preceding and following the birth of Christ by the "nasi," the chief of the Sanhedrim, accompanied by the ceremony of the laying on of hands. At present, the Jewish doctorate is conferred by the universities.

**Doc'tors' Com'mons**, the popular name for the courts and offices once occupied by the body incorporated in

1768 under the title of "The College of Doctors of Law exercent in the Ecclesiastical and Admiralty Courts." These courts were on the S. side of St. Paul's churchyard. The college consists of a president (the dean of the arches for the time being) and of those doctors of law who, having regularly taken that degree in either of the Universities of Oxford or Cambridge, and having been admitted advocates in pursuance of the rescript of the archbishop of Canterbury, have been elected fellows of the college in the manner prescribed by the charter. But the practical functions of this body of lawyers have been materially diminished, and the college has been empowered to sell its property and surrender its charter.

**Doctors of the Church** (see DOCTOR), in the Roman Catholic Church, are certain saints who after death receive this title on account of their superior wisdom and excellence. They are at present seventeen in number, viz.: Sts. Hilary of Poitiers (died 368 A. D.), Athanasius (373), Basil (379), Gregory Nazianzen (389), John Chrysostom (407), Jerome (420), Augustine (430), Peter Chrysologus (450), Leo (460), Gregory (604), Isidore (636), Peter Damian (1072), Anselm (1109), Bernard of Giteaux (1153), Thomas Aquinas (1274), Bonaventura (1274), and Alphonsus of Liguori (1787). The last-mentioned saint first received this honor Mar. 23, 1871, by decree of Pius IX. Outside the Roman Catholic Church the seven Christian Fathers mentioned in the article "Doctor" are more especially designated by the title "Doctors of the Church."

**Doctrinaire**, a French term, originally applied to a party of politicians who just after the restoration of 1815 occupied in the Chamber of Deputies a place between the Centre and the extreme Left. The chief men of this party were systematic writers and speakers on government, who wished to establish a form of constitution somewhat resembling that of England, and supported scientific doctrines of constitutional liberty against the arbitrary will of the king. The word *doctrinaire* was used by their opponents to stigmatize them as pedantic and unpractical theorists. The leaders of the Doctrinaires were Royer-Collard, Guizot, the duc de Broglie, and Decazes.

**Doctrine**. See THEOLOGY, by PRES. E. G. ROBINSON, D. D., LL.D.

**Doc'ument** [Lat. *documentum*, from *docere*, to "teach," to "furnish information"], an original or official paper or writing relied on as the basis or proof of something; in law, a written instrument adduced for the purpose of evidence.

**Dod** (ALBERT BALDWIN), D. D., an American scholar and teacher, born in Mendham, N. J., Mar. 24, 1805, graduated at the College of New Jersey in 1822. Though licensed to preach, he was never a pastor. In 1830 he was chosen professor of mathematics in the College of New Jersey, discharging the duties of the office with signal ability till his death, Nov. 20, 1845. He contributed largely to the "Princeton Review." The family to which he belonged has for several generations been remarkable both for mathematical taste and talent.

**Dod** (DANIEL), an American machinist, born in Virginia in 1788, was the father of the preceding. He constructed the engine of the Savannah, the first steamboat that crossed the Atlantic. He was killed by the explosion of a boiler near New York in 1823.

**Dodd** (CHARLES), the assumed name of HUGH or RICHARD TOOTLE, a Roman Catholic priest of England who died about 1745. He was the author of Dodd's "Church History of England" (3 vols. folio, 1737-42), and of several other works, chiefly polemical. His history was a reply to that of Burnet, and has been in part republished (1839-43). Its value is regarded as considerable, though it is characterized by severity and unfairness.

**Dodd** (JAMES B.), an American mathematician, was born in Virginia in 1807. In 1841 he was chosen professor of mathematics, astronomy, etc. in Centenary College, Miss., and in 1846 became a professor in Transylvania University, of which institution he was acting president (1849-55). He has published several mathematical text-books, besides reviews, etc.

**Dodd** (MARY ANN HANMER), born at Hartford, Conn., Mar. 5, 1813, is the author of many poetical productions of unusual merit, printed chiefly in periodicals. A volume of her poems appeared in 1843.

**Dodd** (RALPH), an English engineer, born in Northumberland about 1756. He was the first projector of the Thames Tunnel, and he planned the Surrey Canal. He wrote, besides other works, an "Account of the Principal Canals of the World" (1795). Died April 11, 1822.

**Dodd** (WILLIAM), LL.D., an English clergyman, born at Bourne, in Lincolnshire, May, 1729. He was ordained in 1753, and became a popular preacher in London. He was

also chaplain to the king, and preceptor to Philip Stanhope, earl of Chesterfield. Among his works are "Reflections on Death," "The Visitor," and "Sermons." In 1777 he was convicted of forging the signature of the earl of Chesterfield to a bond for £4000, and was put to death June 27 of the same year.

**Dod'der** [Ger. *Dotter*, signifying the "yolk of an egg," so called from the color], (*Cuscuta*, *Engelmannia*, etc.), leafless parasitical plants, generally placed by botanists in the order Convolvulaceæ, but sometimes made a distinct order called Cuscutaceæ. They have twining thread-like stems of orange-yellow, and flowers in thick clusters. They are found native in the temperate zone, in both the Old and New Worlds, and are sometimes injurious to the flax, clover, hop, and bean crops by smothering the plants. The dodders are remarkable for having seeds without cotyledons. The vine grows up from the ground, and having attached itself as a climbing parasite to herbs and shrubs, the proper root dies, leaving the vine to subsist upon the juices of the plant which supports it. This it does by means of papillæ, which penetrate the bark of the plant on which it lives. Huge dodders in Afghanistan grow upon the trees, and even prey upon themselves. The *Cuscuta Europæa*, the greater dodder, is found on nettles, thistles, vetches, and the hop; *Cuscuta Epilinum* on flax; *Cuscuta Epithymum* on furze, ling, and thyme; the clover dodder is only a sub-species of the last-mentioned. The dodders of the U. S. are quite numerous, and have been especially studied by the botanist Engelmann of St. Louis.

**Dodder-laurels** (Cassythaceæ), an order of parasitic plants having the habit and appearance of dodders, but in other respects resembling the laurels, to which they are generally referred. They replace the dodders in hot regions, where alone they grow. The U. S. have but one known species, the *Cassytha filiformis* of Florida.

**Doddridge** (JOHN), a celebrated English jurist, born at Barnstaple 1555, died in London Sept. 13, 1628. He was educated at Exeter College, Oxford, which he entered in 1572, and studied law at the Middle Temple after 1576. From 1613 to 1628 he was justice of the king's bench. He wrote "The Lawyer's Light" (London, 1629), "A Complete Parson; or, A Description of Advowsons and Church Livings" (1602), "The History of the Ancient and Modern Estate of the Principality of Wales" (1630), "The English Lawyer" (1631), "Opinions touching the Antiquity, Power, Order, State, Manner, Persons, and Proceedings of the High Courts of Parliament in England" (1656).

**Dod'dridge** (PHILIP), D. D., an eminent English preacher and author, was born in London June 26, 1702. He became pastor of a dissenting congregation at Kibworth in 1723, and removed in 1729 to Northampton, where he was principal of a theological seminary, and at the same time pastor of a large congregation. In 1730 he married Mrs. Mercy Maris. He was a man of great piety and rigorous practice. He was very scrupulous in his habits of study, rising at five in the morning and laying out plans of sermons months ahead. From principle he avoided controversy, but that course drew upon him the charge of being a trimmer and double-dealer. He was an earnest and devout preacher, and acquired a high reputation as a writer. His most important works are "The Rise and Progress of Religion in the Soul" (1745), "The Family Expositor" (2 vols. 4to, 1739-40), "Life of Colonel Gardiner," "A Course of Metaphysical, Ethical, and Theological Lectures," and "A Commentary on the New Testament," which became a household work in England, and, like his "Rise and Progress," very much contributed to stimulate piety throughout the country. He wrote 374 hymns, some of which are admirable. He died at Lisbon (whither he had gone for his health) Oct. 26, 1751. (See JOE ORTON, "Life of Doddridge," 1766; THOMAS STEEDMAN, "Letters to and from Dr. Doddridge," 1790; and his "Correspondence and Diary," edited by DODDRIDGE HUMPHREYS, 1829, 5 vols.)

**Dodec'agon** [from the Gr. *δώδεκα*, "twelve," and *γωνία*, "angle"], a regular polygon of twelve equal sides and twelve equal angles.

**Dodecah'e'dron** [from the Gr. *δώδεκα*, "twelve," and *ἔδρα*, a "base"], one of the five Platonic bodies or regular solids, is bounded by twelve equal and regular pentagons, has thirty equal edges and twenty equal solid angles, each formed by the meeting of three equal plane angles. Its volume is nearly 7.66312 times that of the cube of one of its sides.

**Dodecan'dria** [from the Gr. *δώδεκα*, "twelve," and *ἄνθρωπος* (gen. *ἀνθρώπου*), a "man or male"], the eleventh class of plants in the artificial system of Linnæus, characterized by the presence of twelve stamens; but as the number of

plants which are so characterized is small, it was made to include all plants with more than ten and less than twenty stamens.

**Dodeca'theon** [from the Gr. *δώδεκα*, "twelve," and *θεός*, "gods," probably an allusion to its curious nodding flowers, about twelve in number], a genus of plants of the order Primulaceæ. The *Dodecatheon Meadia* of the U. S. is an elegant plant called American cowslip, pride of Ohio, or shooting star. In cultivation it is very fine.

**Döderlein** (JOHANN CHRISTOPH WILHELM LUDWIG), born at Jena Dec. 19, 1791, died at Erlangen Nov. 9, 1863. He studied philology at Munich, Heidelberg, Erlangen, and Berlin under Thiersch, Creuzer, Voss, Wolf, Boeckh, and Buttmann. In 1815 he was appointed professor of philology at the Academy of Bern, and in 1819 at the University of Erlangen. His philological works belong chiefly to the department of etymology and lexicography: "Lateinische Synonymen und Etymologien" (Leipzig, 1826-33, 6 vols.), "Homerisches Glossarium" (Erlangen, 1850-58, 3 vols.), "Lateinische Wortbildung" (Leipzig, 1838), "Handbuch der Lateinischen Synonymik" (Leipzig, 1839), "Handbuch der Lateinischen Etymologie" (Leipzig, 1841), most of which have been translated into English.

**Dodge** (EBENEZER), D. D., LL.D., an American Baptist divine and scholar, was born at Salem, Mass., April 22, 1819, graduated at Brown University in 1840, and at Newton Theological Institution in 1845: was instructor in Hebrew at Covington Theological School (1845-46), professor in the theological department of Madison University, Hamilton, N. Y. (1853-68), and president of the university from 1868 till the present time (1885). He has published "Evidences of Christianity," several able reviews, and other works.

**Dodge** (GRENVILLE M.), LL.D., American general, born at Danvers, Mass., Apr. 12, 1831; commanded a brigade at Pea Ridge in Mar., 1862, and became a major-general of Union volunteers in June, 1864. He directed a corps of Gen. Sherman's army in the campaign against Atlanta (May to Sept., 1864), and succeeded Roscerans as commander of the department of Missouri in December of that year. He represented a district of Iowa as a member of Congress in 1867-69.

**Dodge** (HENRY), GENERAL, was born at Vincennes, Ind., Oct. 12, 1782. He served with distinction in the war of 1812 and in various Indian wars, was governor of Wisconsin Territory (1836-41 and 1845-48), a delegate to Congress (1841-45), and U. S. Senator from Wisconsin (1849-57). Died at Burlington, Ia., June 19, 1867.

**Dodge** (MARY ABIGAIL), a popular American writer, whose assumed name is GAIL HAMILTON, was born in Hamilton, Mass., about 1830. She was a school-teacher in her youth. Among her works are "Country Living and Country Thinking" (1862), "Gala Days" (1863), "Woman's Wrongs, a Counter-Irritant" (1868), "Skirmishes and Sketches," and "The Battle of the Books" (1870). She has contributed to the "Atlantic Monthly."

**Dodge** (WILLIAM EARLE), an American philanthropist, born in Hartford, Conn., Sept. 4, 1805, removed to New York in his thirteenth year. At the age of twenty-one he went into business on his own account, and became an extensive importer and manufacturer. He was an active member of many benevolent and religious societies, a member of the peace convention of 1861, and a republican member of Congress 1866-67. He was the principal founder of the Syrian Protestant College at Beirut. Died Feb. 9, 1883.

**Dodge City**, on R. R. and the Arkansas River, capital of Ford co., Kan. (see map of Kansas, ref. 7-D, for location of county). Pop. in 1880, 996.

**Dodgeville**, on R. R., capital of Iowa co., Wis. (see map of Wisconsin, ref. 7-D, for location of county), 47 miles W. by S. from Madison. Mines of lead and copper have been opened in the vicinity. Pop. in 1870, 1407; in 1880, 1547.

**Do'do** (*Didus*), an extinct genus of birds, usually classed among the Brevipennes or struthious birds, but by many authorities referred to the Columbidae (pigeons), and peculiarly interesting from the fact that its extinction has but recently taken place—the *Didus ineptus* having been in existence less than three hundred years ago. The dodo was an inhabitant of the islands of Bourbon and Mauritius, and possibly of Madagascar. When Mauritius was first visited by voyagers, the dodo was very abundant, and running slowly and being wholly unable to fly, was easily killed. It is described as larger than a swan; of a clumsy form, with a large head and enormous bill, the upper mandible being the longer and hooked at the point; short, thick legs, covered with scales; four rather short toes, three before and



one behind; and a plumage of grayish down. The flesh, though tough, was eatable. In several works of the seventeenth century are rude representations of the dodo, the best being one in Bontius, edited by Piso, who calls the



Dodo.

bird dorote or dodaers. There is also a painting perfectly corresponding with this in the British Museum, and in Savary's picture of "Orpheus and the Beasts" at The Hague. Prof. Owen discovered what he considers a study of the bird from nature. A foot of the dodo is preserved in the British Museum, and a head and foot in the Ashmolean Museum at Oxford.

**Dodo'na** [Gr. Δωδώνη], an ancient city of Epirus, the seat of a celebrated oracle and temple of Jupiter. This was for a time the most famous oracle of Greece except that of Delphi. Its origin was attributed to Deucalion. This oracle was consulted by the Athenians, Spartans, and other nations, and its responses were delivered from an oak tree. The temple of Dodona was destroyed by the Ætolians in 219 B. C. Its site has not been accurately identified.

**Dods'ley** (ROBERT), an English bookseller and author, born near Mansfield in 1703. He opened a bookstore in London, and became a friend of Pope, and prospered in business, not only on account of his enterprise and the success of his own productions, but also through his cordial and intimate connection with the literary men of his time. He produced in 1737 a farce called "The King and the Miller of Mansfield," which was successful. His tragedy of "Cleone" (1758) was performed with great applause. He purchased Dr. Johnson's "London" for ten guineas, and his "Vanity of Human Wishes" for fifteen guineas. He published a "Select Collection of Old Plays" (12 vols., 8vo, 1780) and other works. Died Sept. 25, 1764.

**Dod'well** (COL. EDWARD), an English antiquary and artist who left college in 1800. He afterwards passed many years on the continent of Europe, and published a valuable illustrated work called "Classical and Topographical Tour through Greece" (1818), also "Thirty Views in Greece" (1821), and other works. Died at Rome May 14, 1832.

**Dodwell** (HENRY), a chronologist, born in Dublin, Ireland, in 1641. He became professor of history at Oxford in 1688, but was soon deprived of that chair because he refused to take the oath of allegiance to William III. Died June 7, 1711.—His oldest son, of the same name, who died in 1763, wrote a book covertly attacking Christianity.

**Doe** (JOHN), the fictitious plaintiff in ejectment. (See EJECTMENT, by PROF. T. W. DWIGHT, LL.D.)

**Doffer**, that part of a carding-machine which takes the cotton from the cylinder when it is carded.

**Dog**, the *Canis familiaris* of the naturalists, a carnivorous mammal of the family Canidae, nearly related to the wolf and the fox, is one of the most remarkable of all brutes, being possessed of sagacity, acute senses, and instincts often exceeding reason. He seeks the society of man, and makes himself a trusty servant, putting at man's disposal all the faculties which nature has given him. It is the opinion of some naturalists that the various kinds of dog are specifically identical with the wolf and the jackal.

The more important varieties of dog have been arranged in three classes, as follows:

I. Those having the parietal bones of the skull widest at the base and gradually approaching each other as they as-

cent, the condyles of the lower jaw being on the same line with the upper molar teeth. The Danish dog, the dingo, and the greyhound belong to this class.

II. Those having the head moderately elongated, and the parietals diverging from each other as they rise upon the side of the head, enlarging the cerebral cavity and the frontal sinus. The most valuable dogs, such as the spaniel, setter, pointer, Newfoundland dog, Esquimaux, etc., belong to this class.

III. Those having the muzzle more or less shortened, the frontal sinus enlarged, the cranium elevated and diminished in capacity. To this class belong the bulldog, the mastiff, some of the terriers, etc. The greyhound (*Canis familiaris leporarius*) is a variety of which there are many kinds, all characterized by a small head, slender limbs, and a gaunt form. In hunting they usually follow by sight, not by scent. They are not intelligent, nor are they distinguished by attachment to their masters. Some are favorites because of their swiftness, others for the extreme elegance of their shape. The Mount St. Bernard dog, often called the Alpine spaniel (*Canis familiaris montanus*), is one of the most celebrated of the shaggy or woolly breeds. It is peculiar to the Alps, and is noted for its sagacity, strength, and fidelity in saving the lives of travellers. The Newfoundland dog (*Canis familiaris Terra Novæ*) originated in the island which gives it its name, and is probably derived from a cross of a dog carried thither by English settlers and a native breed. It is of large size, and is valuable and useful, remarkably docile, and obedient and very serviceable. The shepherd's dog is one of the most interesting and useful of the species. The hunting-dogs, hounds, and spaniels are generally of medium size, the ears are long and pendent, the scent acute, and intelligence great. In general the covering is smooth, though instances of rough hair occur.

The spaniel is probably of Spanish origin, hence his name. The ears are large and pendent, the tail elevated, the fur of a different length in different parts of the body, but longest about the ears, under the neck, behind the thighs, and on the tail, varying in color, but most commonly white with brown or black patches.

The dingo of Australia has an elongated head, flat forehead, and short and erect ears. Two kinds of hair thickly cover the body—one woolly and gray, the other silky and yellow. In form and proportions the dingo resembles the shepherd's dog. He very seldom barks, but whines and growls, like most wild dogs. These animals were formerly numerous in Australia, but are now rare.

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**Doga'na** (i. e. the house (*casa*) of the *doge*, who as head of the republic had charge of the customs; according to others, from the Arabic *al-dīwān*; Sp. *adriana*), the common name in Italian of a custom-house. It perhaps originated with the Venetians. From the same root comes the French *douane*.

**Dog'bane** (*Apocynum*), a genus of plants of the natural order Apocynaceæ, having bell-shaped flowers, no style, and the fruit a pair of follicles. Some of the species are herbaceous, others shrubby, and some are found in colder climates than is usual for plants of this order. The dogbane of North America (*Apocynum androsaemifolium*) is a perennial herbaceous plant about two feet high, with smooth stem, milky juice, smooth ovate leaves, and light pink flowers. It grows in open, barren places from Canada to Georgia, and is valued for the medicinal properties of the bark of the root, which is emetic, diaphoretic, and in small doses tonic. This and the Indian hemp (*A. cannabinum*), which contains similar medicinal properties, yield a copious fine flax-like fibre, used by the Indians; but otherwise the plant is employed only for medicinal purposes.

**Dog Days**, or **Canic'ular Days**, the name given to the forty days between July 3 and Aug. 11. Canicular is derived from *Canicula*, the Latin name of Sirius, the dog-star, which rose heliacally near the 1st of July. The ancients ascribed the great heat of summer to the influence of this star, but it was by accident only that its rising coincided with the warmest season. The time of its rising depends on the latitude of the country, and, owing to precession, is later every year.

**Dog Distem'per**, a disorder common among young dogs, is considered to be of a catarrhal character. A general running from the nose and eyes is a leading symptom, together with a short dry cough, succeeded by loss of strength and wasting of the body. The flow from the nose, at first watery, in a little time becomes mucous and purulent, filling the eyes and choking up the nostrils, attended by coughing and vomiting, with an increased wasting of flesh and loss of appetite. A convulsive twitching, paralysis of the extremities, attended by fits, with symptoms of an affection of the brain, appear when the disease becomes malignant. At such a time the sight of another dog

often brings on a fit, which may be somewhat checked by fondling. The fits usually prove fatal if they continue to increase in violence and frequency. A frequent consequence of the distemper is inflammation of the lungs and a dysenteric discharge, indicating ulceration of the intestines.

The leading remedies, which must be applied in the early stage of the disease, are laxatives, emetics, occasional bleeding, etc. Astringents should be used to check the diarrhoea, and the violence of the fits may be quelled by warm baths and anodynes.

**Doge**, *dōj* [It. pron. *do'já*, a modification of *duce* (from the Lat. *dux*), "duke"], the title of the chief magistrate in the republics of Venice, Amalfi, and Genoa. The origin of the office in Venice dates as far back as 697. Previously Venice had been governed by seven tribunes, but the intrigues consequent on their election, and the rising power of the republic, made it expedient to concentrate the power of the government. The first doge was Paoluccio Anapesto. The doges were elected by the people, and were invested with almost absolute power till 1177, when the legislative power was placed in the hands of a great council of 470 members. This council elected twenty-four of their members, who in turn elected twelve of their own number, upon whom the choice of the doge devolved. The first doge elected in this manner was Sebastiano Ziani, who, on the occasion of his installation in office, scattered money among the people to compensate them for the loss of their rights—a custom which was followed by his successors. This doge also introduced the custom of wedding the Adriatic Sea. This was a marriage ceremony which took place on Ascension Day, and which typified the absolute dominion which the Venetians claimed over that sea. On these occasions a ring was thrown into the sea from the ship Bucentaur. From this time the council gradually narrowed the powers of the doge, till in 1628 the offices of commander-in-chief of the army and high-admiral of the navy ceased to belong to the dogate (or dogado, as the dignity was called), unless by a special decree of the Council of Forty, a high court of justice composed of forty members. In the fourteenth century the Council of Ten was established, and vested with the highest power in the state, which entitled it to pass judgment even upon the doge himself. About this time the powers of the doge became so restricted as to be little more than nominal, and the constant espionage to which he was subjected made the office no longer an object of ambition. In 1339 it was found necessary to pass a law prohibiting a doge who had been elected from resigning his place. The office disappeared with the fall of the Venetian republic in 1797. Lodovico Manin, elected in 1788, was the seventy-third and last doge of Venice.

The first doge of Genoa was Simon Boccanera, elected by the people in 1339. Like that of the doge of Venice, his office was originally for life. His powers were shared, though not restricted, by twelve aldermen. In 1528 the Genoese framed a new constitution, by which the doge was to be re-elected every two years, and the powers of the office were restricted by two councils, of which one comprised 300 and the other 100 members. In 1797, when the French occupied Genoa, the office of doge ceased to exist. In 1802 it was restored with the restoration of the republic, but it finally disappeared in 1804. The republic of Amalfi in 897 A. D. exchanged its government by annually chosen consuls for the dogate, which was held for life; but its republican government ceased in 1350.

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**Dog-Fish**, the name of several small species of shark belonging to the genera *Scyllium*, *Spinax*, *Mustelus*, etc., so named probably from their pursuing their prey like dogs hunting. They have five gill-openings on each side, the tail fin is longer than it is broad, and they have spout-holes. The spotted dog-fishes (*Scyllium canicula* and *Scyllium catulus*) are common on the British coast. The *Acanthias vulgaris*, or common dog-fish, is found in great quantities on the coasts of the Hebrides and Orkneys, where it is used as food. This fierce and greedy fish is abundant along the New England coasts, and is caught for its excellent oil. Other species occur on the American coast. Their bite is much dreaded by sailors. A sort of shagreen is made of their skins. The dog-fish of the Western States is the *AMIA CALVA* (which see).

**Dog-Fox**, the name of a small animal found in Asia and Africa, belonging to the family Canidae, and of the genus *Cynalopex*. They have erect pointed ears, a sharp muzzle, somewhat resembling that of a greyhound, and a bushy tail.

**Dog'ger** [Dutch *dogger*, "cod-fish"], a two-masted fishing-boat of the ketch build, with bluff bows. It is used by the Dutch for the Doggerbank fishery.

**Dog'gerbank**, an extensive sandbank in the middle of the German Ocean, between England and Denmark. It

extends from lat. 54° 10' to 57° 24' N., and from lon. 1° to 6° 7' E. Length, about 320 miles; average width, 40 miles. In some parts it is covered with only nine fathoms of water. Here are important cod-fisheries. An indecisive battle was fought here between the Dutch and English fleets in Aug., 1781.

**Dog'gett** (DAVID SETH), D. D., a bishop of the Methodist Episcopal Church South, was born in Virginia in 1810. He was educated at the University of Virginia, and entered the itinerant ministry in the Virginia Conference of the Methodist Episcopal Church in 1829. He was professor in Randolph-Macon College, Va., for several years, and was consecrated bishop in 1866, from which time his residence was in Richmond, Va. He was learned, eloquent, and very efficient. D. at Richmond, Va., Oct. 27, 1880.

**Doggett** (KATE NEWELL). See APPENDIX.

**Dog Island Light**, on the S. coast of Florida, is a revolving light 45 feet above the water; lat. 29° 46' 51" N., lon. 84° 38' 37" W. The island is 30 miles E. of Appalachicola, and the light is 1 mile E. of its W. end.

**Dog'ma** [Gr. *δόγμα*, from *δοκέω*, to "seem," "that which seems true;" Fr. *dogme*; It. *dotma*; Sp. *dogma*], originally an opinion, afterwards an article of belief derived from authority. The term is sometimes applied to what are regarded as the essential doctrines of Christianity, as contained in the Scriptures or the writings of the Fathers of the Church. The study or science of dogmas (Dogmatik) has a separate professorship in the Protestant universities of Germany. The term "doctrine" is a preferable one, as "dogma" is coming more and more to be used in an unfavorable sense.

**Dog's-Tail Grass** (*Eleusine*), a genus of grasses, the species of which are found native in Europe and Asia. The crested dog's-tail grass (*Eleusine cristata*) is much prized in England for lawns and sheep-pastures. The *Eleusine Indica* is extensively naturalized in the U. S.

**Dog Star**, a popular name of Sirius, a star of the first magnitude in the constellation Canis Major, and the brightest fixed star in the firmament.

**Dogtooth Spar**, a name given to certain pointed crystals of calcareous spar, from their fancied resemblance to the tooth of a dog.

**Dog Watch**, on shipboard, a short watch of two hours. There are two dog watches—the first usually from 4 to 6 o'clock P. M., and the second from 6 to 8 P. M.

**Dogwood**, a name given in the U. S. to several small trees, especially to the *Cornus florida* and others of its genus, which contains also the cornel trees or dogwoods of Europe. The larger species are characterized by their hard wood, which is useful in turnery, and by their bitter tonic bark. The *Cornus florida* is well known for its white, showy involucre blossoms, appearing in May and June. In the West Indies, etc. various other trees are known as "dogwoods." One of these, the *Picidia Erythrina*, or Jamaica dogwood, a small leguminous tree, found also in Florida, has a valuable and very hard timber. Its bark is a powerful narcotic and anodyne poison.

The "poisonous dogwood" or "poison sumach" (*Rhus venenata*) of the U. S. is probably much the most poisonous to the touch of all our native plants. It closely resembles the *Rhus Vernix* or varnish tree of Japan, and may be distinguished from the harmless sumachs by its panicles, which are loose (not thyrsoid or closely clustered in a spike, like the harmless ones), and which are axillary, while those of the harmless species are terminal. (See RHUS.) The common dogwood of Europe, *Cornus sanguinea*, which is found also in Northern Africa, is a shrub of 14–15 feet in height, with greenish-white flowers of an unpleasant odor.

**Dohud**, a town of Upper India, on the boundary between Malwah and Guzerat; lat. 22° 55' N., lon. 74° 20' E. It is on the road to the Gulf of Cambay, and is much visited by merchants.

**Doit** [said to be derived from the Fr. *d'huit*, "of eight," it being the eighth part of a penny or stiver], the name of a small Dutch coin used in Scotland during the reign of the Stuarts, supposed to be worth about half a farthing.

**Do'kos**, a dwarfish race of negroes, inhabiting a region of Africa S. of Abyssinia, and living in a perfectly wild state. They are captured in large numbers by the slave-dealers.

**Dolabel'la** (PUBLIUS CORNELIUS), a profligate Roman patrician, born about 70 B. C., married Cicero's daughter Tullia. He fought for Cæsar at Pharsalia in 48 B. C., and became consul about the year 44. He was afterwards a partisan of Antony, was defeated by Cassius in Syria, and killed himself in 43 B. C.

**Dol'ci** (CARLO), an Italian painter, born at Florence May 25, 1616, was a pupil of Jacopo Vignali. His works, which are numerous and scattered over all Europe, are very finely finished. They consist mostly of "Mater Dolorosa" and "Ecce Homos," but the expression is generally vivid and sentimental. Died Jan. 17, 1686.

**Dol'cinites**, or **Dul'cinists**, a sect founded by Dolcino, an Italian born at Novara in the thirteenth century. They opposed the popes, and, according to Milman, held kindred tenets with the Fraticelli or Spiritual Franciscans, with some leaven of the old doctrines of the Patarines (Puritans) of Lombardy. Dolcino and some of his followers were burned alive in 1307.

**Dole** [Ang.-Sax. *dælan*; Dutch *deelen*; Ger. *theilen*, to "distribute," "deal out in small quantities"], a gift of food or money to the poor at funerals. The custom was formerly very prevalent in Great Britain and Ireland.

**Dôle** [Lat. *Dola* or *Tollium*], a town of France, department of Jura, is at the base of a vineclad hill on the river Doubs, about 30 miles S. E. of Dijon. It is connected by railway with Dijon and Lyons. It has a large cathedral, a court-house, a theatre, and a public library; also manufactures of hardware, pottery, straw hats, and chemical products. Dôle was formerly the capital of Franche-Comté. Pop. in 1881, 13,190.

**Dole** (REV. GEORGE THURLOW). See APPENDIX.

**Dolet** (ÉTIENNE), a learned French writer, born at Orleans in 1509. He lived at Lyons, where he established a printing-press and published able works on theology and other subjects. His writings were burned by order of Parliament as heretical in 1543. He translated some works of Plato and Cicero, and wrote a "Commentary on the Latin Language" (1536). He was burned at the stake in Paris on a false charge of atheism Aug. 3, 1546.

**Dolgelly**, a market-town of Wales, capital of the county of Merioneth, on the Mynach, here crossed by a bridge, 46 miles W. of Shrewsbury. It is in a rich valley at the foot of Cader Idris, and is surrounded by beautiful scenery. It has manufactures of coarse woollens called webs.

**Dolichocephalic** [from the Gr. *δολιχός*, "long," and *κεφαλή*, the "head"], a term applied to human skulls which have the occipito-frontal diameter (that from the back to the front) much in excess of the transverse diameter. The native Australians and West African races afford extreme examples of this form of skull. Those skulls which have a relatively short occipito-frontal diameter are called *brachycephalic*—i. e. "short-headed." Examples of both forms here noted are found among the remains of the prehistoric races of Europe. Which of the two types belong to the earliest period is an unsettled question. Among the historic peoples of Europe the dolichocephalic form prevails among the Indo-European varieties, and the brachycephalic among the Finnic. (See WILSON, "Pre-historic Annals of Scotland," and LUBNOK, "Pre-historic Races," pp. 90-116.)

**Dolichos** [Gr. *δολιχός*, "long," so called from the length of its pods], a genus of leguminous plants, allied to *Phaseolus*. They are natives of the East and West Indies, where the pods and seeds are used as food. The Chinese sauce called soy is made from the *Dolichos Soya*, or soy bean, and the tuberous roots of some species are eaten in China. Other species are cultivated for the beauty of their flowers.

**Doli'na**, a town of Austrian Galicia, about 75 miles S. of Lemberg. It has extensive salt-mines. Pop. 6200.

**Dol'ium** [Gr. a "ensik," from the hooped appearance

living species are found in the warm seas of the Eastern hemisphere, and seven fossil ones, mostly from the tertiary.

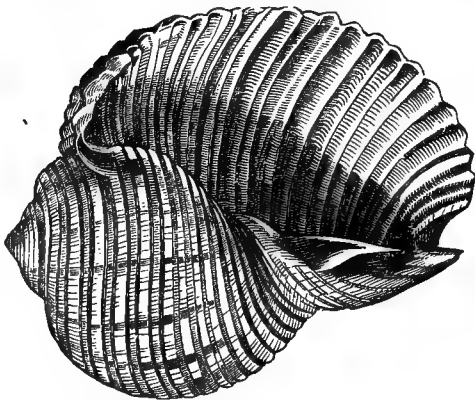
**Doll** [Fr. *poupée*; Ger. *Puppe*; perhaps a contraction of *Dorothy*, but supposed by some to be an abbreviation of *idol*, i. e. an "image"], a toy of wax, wood, or plaster, made like the image of a child, and used as a plaything. Dolls were in use in the earliest times, and those of the Greek and Roman children were buried with them when they died. Great Britain was formerly supplied with dolls mainly from the Netherlands, but now many of them are made in London and other English towns. Many are manufactured in Nuremberg, Germany, for the U. S.

**Dol'lar** [Ger. *Thaler*; Dan. *Daler*; see below], a gold or silver coin of different values current in the U. S. and several countries of Europe. Its name is derived from Joachimsthal (Joachim's Valley) in Bohemia, where dollars were first coined (1518). The dollar is the unit of account in the monetary system of the U. S. It was coined in silver only until 1849, when a coinage was authorized of dollars in gold. Its value was originally the same as that of the Spanish piastre of eight reals, but is now somewhat below. The weight of the silver dollar was fixed by law in 1837 at 412½ Troy grains. Its further coinage was prohibited by the law of 1873, but was resumed in 1878, under the bill known as the Bland-Allison bill, passed in that year. The silver half-dollar weighs 12½ grammes, or two silver half-dollars 25 grammes. (Act of Congress, approved Feb. 12, 1873.) That act created also a silver "trade dollar," weighing 420 grains, for use in commercial transactions in the East. The gold dollar weighs 25.8 grains = 1.672 grammes, exceeding 1½ grammes, or 5 ter-grammes, by only 1000 of a gramme. The standard fineness of both silver and gold for coinage is nine-tenths (i. e. one-tenth of it is alloy). The British standard of fineness is eleven-twelfths for gold, and thirty-seven-fortieths for silver. Half-dollars, quarter-dollars, and dimes are coined in silver. A silver half-dime was also coined before 1873. The half-dollar (since 1873) weighs twelve and a half metric grammes—the smaller coins proportionately less. The actual value of the U. S. gold dollar, in British currency, is 4s. 1¼d. The gold coins of the U. S. are legal tenders for all sums; the silver coins, except the dollar, only for sums not exceeding five dollars. Accounts in dollars and cents are written thus: \$13.78 = thirteen dollars and seventy-eight cents. The coins are double-eagles, eagles, half-eagles and quarter-eagles, valued at twenty, ten, five, and two and a half dollars; also, three-dollar and one-dollar pieces. The German thaler has different values. The most current, that of Prussia, is worth seventy-one cents. (See the articles RIXDOLLAR and COINAGE.)

F. A. P. BARNARD.

**Dol'art, The**, a gulf of the German Ocean, is at the mouth of the river Ems, between Hanover and Holland. It is 10 miles long and 7 miles wide. It was formed by an inundation in 1276.

**Döl'inger** (JOHANN JOSEPH IGNAZ), D. C. L., an eminent German divine and leader of the "Old Catholic" movement, was born at Bamberg, in Bavaria, Feb. 28, 1799. He received priestly orders in 1822, and almost immediately after became chaplain to the diocese of Bamberg. "The Doctrine of the Eucharist during the First Three Centuries" was published by him in 1826, and he was invited the same year to lecture on the history of the Church before the University of Munich. The substance of these lectures appeared in 1828 in his "Manual of the History of the Church," and again, more extended, in his "Treatise on the History of the Church" (1838). He turned his attention to politics in 1845, and represented the University of Munich in the Bavarian Parliament. In 1849, when a delegate to the Diet of Frankfurt, he voted for the absolute separation of the Church from the State. He delivered in 1861 lectures advocating the abandonment of the temporal power by the Holy See. He published "Origins of Christianity" (1833-35), "The Religion of Mohammed" (1838), "The Reformation, its Interior Development and its Effects" (3 vols., 1846-48), "A Sketch of Luther" (1851), "Hippolytus and Callistus, or the Roman Church in the First Half of the Third Century" (1854), "Paganism and Judaism" (1857), "Christianity and the Church" (1860; 2d ed. 1868), "The Church and the Churches, or the Papacy and the Temporal Power" (1861), a translation of which appeared in 1862, "Papal Legends of the Middle Ages" (1863), and a "History of the Religious Sects of the Middle Ages" (3 vols., 1870). Dr. Döllinger has in particular obtained wide fame by his opposition to the decrees of the Vatican Council, and particularly to that one declaring the infallibility of the pope when addressing the Church *ex cathedra* on questions of faith and morals. He published on this subject the pamphlets "A Few Words on the Infallibility Address" and "The New By-Laws of the



Dolium Galea.

of the shell], a genus of gastropod mollusks of the whelk family, having spirally furrowed shells. Some fourteen

Council" (1870), and he was commonly believed to be one of the authors of the "Janus," one of the most important works published against Papal infallibility. As he emphatically declined to submit to the decrees of the Vatican Council, he was, on April 17, 1871, formally excommunicated by the archbishop of Munich. On July 29, 1871, he was elected rector of the University of Munich, receiving 54 out of 63 votes cast. He took a leading part in the Old Catholic congresses of Munich (1871) and Cologne (1872). In the former he showed himself opposed to the measures adopted by the majority for effecting a permanent ecclesiastical organization of the Old Catholics; in the latter he was elected chairman of a special committee on the reunion of the Christian churches, a subject to which he has for years devoted a special attention. He has been for years a member of the first chamber of the Bavarian Diet.

**Dollond** (JOHN), F. R. S., an English optician well versed in mathematics, was born in London June 10, 1706. He was a silk-weaver in his youth, and employed his leisure hours in the study of sciences and languages. In 1752 he became a partner of his son PETER (born 1730, died July 2, 1820) in the business of optician. They fabricated telescopes of superior quality. John Dollond invented the achromatic telescope, for which he received the Copley medal of the Royal Society in 1758. Died Sept. 30, 1761.

**Dolmen**, a word of Cymric origin, nearly synonymous with CROMLECH (which see). The proper dolmen consists of one large unhewn stone, resting on two or more unhewn stones placed erect in the ground. The term is sometimes applied to structures where several blocks are raised on pillars so as to form a sort of gallery. Near Saumur in France is a dolmen called *Pierre Couvert*, which is sixty-four feet long and fifteen feet wide. Such structures are now generally referred to pre-historic races.

**Do'lo**, a town of Italy, in Venetia, on the river Brenta, 12 miles W. of Venice, on the railway to Padua. Here are many fine villas of the Venetian nobility. Pop. 6381.

**Dolomieu, de** (DÉODAT GUI SYLVAIN TANCRÈDE DE GRATET), a French geologist and mineralogist, born at Dolomieu, in Dauphiny, June 24, 1750. He joined the order of the Knights of Malta in his youth, and having returned to France in 1791, he explored the geology of that country, and wrote several geological treatises, which were inserted in the "Journal de Physique." He was one of the savants who accompanied Bonaparte to Egypt in 1798. He was thrown into a prison by the Neapolitans in 1799, and released the following year; he was appointed professor of mineralogy in the Museum of Natural History. He died Nov. 26, 1801. (See LACÉPÈDE, "Notice historique sur la Vie de Dolomieu," 1802.)

**Dolomite** [named in honor of the savant Dolomieu], or **Magnesian Limestone**, a mineral consisting of carbonate of lime and carbonate of magnesia in variable proportions, which are sometimes nearly equal. Its crystals are usually rhomboidal. Dolomite is extensively used as a building-stone, and is converted into good lime by burning. The new British houses of Parliament are built of this stone. In England, fossiliferous dolomites form the greater part of the Permian limestones from Durham to Nottinghamshire. Large mountain-masses of crystalline dolomite occur in the Tyrol. It is also abundant in the eastern parts of New York, Pennsylvania, Maryland, and other States.

**Dolphin** [Gr. δελφίν; Lat. *delphinus*; Fr. *dauphin*] is properly the name of a cetaceous mammal of the Mediterranean (*Delphinus delphis*), the dolphin of the classic poets. It is six or eight feet in length, and very active in its habits. There are many similar species known as dolphins in various parts of the ocean. The dolphin of modern sailors, the beauty of whose colors when dying is so celebrated, is a true fish, the *Coryphæna hippuræ*, abounding in the warmer parts of the Atlantic, where it wages incessant warfare against the flying-fish and other inhabitants of the sea. It is often eaten, and is very palatable, but its flesh is said to be sometimes poisonous. The colors of the dying dolphin appear to be owing to the gradual evaporation of the water retained between the scales of the fish (which are translucent, while the body is white), causing the irised appearance seen in soap-bubbles, and known as the "colors of thin plates." The beauty, which is very real, has been much exaggerated by poets who have never personally observed it. The true dolphin has the snout prolonged into a rather slender beak separated from the forehead by a marked furrow.

**Dom**, or **Don** [from the Lat. *dominus*, a "lord"], a title originally assumed in the Middle Ages by the popes. It was afterwards borne by bishops, and sometimes given to monks, as Dom Calmet and Dom Mabillon. In Portugal the title *dom* is confined to the king and his family. The Spanish *don* was formerly a title confined to noblemen, but

is given by courtesy as indiscriminately as the English *Mr.* In the U. S., Roman Catholic dignitaries of German origin have the title *don*.

**Domain'** [Fr. *domaine*; Lat. *dominium*, from *dominus*, a "lord"], empire, authority; the territory over which authority is exercised; landed estate; an estate which a person has in his own right; that portion of the territorial possessions of a lord which he retains in his own occupation, sometimes called *DEMESNE* (which see). The term *domaine* is applied in France to public property in general. The public land belonging to the government or people of the U. S. is often called the public or national domain.

**Domain, Eminent.** See EMINENT DOMAIN, by PROF. T. W. DWIGHT, LL.D.

**Domat** (JEAN), a French jurist, born at Clermont, in Auvergne, Nov. 30, 1625. He was a friend of Pascal and other recluses of Port Royal. He officiated for many years as king's advocate at Clermont, and published an important systematic work entitled "The Civil Laws in their Natural Order" (1689). Died in Paris Mar. 14, 1696. (See E. CAUCHY, "Études sur Domat," 1852.)

**Dom-boc, or Doom Book** (*Liber Judicialis*), the name of a code of laws compiled by King Alfred, partly from the Kentish collection of Ethelbert and the Mercian laws of Offa, but chiefly from the laws made by his own ancestor, Ina. Alfred made few original laws, but restored and renovated those already existing. The laws of England, up to the time of the Norman Conquest, were administered in the vernacular speech of the people. Alfred's Christian character is clearly indicated in his code, which commences thus: "The Lord spake all these words, saying, 'I am the Lord, thy God.'" Then followed the ten commandments, a part of the Mosaic law, and passages from the New Testament, including the Golden Rule. The code was ratified by the Witan, as Alfred informs us.

**Dombrowski** (JOHN HENRY), a Polish general, born in the palatinate of Cracow Aug. 29, 1755. He fought against Russia in the war of 1792-94, during which he obtained the rank of general. In 1795 he entered the French service, and in 1797 passed into that of the Cisalpine republic as commander of a Polish legion. In 1806 he raised an army of 30,000 Poles to fight for Napoleon. He gained a victory at Dirschau in 1809, and took part in the Russian campaign of 1812. Died June 6, 1818.

**Dombrowsky** (JAROSLAV), a Polish revolutionist, born at Cracow in 1826, served first in the Russian army, and was in 1862 compelled to flee in consequence of having participated in the Polish insurrection. He is also accused of having been a counterfeiter and a traitor to the Poles. He formed in the beginning of the French-German war a Polish legion, was on April 8, 1871, appointed to the command of the insurgent troops at Asnières, and on May 9 succeeded Rossel as commander-in-chief of all the forces of the Paris Commune. On May 22 he was mortally wounded, and died on May 23.

**Dome** [It. *duomo*, originally the "house (*domus*) of God," afterwards applied in Italian to a cathedral, of which a *dome* in the common English sense of this word is one of the most remarkable features]. This word, though used often to signify a cupola, means, strictly, the outer part of a spherical roof, of which the cupola is the inner part. In Italy, however, it has a wider significance, being used to designate the chief church of a town. As all the chief churches were roofed in this way, the name of the church was applied to the kind or species of roof. The origin of the dome is often traced to the Eastern empire, because it was in the Byzantine provinces that it was first applied to ecclesiastical building. But the Romans really invented the dome, and originated all applications of the semicircular arch. The dome of the Pantheon is one of the most magnificent in the world, and domes of smaller size are in the temples of Bacchus, Vesta, Hercules, Romulus, etc. The three most renowned modern domes are those of St. Peter's at Rome, St. Paul's in London, and the Pantheon at Paris.

The dome of the Capitol at Washington is the finest in America. It is made of cast iron, and is surmounted by a bronze statue of Liberty twenty feet high, designed by Crawford. The dome is considered the finest iron structure in the world.

**Domenichi'no**, an Italian painter, whose proper name was DOMENICO ZAMPIERI, was born at Bologna Oct. 21, 1581. He was a pupil of Aniball Caracci at Rome, where he worked for several years. He was employed as painter and architect by Pope Gregory XV. Among his masterpieces are "The Communion of St. Jerome" (in the Vatican), "The Martyrdom of St. Agnes," and the "Cure of the Demoniac Boy." In the latter part of his life he worked in Naples, where he died April 15, 1641. (See LECARPENTIER, "Notice sur D. Zampieri," 1812.)

**Domesday Book.** See DOOMSDAY BOOK.

**Domestic Animals** are such as are reared by man for his own use, and at the same time tamed or familiarized to some extent to man's presence; for bees, silkworms, and a few other insects reared by man are never really tamed, though modified in many cases in form by the influence of man. A great many animals may be tamed, and yet not truly domesticated, for true domestication implies a course of breeding for many generations.

The more important domestic animals are the ox, buffalo, yak, sheep, goat, reindeer, camel, llama, alpaca (ruminants), the horse, ass, elephant, swine (pachyderms), rabbit, guinea-pig (rodents), dog, cat, ferret (carnivores), and of birds, the hen, turkey, peacock, guinea-fowl, pheasant (gallinaceous birds), goose, duck, etc. (natatores), besides the pigeons and various song-birds. The breeding of fishes for food is not true domestication.

The wonderful changes of form, habit, and temper observed in various breeds of the dog, and the still more remarkable variations in the form of pigeons, have suggested to many naturalists the idea of the mutability of species. (For a discussion of the question in this aspect, see DARWIN "On Domestic Animals and Cultivated Plants," 1867, and the articles EVOLUTION, by PROF. HENRY HARTS-MORNE, and DARWINISM, by PROFS. YOUMANS and SEELYE.)

**Dom'icile** [Lat. *domicilium*, from *domus*, a "house;" Fr. *domicile*], a mansion; a place of permanent residence; in law, the place where a person has his home or his legal place of abode.

A distinction must be taken between residence and domicile. A person may have two or more residences, but can have only one domicile. A domicile may be said to be the place where a person has his true fixed and permanent home and principal establishment, and to which, whenever he is absent, he has the intention of returning. A domicile may be acquired in three ways—by birth, by choice, or by operation of law. Domicile acquired in the first mode is frequently called "domicile of origin." When of choice, it must consist both of an act and an intent. A mere intent to acquire a domicile will have no effect. Nor will a prolonged residence in a particular place constitute a domicile, unless accompanied by an intent to acquire it. Domicile is acquired by operation of law when it is a consequence of certain legal relations, as in the instance of a wife. The rules affecting domicile have much importance in international law, whether public or private, and for this purpose it may be distinguished into domestic and national. Questions concerning the validity of marriages and divorces, the execution and construction of wills, and succession to estates, frequently depend on the law of domicile.

The leading rules governing domicile are these: 1. The domicile of origin continues until a new one is acquired. The same rule of continuance applies to successive domiciles. 2. A person having legal capacity may, in general, change his domicile at will. Persons under legal disability, such as minors and lunatics, have no such power. The domicile of a minor is in general that of his parent or guardian. 3. The law in some cases fixes the domicile of a person at the place where the person is under a duty to reside. Under this rule the holder of an office may be domiciled at a place where official duty requires him to reside. On the same principle the wife's domicile follows that of the husband, though this rule is modified in matters of divorce. 4. To change one's domicile there must be both an intent and an act. The intent may be inferred from a variety of circumstances, and in some instances the inquiry ranges over a period of many years. Under this rule an enforced sojourn in a place will not in general constitute a domicile. (See INTERNATIONAL LAW, PRIVATE, by PRES. T. D. WOOLSEY, S. T. D., LL.D.) T. W. DWIGHT.

**Dom'inant** [Lat. *dominans*, present part. from *dominor*, to "rule," to "prevail"], in music, the fifth tone of the scale, agreeing with the note G. The dominant is the ruling tone of the key, and next in importance to the first tone of the gamut.

**Domingo, Santo.** See SANTO DOMINGO.

**Dom'nic** [Sp. *Domingo de Guzman*], SAINT, founder of the order of Dominicans, born at Calahorra, in the diocese of Osma, Old Castile, in 1170, died in the monastery of St. Nicholas, at Bologna, Aug. 6, 1221. He studied theology in the University of Palencia, and was in 1194 made a canon of the chapter of Osma. In that position he distinguished himself by his zeal for the reform of canonical life and by his success as a missionary among the Mohammedans in the neighborhood. In 1204 he was chosen to accompany the bishop of Osma on a diplomatic errand, and on that occasion he came into contact with the Albigenses of Southern France. The ecclesiastical situation of those regions was rather critical at that moment. The Cistercians, who had been sent to convert the Albigenses,

gave up the task in despair and retired. Dominic, supported by a small brotherhood of followers, took it up and began preaching. He was not more successful than the Cistercians, but he was more persistent. Innocent III. sent a crusading army into the country, and in its track Dominic and the brotherhood followed, having been organized as a board of inquisition; the subjugated, when suspicious or suspected, were placed before that court, and when convicted of heresy they were returned to the soldiers for execution at the stake. After the successful close of the crusade, Dominic determined to transform the brotherhood into a monastic order, silence, poverty, fasts, complete abstinence from flesh, linen clothes, and perpetual preaching against heretics being the vows. Innocent III. had no faith in a new monastic order, and barely allowed it to be founded. His successor, however, Honorius III., was more favorable. He confirmed the order (1216) and gave it great privileges. Monasteries were founded at Metz and Venice, and Dominic himself, having preached, during a visit to Rome, to the lower servants of the papal household, who generally lived without any spiritual care at all, and made a great impression on them, was appointed *magister sacri palatii*, or court-preacher, to the pope—an office which is still held by a Dominican. Nevertheless, the new order would not grow, and it was not until 1219 that Dominic, being present at a chapter-general held at Assisi by the Franciscans, discovered the highway to success. At the chapter-general held by the Dominicans at Bologna in 1220 they declared for complete or absolute poverty, renouncing the possession of property in any form or shape, and adopting daily begging for the means indispensable to the sustenance of life. That proved the key to the popular sympathy; and when the next chapter-general was held (Bologna, 1221), sixty monasteries were represented, and members were sent to distant places to make preparations for new foundations. Thus Dominic lived to see his undertaking in a fair way to success. Twelve years after his death he was canonized by Gregory IX. (1233). His "Life" was written by JORDANUS, his successor as general of the order (Lacordaire, Paris, 1840, and Caro, Paris, 1853).

**Domin'ica** ("Sunday Island"), discovered by Columbus on Sunday, Nov. 3, 1493, a British West India island, is 22 miles N. of Martinique; lat. 15° 18' N., lon. 61° 24' W. It is 29 miles long, and has an area of 291 square miles. It is of volcanic origin, and is the highest of the Lesser Antilles, the summit having an altitude of 5314 feet. The soil of the valleys is fertile. The staple productions are coffee, sugar, cotton, tobacco, cocoa, copper ore, rum, and timber. The abolition of slavery increased the prosperity of this island. Dominica was ceded to Great Britain by France in 1763. The public revenue in 1870 amounted to £15,721; the expenditure to £15,248; the public debt to £7230. The total tonnage of vessels entered and cleared (exclusive of coasting-trade) was 19,160; the total value of imports, £60,278. Pop. in 1870, 28,517.

**Domin'ical** [from the Lat. *dominica*, the "Lord's day"] **Letter.** The Romans used the first eight letters of the alphabet (A to H) to mark the consecutive days of their recurring undinal period. The early Christians adopted the same plan for marking the days of the week, dropping the last one (H) as unnecessary. In the Church calendar A has always stood for the first day of January, B for the second, and so on. G therefore marks the seventh day, and the cycle begins again with A on the eighth. A returns in like manner on the 15th, the 22d, and so on. Each day in the year has thus its calendar letter; and the letter which falls on Sunday is called the *dominical letter* of the year. The 28th of February has always the letter C, and the 1st of March has always the letter D. The 29th day of February in leap-year has therefore no letter provided for it; and this makes a change in the Sunday letter after February; so that in leap-year there are two dominical letters. As the common year contains fifty-two weeks and one day, the dominical letter changes from year to year, going backward one place for every common year, and two places every leap-year. This mode of representing the days of the week has been uninterruptedly employed in the calendar of the Church throughout the world from the earliest ages of Christianity. F. A. P. BARNARD.

**Domin'icans**, an order of mendicant friars founded by Saint Dominic at Toulouse, was confirmed by Pope Innocent III. in 1216. They were called Black Friars in England, and Jacobins in France, from the Rue St. Jacques (Jacobus), where they first established themselves. In 1216, Honorius III. constituted the order under the rules of Saint Augustine, which enjoined almost continual fasts, perpetual silence, and other mortifications. In 1221 the order was introduced into England, and their first establishment made at Oxford. In 1276 the corporation of London granted the



order two lanes near the Thames, where a monastery was erected, the neighborhood of which is still called Blackfriars. The order of Dominican nuns was founded in 1206.

The secrets of the immense success of the mendicant and predicator orders were simply their ostentatious display of poverty and destitution, their sympathy with dirt and rags and all the horrors of misery, which made them accepted by the mass of the people as brethren, and their coarse and fanatic, but impressive and interminable, preaching, which made them the spiritual guides of the masses. Their poverty, however, soon became a mere simulation. Martin V. recalled the prohibition, so far as the Dominicans were concerned, to possess real estate or other property in 1425, and donations and bequests immediately began to pour down upon the order; it has erected some of the most magnificent ecclesiastical buildings in Christendom. To its preaching the order afterward added lectures. In 1228 it obtained a chair of theology in the University of Paris, and in 1230 another. At the beginning of the Reformation the Dominicans actually held supreme sway over theological science, and the last and most elaborate—also the narrowest and most unnatural—form of scholasticism was their work.

Among the men of genius and eminent scholars belonging to this order were Thomas Aquinas, Albertus Magnus, Meister Eckart, Johann Tauler, Heinrich Suso, Savonarola, Las Casas, Vincent of Ferrier, and Vincent of Beauvais. It has given to the Church more than eight hundred bishops, one hundred and fifty archbishops, sixty cardinals, and four popes. The reputation of the Dominicans in history, however, is stained by their cruel persecution of the Albigenses and the prominent part they took in the establishment and administration of the Inquisition. Their principal rivals were the Franciscans, and the two orders for a long time divided between them the control of the Church, and frequently of the Catholic states of Christendom. The history of theology, philosophy, and science was for a couple of centuries wholly taken up by the rivalry of the Dominicans and the Franciscans. All mental exertions were absorbed by the controversy between the Thomists and the Scotists, though the controversy seldom reaches beyond such questions as the exemption from hereditary sin—a question which found its final answer Dec. 8, 1854, when Pius IX., to the great humiliation of the Dominican order, promulgated the dogma of the immaculate conception. The Jesuits in the sixteenth century gradually took possession of the power formerly exercised by the Dominicans. Dominican monks and nuns are, however, still found in most countries. In the U. S. their numbers are increasing.

**Dominion of Canada.** See CANADA, DOMINION OF.

**Dom'inis, de** (MARCANTONIO), an Italian theologian, born in the isle of Arba, near Dalmatia, in 1566. He became professor of philosophy at Padua, and wrote a curious treatise on light entitled "*De Radiis Visus et Lucis in Vitris Perspectivis et Iride*" (1611), in which the phenomena of the rainbow were explained for the first time. After he had been appointed archbishop of Spalatro he went to England in 1616, and became a Protestant. He wrote "*De Republica Ecclesiastica*" ("On the Ecclesiastical Republic," 1617). In 1622 he returned to Italy, and relapsed into the Roman Catholic Church. Died Sept., 1624.

**Domin'ium** [from *dominus*, a "master," a "lord"], a legal term of the Romans, signifying a full legal right in and to an object, but which could not be conferred by actual possession alone unless such possession had endured for the period of legal prescription.

**Dom'ino**, an Italian word, is the name of a long loose cloak of black silk, furnished with a hood, worn at masquerades by persons of both sexes.

**Dom'inoes**, a game played by two or more persons with twenty-eight pieces of ivory or bone variously dotted. It is said to have been first introduced into France from Italy, and soon became popular throughout Europe. Various games are played with dominoes.

**Domi'tian** [Lat. *Domitianus*], or, more fully, **Titus Flavius Domitianus**, a Roman emperor, born Oct. 24, 52 A. D., was the second son of Vespasian. He succeeded his brother Titus in the year 81, and began his reign with moderation and apparent respect for justice. In the year 87 he was defeated by the Dacians, who compelled him to pay tribute. After 93 A. D. he became extremely cruel and suspicious, and caused many innocent persons to be put to death. He banished a number of eminent men and philosophers, including Epictetus. He was assassinated by conspirators in his palace in 96 A. D., and was succeeded by Nerva. (See SUTONIUS, "Domitianus.")

**Don.** See DOM.

**Don** (anc. *Tanaïs*), a river of Russia, rises in the gov-

ernment of Tula, and flows in a general S. E. direction to Katschalinsk. Below the town it runs nearly south-westward, and enters the N. E. part of the Sea of Azof near the town of Azof. Its total length is about 950 miles. The navigation of it is difficult during low water, but when the water is high (*i. e.* in April and May) vessels can ascend about 600 miles from its mouth. The Don is connected by a canal with the Volga. In its lower course it is subject to two floods, called respectively the cold water and the warm water, of which the former is caused by the melting of the snow in the country of the Don Cossacks, and the latter by the melting of the snow in the regions of its upper course. When flooded it presents a very lively aspect, a great number of steamboats traversing its waters from its mouth to Katschalinsk, the terminus of the Wolga railway. But when the flood subsides, in June or July, navigation almost ceases. It is generally closed by ice from November or December to March or April, and in rare cases the freezing has taken place in October. At Aksai it remains open 250 days in the year, but at the influx of the Medveditan only 239.

**Don**, a river of Scotland, in Aberdeenshire, rises in Ben Aven, and enters the North Sea 1 mile from Old Aberdeen. Its general direction is eastward, and its length, including windings, 78 miles. Nearly a mile from its mouth it is crossed by the "Brig o' Balgownie."

**Donaghadee'**, a seaport of Ireland, in the county of Down, and on the Irish Channel, 18 miles E. N. E. of Belfast. It has a good harbor, and trade in cattle, grain, and other articles. The embroidery of muslin is carried on here. Pop. 2664.

**Don'aldson** (EDWARD), U. S. N., born Nov. 17, 1816, in Maryland, entered the navy as a midshipman July 21, 1835, became a passed midshipman in 1841, a lieutenant in 1847, a commander in 1862, a captain in 1866, and a commodore in 1871. He commanded the steam-gunboat *Scioto* at the passage of Forts Jackson and St. Philip and capture of New Orleans April 24, 1862, and at the passage of the Vicksburg batteries June 28, 1862. Referring to the former battles, Commodore Henry H. Bell, Farragut's fleet-captain, writes: "Throughout the trying scenes of this dashing expedition, which is second to none on record, Captain Donaldson, his officers, and crew were conspicuous for their coolness, intrepidity, and good conduct." And in his report of the Vicksburg fight Rear-Admiral Farragut says: "It gives me great pleasure to mention that the officers and men of the ships which accompanied me up the river behaved with the same ability and steadiness on this occasion as in passing Forts Jackson and St. Philip." He commanded the steamer *Seminole* at the battle of Mobile Bay, and for his services on this occasion is thus highly complimented by Captain John B. Marchand in his official despatch of Aug. 7, 1864: "Commander Edward Donaldson, commanding the *Seminole*, which was lashed alongside of this ship, rendered most efficient service by his coolness and judgment in piloting both vessels until passing Fort Morgan, the regular pilot being sick. My additional thanks are due him and all his officers and men for volunteering to aid in manning the guns of the *Lackawanna*, and the continuous fire which they kept up whilst their guns could bear upon the enemy." Became rear-admiral 1876; retired Sept. 29, 1876. FOXHALL A. PARKER.

**Donaldson** (JAMES LOWRY), an American officer, born Mar. 17, 1814, at Baltimore, Md., graduated at West Point 1836, and July 28, 1866, assistant quartermaster-general U. S. A. (rank of colonel). He served in the artillery till Mar. 3, 1847, and subsequently in the quartermaster's department; on topographical duty 1836; in Florida war 1836-38; in emigrating Cherokees to the West 1838; on Maine frontier pending boundary controversy 1840-42; on the north-eastern boundary survey 1844-45; in the military occupation of Texas 1846; in the war with Mexico 1846-48, engaged at Monterey (brevet captain) and Buena Vista (brevet major); on quartermaster duty at various posts 1848-58; and chief of quartermaster's department of New Mexico 1858-62. He served in the civil war in command of the district of Santa Fé, N. M., 1861-62, engaged at Valverde; as quartermaster at Pittsburg, Pa., 1862-63; as chief quartermaster of the middle department 1863; as supervising quartermaster of the department of the Cumberland 1864-65, being in command of quartermaster's forces at the battle of Nashville; and as chief quartermaster of the middle division of the Tennessee 1865-66; of the department of the Tennessee 1866; of the military division of the Missouri 1866-69. Brevet colonel and brigadier-general Sept. 17, 1864, for distinguished services in the Atlanta campaign, and major-general U. S. A. Mar. 13, 1865, and major-general U. S. volunteers June 20, 1865, for faithful and meritorious services; retired Mar. 15, 1869; resigned Jan. 1, 1874. He

is author of "Sergeant Atkins," a tale of adventures in the Florida war, 1871. GEORGE W. CULLUM.

**Donaldson** (JOHN WILLIAM). See APPENDIX.

**Donaldson** (THOMAS LEVERTON), Ph. D., an English architect, born in 1795, studied architecture in Italy and Greece. He was long the professor of architecture in University College, London, from which he retired in 1864. He has published works upon ancient and modern art, "Pompeii Illustrated" (1837), "Architectural Maxims" (1847), and designed many fine buildings in London.

**Donaldsonville**, city, capital of Ascension parish, La. (see map of Louisiana, ref. 10-E, for location of parish), is on R. R. and Mississippi River at the origin of the Bayou Lafourche, 64 miles above New Orleans. It was formerly the capital of the State. Pop. in 1870, 1573; in 1880, 2600.

**Donati's Comet**. This most striking comet of the present century was discovered in June, 1858, by Donati, and continued visible for many months. It was nearest to the earth in Oct., at which time its tail was over 40° in length and remarkably brilliant. It was carefully observed by Prof. Bond of Cambridge, who published an elaborate and elegantly illustrated memoir on the subject. Mr. G. W. Hill combined all the observations that were made on its position, and as a result assigned to it a period of about 1950 years. Newcomb says that the uncertainty arising from imperfect observations may amount to 50 years.

W. G. PECK.

**Do'natists**, in ecclesiastical history, a party in the North African Church which effected a schism that lasted from 311 A. D. till the sixth century. They took their name from Donatus the Great, who was their bishop after Majorinus, from 315 to 348. The early history of this deeply interesting movement is obscure and complicated. A powerful exciting cause of the schism was the question as to the mild or severe discipline of Christians who left the faith in times of persecution, the Donatists advocating rigorous measures; but there were numerous other questions involved in the controversy, the most important being that of the union of the whole people within the Church (as maintained by the Catholic party), while Donatus demanded the separation of the Church from the world. Early in his reign Constantine the Great excluded the Donatists from the privileges conferred upon the Church, and in 316 A. D. he issued penal edicts against them. A fierce persecution ensued, lasting till 321, when the emperor granted them liberty of conscience. After his death the penal laws against them were revived, but they defended themselves with much spirit until, in 361 A. D., Julian (the so-called Apostate) restored to them their full freedom. Prosperity followed, and they boasted at one time of having 400 bishops in Africa; but controversies sprang up with each other and with the Catholic party, and in 415 their assemblies were forbidden on pain of death, Augustine himself joining in the persecution. Donatism, as well as the African Church in general, was overwhelmed by the Vandal conquest (428 A. D.), yet it survived in a feeble condition for many years.

The Donatists are held by many historians to have erred by excessive fanaticism and a schismatical spirit, while it is generally conceded that the treatment they received from the state Church was severe and injudicious. In doctrine they were essentially orthodox, and the charges of immorality brought against them appear to have been the inventions of their enemies. There were doubtless errors on both sides, but the general position of the Donatist party appears to have been in accord with that now taken by those Protestant churches which demand a personal experience of regeneration, as separating their membership from the world at large. (See SCHAFF and NEANDER, also DEUTSCH's "Drei Aktenstücke zur Geschichte des Donatismus," 1875.)

REVISED BY R. D. HITCHCOCK.

**Donato**, or **Donatello**, called **Donato di Niccolò di Betto Bardi**, a distinguished sculptor. (DONATELLO is simply a diminutive.) He was born in Florence, probably in 1386, and died in that city, according to Vasari, on the 13th Dec., 1466, but according to Palmieri in 1468. His first work of importance was a beautiful bas-relief of the Annunciation in the church of Sta. Croce. On the campanile of the cathedral of Florence are statues of Saint Matthew and Saint Mark (on the western face). That of Saint Matthew has a bald head, and from the resemblance of this to a gourd the Florentines nicknamed it *Il Zuccone*, or the "great gourd." This, of all his works, was Donatello's favorite, and he was so pleased with the life he had been able to impart to his statue, that, as the story goes, while he was working at it he would strike it impatiently, crying, "Why don't you speak, then?" He also used, says Vasari, to express the confidence he had in anything by the expression, "By the faith I have in my Zuccone." Donatello was a prolific worker, and much of his work re-

mains in good condition to attest his vividness of conception, his noble strong ideal, and his beautiful execution. His most famous work is the statue of Saint George, the patron saint of the sword-makers and armorers, which he made for that guild, and which was placed in a niche designed for it on the outer wall of the church of San Michele, under which was a bas-relief representing the fight of the saint with the dragon. To protect it from the action of the weather, the statue has been removed to another niche on the opposite side of the building.

Vasari makes Donatello one of the three successful competitors for the gates of the Baptistery—he and Brunelleschi withdrawing in favor of Ghiberti. Another famous work of this master is the bronze equestrian statue of Gattamelata (Erasmus da Narni, called Gattamelata, a *condottiere* (leader) of the Venetian troops), made at the command of the Signoria of Venice for the city of Padua. It stands on the platform of the church of Saint Antony. Donatello made a bronze statue of David, which is now in the Museo Nazionale (Bargello); a statue in wood of Mary Magdalen for the Baptistery, where it is still to be seen; and a statue of Judith, in a niche over one of the arches of the Poggia dei Lanzi, with a crowd of other works, no one of which is without interest.

Donatello's life has been very entertainingly written by Vasari. (See also PERKINS's "Italian Sculptors," also, by the same author, "Historical Handbook of Italian Sculpture," New York, Charles Scribner's Sons, 1883, and LUBKE, "History of Sculpture." DR. HANS SEMPER began in A. Von Zahn's now discontinued "Jahrbücher für Kunstwissenschaft," 3d year, 1870, Part 1, a valuable series of articles: "Donatello, seine Zeit und Schule." Of this only the first part has appeared. CLARENCE COOK.

**Donatus**, bishop of Casae Nigræ in Numidia, an early leader in the Donatistic schism, but not to be confounded with Donatus the Great, a much abler man, who was the second schismatical bishop, as noticed above.

**Donatus** (ÆLIUS), an eminent Latin grammarian, born about 333 A. D., taught rhetoric at Rome. He was the teacher of Saint Jerome, who expressed a high opinion of his talents. He wrote a work on grammar, which was commonly used in the schools of the Middle Ages. The word *Donat* became synonymous with *grammar*.

**Do'nauwörth**, a walled town of Bavaria, on the Danube, at the mouth of the Wernitz, 25 miles N. N. W. of Augsburg. It was formerly a free town of the empire, but has declined in importance. It has several churches and hospitals. Here Marlborough defeated the Bavarians in 1704, and here the French general Soult gained a victory over the Austrian general Mack Oct. 6, 1805. Pop. 3859.

**Do'nax** [from the Gr. *δῶναξ*, a kind of fish], a genus of bivalve mollusks of triangular form, belonging to the Tellinidæ. There are forty-five living European and tropical species, and thirty fossil ones from the eocene of Europe and the U. S. *Donax* is also the specific name of a reed or grass (*Arundo Donax*) found in the south of Europe, used for fishing-rods and other purposes.

**Don Beni'to**, a town of Spain, in the province of Badajoz, near the river Guadiana, 55 miles E. of Badajoz. It has manufactures of woollen goods, wine, and oil. Pop. 14,692.

**Don'caster** (anc. *Danum*), a market-town of England, in the West Riding of Yorkshire, and on the river Don, 35 miles S. of York. It is pleasantly situated and well built. The Don is here crossed by two stone bridges. Doncaster has a fine parish church, a public library, and a theatre. It was burned by lightning in 759 A. D. It is famous for its annual horse-races. Colonel St. Leger founded in 1776 the stakes, for which the best horses of England annually contend. Pop. in 1881, 21,139.

**Don'dra Head**, the most southern extremity of Ceylon, is in lat. 5° 55' N., lon. 80° 38' E.

**Donegal**, a county in the extreme N. W. part of Ireland, province of Ulster, is bounded on the N. and W. by the Atlantic Ocean. Area, 1859 square miles. The coastline is 395 miles long, and is deeply indented by many bays and loughs. The surface is mountainous, moory, and boggy. About one-third of it is arable. Granite, Devonian rocks, and carboniferous limestone are found here. This county has some manufactures of linen and worsted hose, and good fisheries of cod, sole, plaice, herring, and mackerel, but it was at one time also the chief seat of illicit distilleries in Ireland. Capital, Lifford. Pop. in 1881, 206,035.

**Donegal**, a seaport of Ireland, in the above county, on Donegal Bay, at the mouth of the Eske, 11 miles N. N. E. of Ballyshannon. It has a harbor for vessels which draw twelve feet of water. Lat. 54° 39' N., lon. 8° 6' W.

**Donegal**, MARQUESSES OF (1791), earls of Donegal (1647), earls of Belfast (1791), Viscounts Chichester and Barons Belfast (Ireland, 1625), Barons Fishwick (Great Britain, 1798), Barons Ennishowen and Carrickfergus (United Kingdom, 1841).—GEORGE HAMILTON CHICHESTER, third marquess, K. P., G. C. H., F. R. S., aide-de-camp of the queen, born Feb. 10, 1798, succeeded his father in 1844.

**Don'elison** (ANDREW JACKSON), LL.D., an American officer and diplomatist, born Aug. 25, 1800, near Nashville, Tenn., graduated at West Point in 1820. He served (1821-22) as lieutenant of engineers and as aide-de-camp to his uncle, Maj.-Gen. Jackson, when governor of Florida, just acquired from Spain. He resigned from the army Feb. 1, 1822, studied law, and became a cotton-planter near Nashville, Tenn. During President Jackson's administration (1829-33) he was his efficient private secretary; chargé d'affaires to Texas 1844-45, negotiating its annexation to the U. S.; and U. S. minister plenipotentiary to Prussia 1846-49; and to the federal government of Germany 1848-49. Soon after his return from Europe he became enlisted in efforts to secure the settlement of the slavery agitation growing out of the acquisition of territory from Mexico. With strong national views he became editor of the "Washington Union" 1851-52, and in 1856 the American candidate for Vice-President of the U. S. After his defeat he retired altogether from public life, and devoted his time to planting interests in Mississippi, till he died June 26, 1871, at Memphis, Tenn., aged seventy-one.

GEORGE W. CULLUM.

**Donelson, Fort**, a strong position on the W. bank of the Cumberland River, in Stewart co., Tenn., 2 miles below Dover, and 12 miles E. of Fort Henry. In the early part of the late civil war it was strongly fortified by the Confederates. On Feb. 14, 1862, this position, being held by Gen. J. B. Floyd with 15,000 men, was attacked by a fleet of gunboats under Commodore Foote, who was repulsed with considerable loss. Meanwhile, the army of Gen. Grant, advancing from the capture of Fort Henry, successfully fought the Confederates outside their works. Floyd and a large part of his force escaped by means of rafts. On the morning of the 16th, Gen. Buckner, in command of the remaining Confederates, proposed terms. Grant replied, "No terms except immediate and unconditional surrender will be accepted. I propose to move immediately upon your works." On the same day the fort was surrendered with 14,623 prisoners.

**Doneraile**, VISCOUNTS (1785), and Barons Doneraile (Ireland, 1786).—HAYES ST. LEGER, fourth viscount, born Oct. 1, 1818, and elected a representative peer for Ireland in 1855, succeeded his father in 1854.

**Do'nets**, a river of Southern Russia, the chief affluent of the Don, rises in the government of Koorsk. It flows nearly south-eastward, and enters the Don 40 miles N. E. of Novo-Toherkask. Length, about 400 miles.

**Dong-nai**, a river of Annam, enters the China Sea about 40 miles below the city of Saigon. It is navigable for large ships to Saigon.

**Dong-nai**, a town on an affluent of the above river, is about 25 miles N. E. of Saigon.

**Don'gola**, a province of Upper Nubia, is mostly included between lat. 18° and 19° 30' N., and is about 150 miles long. It is a narrow plain intersected by the river Nile.

**Dongola**, a town of Nubia, the capital of the above province, is on the left bank of the Nile, in lat. 19° 10' N. It is generally called **Dongola Makarah**, or New Dongola, in contradistinction to Dongola Angusa, or Old Dongola, a village, half in ruins, situated about 75 miles farther up the river and once a flourishing place, but destroyed by the Mamelukes. New Dongola grew up around the new military and administrative buildings which were established on the spot in 1820 by the Egyptian government, and it is now a thriving place, with well furnished bazaars, an indigo factory belonging to the government, public baths, and a considerable trade. The population is estimated at 6000.

**Dongola, Old**, a ruined town of Nubia, on the Nile, 75 miles S. S. E. of New Dongola.

**Doniphan**, capital of Ripley co., Mo. (see map of Missouri, ref. 8-I, for location of county), on R. R. and the Current River, about 200 miles S. by W. of St. Louis. Pop. in 1870, 146; in 1880, 167.

**Donizet'ti** (GAETANO), born at Bergamo Sept. 25, 1798, received his musical education in his native city and in Bologna; produced his first opera, "Enrico," at Vienna in 1818; composed about thirty other operas, now forgotten, in the style of Rossini; entered a new stage of development by his "Anna Bolena," Milan, 1830, partly under the in-

fluence of Bellini, partly in rivalry with him; acquired a European fame by his "Lucia di Lammermoor," Naples, 1835; produced at Paris in 1840 "La Fille du Regiment," "Poliuto," and "La Favorita," at Vienna in 1842 "Linda di Chamouni," at Paris in 1843 "Don Pasquale," was in 1844 struck by paralysis, and spent his last years for the most part in a lunatic asylum. He died at Bergamo April 8, 1848.

**Don'jon**, or **Dun'geon** [from the Celtic *dun*, a "height" or "hill"], the central building, tower, or keep of an ancient castle or fortress of the Middle Ages. It was often erected on a natural or artificial elevation. The lower story of the donjon was used as a prison.

**Don Juan**, a mythical personage, was, according to Spanish tradition, a profligate nobleman who killed in a duel the father of a lady he had attempted to seduce. Having afterwards invited to a feast the statue erected to his victim, he challenges the spirit, whose existence he denies, to manifest itself to him. The spirit thereupon proves its power, and condemns him to perdition. This story was dramatized by Tirso de Molina; it also forms the subject of one of Molière's comedies and Mozart's celebrated opera, and numerous other productions of fiction.

**Donkey**. See ASS.

**Donkey-Engine**, a small auxiliary engine used on shipboard, in factories, etc. for hoisting and lowering goods, for working the ship's rigging, raising anchors, etc.

**Donne** (JOHN), D. D., an English poet, born in London in 1573. He married a niece of Sir George More of Loxly, lord-lieutenant of the Tower, who was visiting in the house of Sir Thomas Egerton, afterward Lord Chancellor Ellesmere, where he had a position as private secretary. Though Donne had already acquired a reputation as a poet, Sir George absolutely refused to give his consent to the marriage, and when they were, nevertheless, married clandestinely, he disinherited the daughter. Donne afterward became a priest of the Anglican Church, although of Roman Catholic parentage, and not without scruples on that account. But James I. had conceived high ideas of his theological capacity, and would give him no other preferment than in the Church. Having gained distinction as an eloquent preacher, he was appointed dean of St. Paul's, London, in 1621. He wrote elegies, satires, and other poems, and belonged to the school called "Metaphysical Poets," whose works abound in forced conceits. Some of his early poems are very licentious, but many have great poetic merits. His sermons are justly admired. The first complete edition of his poems was issued in 2 vols., London, 1872. Died Mar. 31, 1631. (See IZAAK WALTON, "Life of J. Donne," 1640; H. ALFORD, "Life of Donne," 1839.)

**Donnelly** (IGNATIUS). See APPENDIX.

**Don'ner Lake**, a small lake in Nevada co., Cal., near the Central Pacific R. R., 154 miles from Sacramento. It is a place of summer resort. It takes its name from the tragical fate of a party of overland emigrants, led by a man named Donner, who in the winter of 1846 were snow-bound at this point, and nearly all starved to death, the survivors having eaten the flesh of their dead comrades.

**Don'nybrook**, a parish and village of Ireland, in the county of Dublin. The village is about 2 miles S. E. of Dublin. It has a magdalen asylum, a dispensary, a hospital for incurables, and a lunatic asylum, called the Bloomfield Retreat, established by the Society of Friends. Here is a famous annual fair, held during the week commencing Aug. 26. Pop. 1892.

**Dono'so Cortés** (JUAN), MARQUIS DE VALDEGAMAS, a Spanish writer and diplomatist, born in Estremadura May 6, 1809. He opposed Don Carlos, and became secretary to Queen Isabella in 1844. In 1848 he was sent as ambassador to Berlin. He was conservative in politics, and defended the Roman Catholic religion in his "Essay on Catholicism, Liberalism, and Socialism" (1851). He died May 3, 1853.

**Donoughmore**, EARLS OF, and Viscounts Suidale (1800), Barons Donoughmore (Ireland, 1783), Viscounts Hutchinson (United Kingdom, 1821).—JOHN LUKE GEORGE HELY HUTCHINSON, fifth earl, born Mar. 2, 1848, succeeded his father Feb. 22, 1866.

**Don Quixote de la Man'cha** is the title of a celebrated satirical romance by Cervantes, the most celebrated book in the whole Spanish literature. First part of it was published at Madrid in 1605; second in 1615; first collected edition in 1617. The best edition is that by the Academy of Madrid, in 4 vols., in 1780, reprinted several times; in 1819 in 5 vols. with good notes. There are about sixty French translations; that by Viardot, Paris, 1836, is said to be the best. The English translation by Motteux, the German by Ludwig Tieck, Berlin, 1815, and the Danish by Charlotta Dorothea Biehl, Copenhagen, 1776, are

good. The famous illustrations by Gustave Doré, Paris, 1863, have been reprinted in London, 1864, and in Berlin, 1867.

**Doo** (GEORGE THOMAS), F. R. S., a skillful English historical engraver, born in Surrey Jan. 6, 1800. He became historical engraver to Queen Victoria in 1842, and was elected a Royal Academician in 1856. Among his works are "Eee Homo," after Correggio; "Knox Preaching," after Wilkie; and "Pilgrims Coming in Sight of Rome," after Eastlake. He exhibited at the Great Exposition of Paris in 1867 his engraving of "Saint Augustine and Saint Monica," after Scheffer, and in 1878 three portraits.

**Dobov'ka**, a town of European Russia, government of Saratof, on the river Volga, 180 miles S. S. W. of Saratof. It has an active trade by the river. Pop. in 1881, 12,767.

**Doo'little** (JAMES ROOD), LL.D., born Jan. 3, 1815, at Hampton, Washington co., N. Y., graduated at Hobart College in 1834, was elected U. S. Senator from Wisconsin in 1857, and re-elected in 1863.

**Dooly** (JOHN M.), a lawyer and judge of Georgia, greatly distinguished in his day, and the most famous wit ever produced in the State. His sayings and repartees have formed the staple of the raciest bar anecdotes throughout the commonwealth for the last half century, and are likely to be transmitted in legendary tradition, within the same sphere, to many generations hereafter. Born in 1772, and died in 1827.

**Doom** [probably allied to the verb "deem," to "think," to "judge"], the name formerly given to the Last Judgment, and to representations of it in churches by painting or otherwise. Most of these were obliterated in the time of Edward VI., but a fine one still exists in the church of the Holy Trinity at Coventry.

**Doom** (or **Dum**) **Palm** (*Hyphane Thebaica*), a native of Upper Egypt and Central Africa, where it sometimes forms forests, growing even in the deserts. The lower part of the stem is single, and invariably divides at a certain height into two branches, each of these again being bifurcated, always in two sets. The wood is tougher than that of most other palm trees. It has fan-shaped leaves, globular fruit about the size of an orange, with the outer skin red, enclosing a thin spongy substance which resembles gingerbread. From this substance, which forms an article of food, it has been called the gingerbread tree. Ornaments are made from the hard, semi-transparent kernel of the fruit. This tree produces the gum resin called Egyptian bdellium, and its fibre is made into ropes which are dyed black.

**Dooms'day Book**, or **Domesday Book**, often called simply **Domesday**, the name of an ancient record of England containing a statistical account of the state of that country, made by William the Conqueror in the year 1086. Several of the northern counties were not included in this account. The origin of the name is not precisely known, but it seems to indicate the absolute authority of the book in doom or decision on matters of which it treats. The original record, in two parts, the "Great" and "Little Domesday," is still preserved at Westminster. It was also known as the *Liber Regie*, or the "King's Book;" the *Scriptura Theauri Regie*, or "Record of the King's Treasury;" the *Liber Censualis Anglie*, or "Rate Book of England," etc. This work is very comprehensive and minute, and forms the basis of all historical accounts of those times. It was the first great English record published at the cost of the nation, and appeared in two folios, printed with types cast for the purpose. It was ten years in passing through the press, being completed in 1783; and later supplementary records have been since published. Several other ancient English records are known as *Domesdays*. For example, the registers of the visitations and inquiries made by the dean and chapter of St. Paul's, London (1181-1222), were published in 1857 by the Camden Society as the "Domesday of St. Paul's."

**Doon**, a river of Scotland, rises in Ayrshire, flows nearly north-westward, and enters the Frith of Clyde 2 miles S. of Ayr. It is 30 miles long, and passes through picturesque scenery. The Doon has been immortalized by the poet Burns. Loch Doon, an expansion of this river, is 5 miles long, and is enclosed by mountains.

**Door** [a word etymologically related to the Dutch *door*, "through," the prominent idea being that of a "place to go through"], the panel of wood or other material by which the entrance of a house, etc. is opened or closed. Doors are of different kinds, the most common being made to move on hinges. Others, called sliding doors, are moved on rollers. A trap-door opens vertically over a hole in a roof or floor, while a jib-door is made even with the wall, and concealed as nearly as possible. Doors are also made of bronze, iron, and stone.

In architecture, great attention has been paid to the ornamentation of doors. Perhaps the finest example in the U. S. of ornate doors is afforded in the bronze doors of the old Representatives' Hall in the Capitol at Washington, which were cast in Munich, and are covered with beautiful historical and emblematic figures.

**Doo'ra**, or **Dhurra**, called also **Indian Millet** (*Sorghum vulgare*), a kind of grain much cultivated in Asia, Africa, and Southern Europe. The genus differs from *Andropogon* in having hermaphrodite spikelets and glumes, with three small teeth at the end. The species are mostly tall, broad-leaved annual grasses, with large panicles, and strong culms containing a sweet and juicy pith. The doora (sometimes called jowaree in India) has grain somewhat larger than mustard-seed; it yields abundant crops, and the stalks and leaves are food for cattle and horses. The sugar-grass or Chinese sugar-cane (*Sorghum saccharatum*), a sugar-producing plant, has been introduced into the U. S. and cultivated with success. The Caffer corn (*Sorghum Caffrorum*) is chiefly valued as food for horses. The doora grows well in the U. S., but has not been found profitable for culture.

**Doorak'**, a town of Persia, in Khoozistan, at the confluence of the Doorak and Jerahi rivers, is about 200 miles S. W. of Ispahan. It has manufactures of silk handkerchiefs. Pop. about 8000.

**Doorkeeper of the House of Representatives of the U. S.** At the commencement of each Congress a doorkeeper is elected *viâ voce*, and he continues in office until a successor is qualified. He takes the usual oath of office, with the addition that he will keep the secrets of the House. His general duties are those described as appertaining to the same officer in the Senate. He keeps hung up at each entrance-door of the Representatives' chamber printed lists of those entitled to enter, so that visitors may understand his duties and their privileges. The galleries of both houses are open to all orderly people; the diplomatic corps, the reporters, the ladies, and gentlemen without them, having separate entrances and divisions assigned them. (See GILLET, "Federal Government," 1872.)

**Doorkeeper of the Senate of the U. S.** The sergeant-at-arms of the Senate is, *ex officio*, doorkeeper to that body, having an assistant doorkeeper to aid him in performing his duties, and who, in fact, acts as doorkeeper. He keeps the doors of the Senate, and announces from them messages from the President and House of Representatives. As doorkeeper he appoints superintendents of the folding-room and document-room, messengers, pages, folders, and laborers, and discharges various duties not enumerated in the rules. He folds and distributes extra documents, furnishes members with printed bills, reports, and other documents, conveys messages for members, and keeps the hall, galleries, and committee-rooms in order. (See GILLET, "Federal Government," 1872.)

**Doorn'boom** ("thorn tree," *Acacia horrida*), a tree growing abundantly in South Africa, so named by the Dutch on account of its sharp and numerous spines. Its usual height is about thirty feet, and the wood is valued for building.

**Doo's'tee**, a river of Beloochistan, enters the Arabian Sea in lat. 25° 15' N., lon. 61° 50' E. It is nearly 900 miles long, but is shallow in all parts of its course.

**Dore, Mont**, a group of high mountains in Auvergne, France, in the department of Puy de Dôme. They are of volcanic formation. The highest summit is the Pic de Sancy, which has an altitude of 6190 feet.

**Dora d'Istria** [from *Istria*, the Roumanian name of the Danube] is the literary pseudonym of Helene Ghika, Princess Koltzoff Massalsky, the celebrated Roumanian writer. She was born at Bucharest Jan. 22, 1829, a niece of Prince Alexander Ghika, ex-hospodar of Walachia. Thoroughly conversant with classical literatures and languages from her home-education, she made herself master of the principal European languages and literature by extensive travels. After her marriage with Prince Koltzoff Massalsky she lived partly in Russia, partly in Italy and Switzerland. Her principal works are "Monastic Life in the Oriental Church" (1855), "The Heroes of Roumania," "The Roumanians and the Papacy," "Women in the Orient" (1858, 2 vols.), "On Women, by a Woman" (1864), besides a great number of minor essays in various periodicals. She has been elected member of several scientific societies.

**Do'ra Balte'a** (anc. *Duria Major*), a river of Italy, in Piedmont, rises at the foot of the Little St. Bernard, and enters the Po near Crescentino. Length, about 90 miles.

**Dora'ma**, a town of Arabia, in Nedjed, 30 miles N. E. of Derayeh. The caravans moving between Persia and

Mecca halt here to obtain supplies. It was taken in 1818 by Ibrahim Pasha, who killed nearly all the inhabitants. Pop. about 8000.

**Dor'cas Soci'ety**, a benevolent association of ladies, usually of the same congregation, for the purpose of providing the poor with clothing. It is so called from Acts ix. 39: "And all the widows stood by him weeping, and showing the coats and garments which Dorcas made while she was with them."

**Dor'chester** (anc. *Durnovaria* and *Durinum*), a town and parliamentary borough of England, the capital of Dorsetshire, is on the river Frome and on the South Downs, 115 miles W. S. W. of London and 7 miles from the English Channel. It sends two members to Parliament. The South-western Railway connects it with London on the one hand and Weymouth on the other. Here are the remains of the most perfect Roman amphitheatre in England, 218 feet long and 163 feet wide. The seats for the spectators were formed of masses of chalk, rising 30 feet above the arena, and in its complete state the amphitheatre is supposed to have been capable of accommodating thirteen thousand spectators. It is also probable that the Poundbury camp, to the north-west of the town, is of Roman origin. Indeed, Durnovaria, the old Latin name of Dorchester, was one of the principal stations of the Romans in England, and was surrounded with a wall and a fosse, of the former of which parts are still standing. Pop. in 1881, 7567.

**Dorchester**, a river-port and capital of Westmoreland co., New Brunswick, is on the Memracook River, near its mouth, and on the Intercolonial Railway, 115 miles E. N. E. of St. John. Large ships can ascend from the Bay of Fundy to this place, which has an active trade. Gas-coal and building-stone are largely exported. It has a court-house, jail, and many fine buildings. Pop. including Dorchester township, in 1881, 6582.

**Dordogne**, a department in the S. W. part of France, has an area of 3545 square miles, and is bounded on the N. by Haute Vienne, on the W. by Charente and Charente Inferieure, on the S. W. by Gironde, on the S. by Lot-et-Garonne, and on the E. by Lot and Corrèze. It is drained by the river Dordogne. The surface is diversified by hills, marshes, and fertile valleys. The soil is generally sandy. Chestnuts and wine are among the staple productions. Here are mines of coal, copper, and iron, and quarries of marble and alabaster. It has manufactures of paper, brandy, hosiery, and iron. Capital, Périgueux. Pop. in 1881, 495,037.

**Dordogne**, a river rising in the S. central part of France, flows nearly westward through the departments of Corrèze, Lot, and Dordogne, and enters the Garonne 13 miles N. of Bordeaux. It is about 220 miles long, and is navigable for 150 miles.

**Dordrecht**. See DORT.

**Doré** (PAUL GUSTAVE), a French painter and designer, born at Strasburg Jan. 6, 1833. He was educated at Paris, and in 1848 made his first public appearance as an artist with some pen-and-ink drawings sent to the Salon. His first successes were obtained by his paintings, chiefly of landscape subjects, but in 1854 he illustrated an edition of "Rabelais," and in 1856 published a series of designs illustrating the story of the Wandering Jew, by which performances the public attention was strongly directed towards him. In the same year (1856) he illustrated an edition of Balzac's "Contes Drolatiques," which is the work that shows all his powers in their fullest and freest exercise. One would say that the stories were written for the designs, so perfectly do these follow and reflect the audacious indecencies of that most libertine of books. Meanwhile, Doré was making himself known in a wider and happier circle with his designs for Perrault's "Fairy Tales" (1861), "Don Quixote" (1863), the "Travels in the Pyrenees" of Taine (1859), which has been translated and published with Doré's designs in New York (1873), and the "Fables" of La Fontaine (1867). These works were suited to the artist's talent, but he overleaped the saddle when his ambition led him to try to illustrate Dante and the Bible. Though his designs for these works created a wide interest, and it was felt that he showed a great deal of facility and felicity in his inventions, yet it was also felt that they were wholly inadequate, and they have failed of any lasting success. Indeed, they were mere publishers' ventures, and of late years Doré came to be a mere hack worker. His "Rabelais," however, published in 1873, an enlarged issue of his early work, shows him more at home in his proper field. In 1866-68 he was laid hold of by English publishers, who persuaded him to illustrate Tennyson's "Idylls," a work of whose very existence, and naturally, the Frenchman was ignorant, and

into the spirit of which he was powerless to enter. The work was an unhappy failure. Doré designed and executed a statue of Alexandre Dumas the elder, which was not set up until 1883. It is a work of no little merit. Doré was one of the most prolific designers that ever lived, but it would be unfair to conceal the fact that he owed much of his success to the admirable wood-engravers who have translated him to the public. In these successive publications Pisan, Dumont, Gauchard, and others have created a new era in the art of engraving on wood. Died Jan. 23, 1883. CLARENCE COOK.

**Dorée** [Fr. *dorée*, "gilded"], the name of several species of fish of the genus *Zeus*. The one most common on the British coasts is *Zeus faber*, commonly called John dory, a corruption of the French *jaune dorée* (golden-yellow). Its color is dusky-green, tinged with gold; the head is large, and on each side of its body is a dark oval spot. It is highly prized by epicures.

**Doremus** (SARAH PLATT). See APPENDIX.

**Do'ria**, the name of one of the most noble and powerful families of Genoa. It was attached to the Ghibelline party. In 1339 the families of Doria, Spinola, Grimaldi, and Fieschi, which had by their rivalry long troubled the republic, were exiled.—PAGANINO DORIA, a famous Genoese admiral, gained a naval victory over the Venetian admiral Pisani in 1352.

**Doria** (ANDREA), a celebrated Genoese admiral and patriot, born at Oneglia Nov. 30, 1468, is called the restorer of Genoese liberty. He entered the French navy about 1490, gained the rank of admiral, and commanded with success the fleet of Francis I. in the war against Charles V. In 1524 he defeated the imperial fleet near Marseilles. He also captured Genoa, from which he expelled the Adorni. In 1528 he abandoned the service of Francis I., and became an ally and adherent of Charles V., on the condition that Genoa should be a free and independent state. He entered Genoa in 1529, was welcomed by the citizens, and gave them a free constitution, which remained in vigor until the republic ceased to exist. He afterwards acted as admiral in the service of the emperor, and gained a victory over the Turks near Patras in 1532. In 1535 he contributed greatly to the conquest of Tunis. Charles V. gave him the title of prince of Meli. Doria died without issue at Genoa Nov. 15, 1560. (See CARLO SIGONIO, "De Vita et Gestis A. Doriæ," 1586; RICHER, "Vie d'André Doria," 1789.)

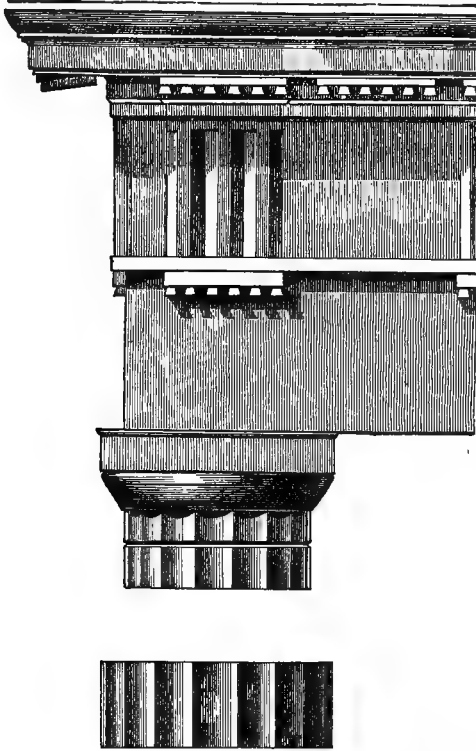
**Do'rians** [Gr. *Δωριεῖς*], one of the four principal branches or tribes of the ancient Hellenic people, claimed that they were descended from Dorus, a son of Hellen. They are supposed to have originally lived in Doris, from which they migrated to the Peloponnesus, where they founded Sparta, Argos, and Messenia. The migration of the Dorians to the Peloponnesus, which is called the return of the Heraclidae, and forms a celebrated epoch in ancient chronology, is said to have occurred soon after the siege of Troy, in 1104 B. C. Dorian colonies were planted in Crete, Sicily, and Asia Minor. The Dorians were the most powerful and warlike of the Hellenic tribes. They used a peculiar dialect, called the Doric. They surpassed the Ionians in solidity and earnestness of character, but were less refined and ingenious. (See K. O. MÜLLER, "Die Doriæ," 2 vols., 1824; 3d ed. 3 vols., 1844; CURTIUS, "History of Greece.")

**Dor'ic Di'lect**, one of the principal dialects of the ancient Greek language, took its name from the Dorians, among whom it was the principal dialect used. It was distinguished by its strength and the broadness of its sounds, and was much less finished than the Attic and Ionic.

**Doric Order**, one of the orders of classic architecture, takes its name from the Dorians, its possible inventors. It is popularly considered the oldest of the Greek orders, but Fergusson, Viollet-le-Duc, and other scholars think the Ionic or Ionian style was brought earlier from Asia into Greece. However it may have been—whether the earlier buildings were built of wood and so perished, or whether the style was simply abandoned for the severer Doric—it is certain that the Greeks showed a marked preference for the Doric, and used it in all the buildings of which we have any knowledge from their remains, until the time of the Roman conquest. The order is characterized by an air of dignity and strength. The true Doric column rests upon a stylobate of three courses, together equal to one inferior diameter of the shaft, which is itself from four to six diameters in height. Its superior diameter is three-fourths of the inferior, the latter being the unit of measure. This diminution is reached by an entasis or slight curve. Doric columns generally have twenty shallow flutes, separated by a sharp edge. The capital is about half a diameter in height, composed of an abacus, resting upon an echinus



of variable proportions. The columns incline slightly inwards towards the main building. The architrave, frieze,



Doric Order.

and cornice were ornamented with simple yet beautiful mouldings of various forms. CLARENCE COOK.

**Dor'is** [from the Gr. *Δωρίς*, the name of a daughter of Oceanus and Tethys, and the wife of her brother Nereus], a genus of marine gasteropodous mollusks belonging to the section Nudibranchiata. They are found mostly in southern seas, but several species are native on northern coasts. They have an oval body; the mouth is a proboscis with two tentacula, and the vent is encircled by branched gills. They are sometimes called sea-lemons.

**Dor'is** [*Δωρίς*], a small district of ancient Greece, was bounded on the N. by Thessaly, and on the other sides by Locris, Phocis, and Ætolia. The surface is mountainous. The people were called DORIANS (which see). Doris is now an eparchy in the government of Phocis.—The name DORIS is also given by some ancient writers to that part of Caria which was occupied by Dorian colonists and their descendants.

**Dor'mant** [present part. of the Fr. *dormir*, to "sleep"], in heraldry, a sleeping animal, with its head resting on its fore paws, as a lion *dormant*.

**Dormant Animals.** See HIBERNATION.

**Dor'mer** [probably from the Fr. *dormir* (Lat. *dormio*, *dormire*), to "sleep," because it lighted sleeping apartments], or **Dormer Window**, also written **Dorment** or **Dormar**, a window inserted on the inclined plane of the roof of a house, the frame being placed nearly vertically with the rafters. It is often used for the purpose of lighting the attic or garret of modern dwelling-houses.

**Dor'mouse** [a contraction of *dormant mouse*, because the animal is dormant in winter], a small rodent animal of the genus *Myoxis*, regarded as a connecting link between the Sciuridæ (squirrels) and the Muridæ (mice, etc.). Each jaw contains four molar teeth on each side; there are no cheek-pouches; each of the fore paws has four toes and a rudimentary thumb, and they have five toes on the hind feet. They have ears like mice; their fur is soft and fine, and the tail long. They are mostly natives of Southern Europe. The muscardine or red dormouse (*Myoxis avelanarius*) is the only British species. The fat dormouse (*Myoxis glis*) is about the size of a rat, of a brown-gray color, with a bushy tail. It is prized as food by the Italians. The garden dormouse (*Myoxis nitela*) is found in the central parts of Europe. It is often injurious to fruit trees. They all remain dormant the greater part of the winter.

**Dorn** (JOHANN ALBRECHT BERNHARD), a German Orient-

alist, born in Saxe-Coburg Mar. 11, 1805. He became in 1843 the chief librarian of the imperial library at St. Petersburg.

**Dorn'birn**, a town of Austria, in Tyrol, about 7 miles S. of Bregenz, which is on Lake Constance. The men are mostly carpenters, employed in the construction of wooden houses, which are exported. It has manufactures of cotton fabrics. Pop. in 1869, 8486.

**Dor'ner** (ISAAC AUGUST), D. D., an eminent Protestant theologian, born in Neuhausen-ob-Eck in Württemberg June 20, 1809. He was educated at Tübingen, and became professor of theology at Tübingen (1838), Kiel (1839), Königsberg (1840), Bonn in 1847, and at Berlin in 1857. He wrote, besides other works, a "History of the Development of the Doctrine of the Person of Christ" (1839), and an able work entitled "History of Protestant Theology, especially in Germany" (1867); also "History of Pietism, especially in Württemberg" (Hamburg, 1840), "The Principle of our Church" (Kiel, 1841), etc. He visited the U. S. in 1873 as a delegate to the meeting of the Evangelical Alliance. D. July 12, 1884.

**Dor'nic, Dornick, or Dor'nock** [from *Doornik*, Flemish for Tournay], the name of a kind of figured linen of coarse quality, originally made at Tournay.

**Dor'noch**, a royal burgh of Scotland, capital of the county of Sutherland, is on an inlet of the sea called Dornoch Frith, 14 miles N. of Cromarty. It has an old cathedral, which was restored by the duchess of Sutherland in 1837. Pop. in 1881, 497.

**Do'rogoboozh'**, a town of Russia, in the government of Smolensk, on the river Dnieper, about 55 miles E. N. E. of Smolensk. The Russians here defeated the French in Oct., 1812. Pop. 9099.

**Dorosma**, a town of Central Hungary, in Little Cumania, 6 miles W. N. W. of Szeged. Pop. in 1881, 10,657.

**Dorp**, a town of Prussia, in the Rhine province, on the Wupper, has iron, steel, and paper factories. It was before 1849 an insignificant place, but since that time, like so many other towns in Wupper Valley, it has greatly increased, and has become the centre of a considerable manufacturing industry, owing principally to the presence of huge coal-deposits. Pop. in 1881, 11,999.

**Dor'pat, or Derpt** [Russ. *Юрьев*], a town of Russia, in the government of Livonia, is on the river Embach, 138 miles N. E. of Riga. It is well built, and has a stone bridge across the river. The old ramparts have been converted into gardens and public promenades. Here Gustavus Adolphus founded in 1632 a university which became a large and celebrated institution. Nearly all the lectures at the university are given in the German language, but the Russian government is making great efforts to substitute the Russian for the German. Struve and Mädler have successively directed the astronomical observatory of Dorpat, which their labors have made famous. The town has a gymnasium. Dorpat was founded in 1030, became an important town, sank into decay, but revived at the beginning of the last century. It was captured by the Swedes in 1625, and by the Russians in 1704. Pop. 29,727.

**Dorr** (BENJAMIN), D. D., was born at Salisbury, Mass., Mar. 22, 1796, graduated at Dartmouth in 1817, studied law and then theology, was ordained to the Protestant Episcopal ministry in 1820, was a rector in Lansingburg, Waterford, and Utica, N. Y., general agent for the domestic committee of the Board of Missions (1835-37), and afterwards rector of Christ Church, Philadelphia. He published, besides other works, "The Churchman's Manual," "Recognition of Friends in Another World," "Travels in Egypt, the Holy Land," etc. Died Sept. 18, 1869.

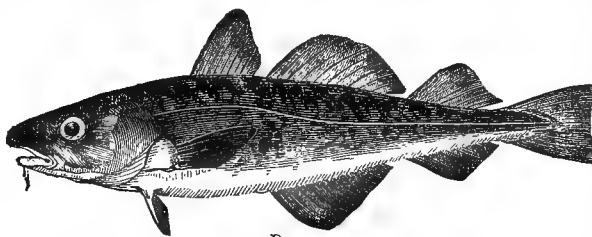
**Dorr** (THOMAS WILLIAM), born at Providence, R. I., Nov. 5, 1805, graduated at Harvard in 1823, was a Democrat and a leader of the suffrage party. Under the old charter the right to vote was limited to men who possessed a certain amount of real estate, and to their eldest sons. In 1841 the suffrage party formed a new constitution, and chose Mr. Dorr governor of the State. His official action was resisted in May, 1842, by the government chosen according to the old charter. Dorr was arrested, convicted of treason, and sentenced to imprisonment for life, but he was pardoned in 1847. Died Dec. 27, 1854.

**Dor'relites**, the followers of a man named Dorrel, who lived in Leyden, Mass., and who claimed to be equal to Christ and invulnerable; but having been soundly beaten by one of his hearers, his congregation was at once dispersed.

**D'Orsay** (ALFRED GUILLAUME GABRIEL), COUNT, a French artist and leader of fashion, was born at Paris in 1798. He married a daughter of Lord Blessington in 1827, but subsequently separated from her, and became

the intimate friend of Lady Blessington. His wit, manners, amiability, and brilliant talents made him very popular in the society of London. Died at Paris Aug. 4, 1852.

**Dorse** (*Morrhua callarias*), a fish sometimes called



Dorse.

**Baltic Cod**, from the great numbers found in the northern seas. It is less in size than the cod, and differs from it also in having a longer upper jaw.

**Dorset**, a county in the S. part of England, is bounded on the N. by Somerset and Wiltshire, on the E. by Hampshire, on the S. by the English Channel, and on the W. by Devonshire. Area, 988 square miles. The surface is partly hilly and occupied by chalk-downs. The chief rivers are the Frome and the Stour. Among the mineral resources are chalk, china clay, and the celebrated Portland building-stone. The chalk-downs or hills produce fine pasture, on which vast numbers of Southdown sheep feed. Dorset is mainly a pastoral county, and exports cattle, sheep, butter, and cheese. From the middle of March to midsummer great quantities of mackerel are caught along its shores. The chief towns are Dorchester (the capital), Poole, Bridport, Weymouth, and Shaftesbury. The Saxons called the country *Dornisota* or *Dorsota*, from the root *dior*, "water." In the Roman period it belonged to *Britannia prima*, and in the British, previous to the landing of Cæsar, it was, according to Ptolemy, inhabited by a tribe of the name *Durotriges*. Pop. in 1881, 191,028.

**Dorset** (CHARLES SACKVILLE), K. G., SIXTH EARL OF, an English courtier and wit, born in 1637, was a son of Richard, the fifth earl of Dorset. He was brave, witty, and generous, and had superior talents, but was indolent and unambitious. His popular qualities rendered him a general favorite. He was distinguished as a patron of literary men, and bestowed his bounty with equal judgment and liberality. Dryden was one of the authors who enjoyed his bounty. Lord Dorset was appointed lord chamberlain by William III. in 1689. He wrote several admired satires and songs. Died Jan. 16, 1706.

**Dorset** (THOMAS SACKVILLE), K. G., FIRST EARL OF, an English statesman and poet, born in 1536. He wrote a tragedy entitled "Gorboduc, or Ferrex and Porrex" (1561), which was praised by Sir Philip Sidney, and also the "Induction to the Mirror for Magistrates." He received the title of Lord Buckhurst in 1566, and was sent as minister to France in 1570. In 1599 he succeeded Lord Burleigh as lord treasurer of England. He was afterwards created earl of Dorset by James I. He died April 19, 1608, and was succeeded by his son Robert.

**Dorsey** (JOHN SYNGE), M. D., an American physician, born in Phila. Dec. 23, 1783. He studied in London and Paris, and became in 1813 prof. of materia medica in the University of Pa. He published "Elements of Surgery" (1813), which was highly esteemed. Died Nov. 12, 1818.

**Dorsheimer** (WILLIAM). See APPENDIX.

**Dort**, also called **Dor'drecht** [Lat. *Dordracum*], a fortified town of the Netherlands, in South Holland, is on an island in the Meuse, 10 miles S. E. of Rotterdam. It is traversed by canals, is accessible to large ships, and has an active trade in grain, flax, timber, and salt fish. Here are shipbuilding docks, sugar-refineries, saw-mills, and manufactures of tobacco, white lead, etc. In 1421 a terrible inundation destroyed seventy villages, and converted the ground where Dort stands into an island. The Synod of Dort met here in 1618, and condemned the doctrines of Arminius. Pop. in 1880, 27,292.

**Dortmund**, a walled town of Prussia, in Westphalia, on the Emscher and on the Cologne and Minden Railway, 47 miles N. N. E. of Cologne. It has several fine churches, three hospitals, a Protestant gymnasium, and a realschule; also manufactures of cotton, linen and woolen fabrics, cutlery, and nails. It was a city of the Hanseatic League, and was the chief seat of the Vehmic Court. Its trade was nearly ruined by the Thirty Years' war. Dortmund was ceded to Prussia by the Congress of Vienna in 1815. Pop. in 1880, 66,544.

**Dort, Synod of** [Lat. *Synodus Dordracena*], a great

synod of the Dutch national Church, convened at Dort from Nov. 13, 1618, to May 9, 1619, consisting of 39 ministers, 18 ruling elders, and 5 professors, deputies from the several states of the Netherlands, besides 24 foreign deputies representing the Anglican and most of the Calvinistic churches. The synod was convoked by the States-General on account of the controversies between the Gomarists (Calvinists) and Remonstrants (Arminians). The synod was convened in the Calvinistic interest, and there has been much difference of opinion as to the fairness of its proceedings. The principal work of the synod was the preparation of canons setting forth the Calvinistic doctrines, and the publication of an Ecclesiastical Censure against the Remonstrants, calling upon the civil power to enforce the decrees of the synod by banishment, imprisonment, or fines imposed upon the refractory.

The canons are ably drawn up, and were officially received by the Reformed churches of the Low Countries, France, Switzerland, and the Palatinate, but were some years later rejected by the Church of England. (See the official "Acta Synodi," 4to, 1620.)

**Dositheans**, the name of a Samaritan sect founded by Dositheus in the first century after Christ. In the fourth century there still remained a few Dositheans, who believed their master to have been the true Messiah.

**Dotis**, or **Totis**, a market-town of Western Hungary, in the county of Comorn, 37 miles W. N. W. of Pesth. It has several Roman Catholic churches, a synagogue, and a gymnasium. Here is a splendid chateau of the Esterhazy family, with extensive wine-vaults. Pop. 6507.

**Douai** [Lat. *Duacum*], a fortified town of France, department of the Nord, on the river Scarpe and on the Railway du Nord, about 21 miles S. of Lille. It is well built, has several fine churches and hospitals, a theatre, an arsenal, a botanic garden, a national college, and a Roman Catholic college for the education of British Roman Catholics. Here are manufactures of cotton stuffs, lace, gauze, paper, glass, pottery, and soap. Douai existed in the time of Cæsar. It has often been besieged and taken by the French and Flemings. Pop. 26,172.

**Douai Bible**, The, was translated by English Roman Catholic divines connected first with the college at Rheims, and afterwards with the college at Douai. According to Dodd, the translators were Gregory, Martin, William Allen, Richard Bristow, William Reynolds, and others. The New Testament was published at Rheims in 1582. The Old Testament, then already translated, was published at Douai in 1609-10. Both Testaments were translated from the Vulgate. The annotations were quite copious, and intensely Roman Catholic. Numerous editions have appeared, which greatly vary both in the text and in the notes. An exact reprint of the original Rheims New Testament was published in New York in 1833. Of the original Douai Old Testament there has been no exact modern reprint. (See COTTON, "Rheims and Doway," Oxford, 1855.)

**Douarnenez**, a town of France, in the department of Finistère, 14 miles W. N. W. of Quimper. It has large fisheries and a considerable coasting-trade. Pop. 9809.

**Douay** (CHARLES ABEL), a French general, born in 1809, served in Algeria, in the Crimean war, and in 1859 in Italy, where he distinguished himself at Solferino, became in 1866 general of division, and 1869 inspector of the military academy at St. Cyr. In the French-German war he commanded the second division under MacMahon, and was killed on Aug. 4, 1870, in the battle of Weissenburg.

**Douay** (FELIX), a French general, a brother of the preceding, born in 1816, served in Algeria, the Crimea, in the Italian war, and as general of division in 1862 in Mexico. In the war against Germany he commanded the seventh army corps, was taken prisoner at Sedan, and having returned to France in 1871, organized an army against the insurgents in Paris. He was the first one to enter Paris on the 22d of May. After the war he was appointed inspector-general of the army. D. May 4, 1879.

**Doub** (PETER), D. D., an eminent minister of the Methodist Episcopal Church South, born in North Carolina Mar. 12, 1796. He joined the Virginia Conference in 1818. He performed an immense amount of service in Virginia and North Carolina. Many thousands were brought into the Church by his ministry. He was a polemic of great power. He was for three years before his death professor of biblical literature in Trinity College, N. C. He died in Greensboro', N. C., Aug. 24, 1869.

T. O. SUMMERS.

**Double-acting Pump**, a pump that lifts and forces water alternately on each side of the course by means of a solid piston or plunger, and an entrance and exit valve

communicating with each side. (See PUMP, by J. P. FRIZELL, C. E.)

**Double Dagger**, in printing, a character marked thus ‡, used as a reference to marginal notes.

**Doubleday** (ABNER), an American general, born in Saratoga co., N. Y., June 26, 1819, graduated at West Point in 1842. He became a captain in 1855, and was one of the garrison of Fort Sumter in 1861; brigadier-general of volunteers Feb., 1862; major-general Nov., 1862, and engaged in battles of Manassas, South Mountain, Antietam, Chancellorsville, and Gettysburg; brevet brigadier and major-general U. S. army; became a colonel of infantry in 1867. Retired in 1873.

**Double-Eagle**, a gold coin of the U. S. bearing the figure of an eagle, and equivalent to twenty dollars in value.

**Double Refraction**, a phenomenon exhibited by Iceland spar and several other crystals. A ray of common light passing through them is divided into two polarized rays, which take different directions and are refracted according to different laws. (See REFRACTION and POLARIZATION.)

**Double Stars, or Binary Stars.** (See STARS.) It was announced in 1803 by Sir William Herschel that there exist sidereal systems composed of two stars, one revolving around the other, or both about a common centre. Subsequent observations have confirmed this discovery, and in some instances the periods of revolution have been determined. Some of these binary systems have periods of great length, and some of them afford curious instances of contrasted colors, the color of the smaller star being complementary to that of the larger. In such instances the larger star is usually red or orange, and the smaller star blue or green.

**Doubling Gap Springs**, in Cumberland co., Pa., 30 miles W. of Harrisburg, are 8 miles from Newville, on the Cumberland Valley R. R. A part of the springs have carbonated saline chalybeate waters, and others are saline sulphur springs. They are useful in a wide range of chronic disease.

**Doubloon** [Fr. *doublon*; Sp. *doblon*, from *doblar*, to "double"], a Spanish gold coin nearly equivalent to sixteen dollars. It is the double of a pistole.

**Doubs** (anc. *Dubis*), a river of France, rises in the Jura Mountains, flows nearly south-westward through the departments of Doubs and Jura, and enters the Saône at Verdun-sur-Saône. Total length, about 250 miles. The chief towns on its banks are Besançon and Dôle. It is navigable to Dôle.

**Doubs**, a department in the E. part of France, bordering on Switzerland. Area, 2018 square miles. It is intersected by the river Doubs. The surface is traversed by several ridges of the Jura Mountains, which are covered with forests of pine, walnut, and other trees. The soil of the valleys is fertile, and produces good pasture. Here are mines of coal and iron and quarries of marble. Among the exports are cattle, horses, iron, and butter. Capital, Besançon. Pop. in 1881, 310,827.

**Douglas**, a seaport and the principal town of the Isle of Man, is on the E. coast, 80 miles N. W. of Liverpool. It stands on a picturesque bay, and has a harbor which will admit vessels drawing ten or twelve feet of water. It contains a custom-house, handsome villas, good hotels, and baths. The excellence of its sea-bathing renders this an important watering-place. Pop. in 1881, 15,725.

**Douglas**, capital of Coffee co., Ga. (see map of Georgia, ref. 6-I, for location of county). Pop. in 1880 not in census.

**Douglas**, the name of an ancient noble family of Scotland which has produced many eminent men. The first member of the family who appears on record was William of Douglas, 1175-1200. The first earl of Douglas was Archibald. Sir William was a competitor for the crown, but he agreed to recognize his rival, Robert II., on the condition that his son James should marry a daughter of that king. The earl of Douglas died in 1384, and was succeeded by his son James. He was killed at the battle of Otterburn in 1388. As he left no lawful issue, Archibald the Grim, a natural son of Sir James the Good, became the third earl of Douglas. He died in 1400, leaving a son, Archibald, the fourth earl. Douglas fought at Shrewsbury (1403), and was killed at Verneuil in France in 1424. He was succeeded by his son, Archibald, the fifth earl, who died in 1430. His son and heir, William, the sixth earl, was born about 1422. His power and foreign possessions rendered him an object of fear and suspicion to the court. He was beheaded after a hasty trial, Nov. 24, 1440, and left

no issue. The earldom was then given to his grand-uncle James, who died in 1443, and was succeeded by his son William, the eighth earl, a powerful and turbulent person. He was appointed lieutenant-general of the kingdom by James II., but soon lost the royal favor. He was killed by that king Feb. 22, 1452, and was succeeded by his brother James, ninth earl of Douglas, who waged open war against King James II. in 1454. He was defeated and taken prisoner in 1484, and died in 1488, when that branch of the Douglas family became extinct. The earls of Angus and earls of Morton, besides other noble lines, belonged to the family of Douglas, which is now represented in the peerage by the earls of Selkirk. WILLIAM JACOBS.

**Douglas** (ARCHIBALD), fifth earl of Angus, surnamed BELL THE CAT, was a son of George, the fourth earl, who died in 1462. He (the son) was a powerful and ambitious subject, and held the highest offices in the state. He was the father of Gawin Douglas, the poet, and of other sons. Died in 1514. His grandson Archibald became the sixth earl of Angus, and married in 1514 Margaret, who was a sister of Henry VIII. of England and widow of James IV. of Scotland. He had a daughter, who became the wife of the earl of Lennox and the mother of Lord Darnley. The sixth earl died about 1660, and his title was inherited by his nephew George, who was a brother of Regent Morton. The eleventh earl of Angus was created marquis of Douglas in 1633. (See DAVID HUME, "History of the Houses of Douglas and Angus," 1644.)

**Douglas** (DAVID), a Scottish botanist, born at Scone, in Perthshire, in 1798. As an agent of the London Horticultural Society he visited the U. S. in 1823 to collect botanical specimens. He returned to England in 1827, and afterwards went on a scientific excursion to the Sandwich Islands, where he was killed by a wild bull July 12, 1834.

**Douglas** (GAWIN), a Scottish poet, born in 1474, was the third son of Archibald, fifth earl of Angus. He was educated for the Church, and became bishop of Dunkeld in 1515. His most remarkable production is a translation of Virgil's "Æneid" into Scottish verse (1513), which is highly commended. His chief original poem is "The Palace of Honor." Died in 1522.

**Douglas** (Sir HOWARD), BART., D. C. L., G. C. B., a British general, born at Gosport, in Hampshire, July 1, 1776, was a son of an admiral. He served in the Peninsular war (1808-12), was governor of New Brunswick (1823-29), and a member of Parliament for Liverpool (1842-47). In 1851 he was raised to the rank of general. He wrote, besides other works, a "Treatise on Naval Gunnery" (1819), which is regarded as a standard authority in foreign countries as well as in England. Died Nov. 8, 1861.

**Douglas** (STEPHEN ARNOLD), one of the most eminent of American statesmen in his day, was born at Brandon, Rutland co., Vt., April 23, 1813. He was of poor but respectable parentage. His father was a practising physician, with prospects of success, but died suddenly of apoplexy soon after the birth of the subject of this notice. His mother, with another infant, a daughter, not yet two years old, was thus left a widow, with means, in addition to her own exertions, barely sufficient to support herself and her two orphan children, without being able to give them more than the rudiments of a good English education. At the age of fifteen the son, with the consent of his mother, engaged himself to work in the cabinetmaking business for the purpose of raising means to carry him through college. After a few years of labor in this trade he was able to enter upon an academical course, first at Brandon, Vt., and then at Canandaigua, N. Y. At the latter place he remained until 1833, and took up the study of the law at the office of the Messrs. Hubbel, and prosecuted this in connection with his academic course. Early in 1833, before he was twenty, his funds running low, he determined to abandon further attempts at education, and to enter at once into the conflicts of life with such acquisitions of knowledge as he had then obtained and might be enabled afterwards to obtain. After some wanderings in the Western States in quest of a new home where his fortunes were to be tried, he took up his abode at Jacksonville, Ill., where, after teaching school for three months, he was admitted to the bar, and opened an office in 1834. He rapidly rose in his profession. Within a year from the time that he received his license to practise he was elected attorney-general of the State. Having been reared in the Jeffersonian school of politics, Mr. Douglas zealously espoused the Democratic side on all public questions then agitated, and soon became one of the most popular orators of his party in Illinois. He was, at an early day in his political life, styled "The Little Giant," in allusion to his diminutive stature in contrast with the extent and comprehensiveness of his intellectual powers. In 1835 he resigned his position as attorney-general upon his being elected a member of the

State legislature. In 1841 he was chosen one of the judges of the supreme court of the State. This position he resigned in 1843 to take a seat in the House of Representatives of the Congress of the U. S. His *début* on this elevated arena was upon the bill to refund to Gen. Jackson the fine of \$1000 imposed by Judge Hall in New Orleans during the war of 1812. His first speech placed him high in the ranks of the most promising young men of mark of that period. On all questions of constitutional law he at once took position among the ablest members of the House, in which then figured, as they had for years before, such men as Daniel D. Barnard, Alexander Dromgoole, Joseph R. and Charles J. Ingersoll, Garrett Davis, Robert C. Winthrop, R. Barnwell Rhett, Henry A. Wise, and John Quincy Adams, to say nothing of many others of the illustrious compeers of these acknowledged leaders, who were then making such a deep impress upon the history of the country. Mr. Douglas was among the most zealous, as well as the most efficient, advocates of the admission of Texas as a State into the Union by joint resolution of both houses of Congress. He sustained the constitutionality of the measure in a speech of great power and effect. He defended that feature of the resolutions known as the extension of the line of the "Missouri Compromise," simply as a pledge of his adherence to the principle of a division of the public domain between the two great sections of the country, North and South, as it had been tendered by the North and accepted by the South in 1820. As an original question Mr. Douglas did not believe that Congress had any rightful power to impose an anti-slavery restriction upon any of the Territories or States of the Union; but being willing to abide by the principle of division as established in 1820 as to the Louisiana acquisition, he was for its reaffirmance in 1845 as to the new acquisition then to be made on the acceptance by Texas of the terms proposed for her admission into the Union. He was also one of the ablest supporters of the administration of President Polk during the war which ensued with Mexico.

When Mr. David Wilmot of Pennsylvania, in Aug., 1846, moved his celebrated "Proviso" for slavery restriction to any new territory that might be acquired from Mexico in a treaty of peace, Mr. Douglas was one of five only in the House, from the entire North, who took decided position against that measure. He did it for the same reason and upon the same principles that Mr. Jefferson acted on when, though then in private life, he spoke and wrote against a like restriction upon the Louisiana Territory, when it was proposed in Congress in 1818-19. Mr. Douglas, like Mr. Jefferson, was opposed to African slavery, but, like him, he maintained that the Congress had no constitutional power to impose the restriction. The internal polity and domestic institutions of the several States composing the Union were subjects, in his judgment, over which the Federal legislative authority did not extend under the limitations of the Constitution. He was still willing to abide by a further extension of the "Missouri Compromise" line, so called, and in many speeches, with most patriotic fervor, urged the adoption of this policy.

In all the subsequent agitation of this question the speeches of Mr. Douglas, while he remained in the House, were clear, earnest, and masterly. In 1847 he was elected to the Senate for a full term of six years. In that body he was no less distinguished than he had been in the House. No man in the Senate, not excepting Mr. Clay or Mr. Webster, acted a more conspicuous part than he did in what is known as the "Compromise" or adjustment of the sectional questions of 1850. While the success of this compromise is generally attributed to the lead and auspices of Mr. Clay, yet it is due to Mr. Douglas to state that Mr. Clay's celebrated "Omnibus Bill," so called, which provided for the settlement of the five great questions of discontent, as stated by him, was made up of several distinct bills on the same subject previously introduced by Mr. Douglas. The full and minute history or nature of that compromise it is not proposed to give in this connection; suffice it to say that no one acted a more important and efficient part in effecting it than did Mr. Douglas, and that it was based throughout upon what he had ever maintained to be the true constitutional principles of the government. In 1852 he was again elected to the Senate for another full term. In 1854, when, as chairman of the committee on territories, he introduced bills for the organization of governments in the Territories of Kansas and Nebraska, the whole subject of slavery agitation in the Territories was again renewed, and with increased fierceness. The policy and provisions of these bills, he maintained by argument and eloquence seldom surpassed, were in strict accordance with the principles established by the territorial policy adopted in 1850. Under his lead the Kansas-Nebraska bill was triumphantly carried in the Senate, on the grounds that the principle of a division of

the public domain between the sections by the Missouri or any other line had been totally abandoned by the adjustment of 1850, and the principle of non-intervention by Congress anywhere in the Territories substituted in its stead. On the like ground it was triumphantly carried in the House, and constitutes what is known as the "Territorial legislation of 1854." Mr. Douglas's views of the rights of the people of a Territory under the Constitution of the U. S. gave rise to what is styled the doctrine of "squatter sovereignty," for which he was assailed quite as bitterly at the South as at the North. It is not the purpose of this notice to go into any elaboration on this point. His doctrine, briefly stated, was, that the inestimable right of local self-government was the seminal principle from which all American free institutions sprung; it was on this that each of the original thirteen colonies had been planted; and that it was for the maintenance of this sovereign right on the part of the peoples of the several States of the Union that their independence had been declared and their first confederation entered into. With Mr. Jefferson and all strict constructionists, Mr. Douglas held that the Federal government possessed no inherent powers, and could exercise none except those delegated by the States; that the delegated powers are specific and enumerated in the Constitution; and that Congress cannot rightfully exercise any power which is not thus enumerated or incident to some or more which are. The power conferred upon Congress in the Constitution, "to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the U. S.," he, with the Jeffersonian school generally, maintained referred to the territory as land or public domain only, and carried with it no power whatever for the government of the inhabitants thereof. The Territories, with their inhabitants, politically considered, he regarded as inchoate States, and bearing towards the government of the Union a relation not unlike, in many respects, that which the colonies bore towards the mother-country. The great right of local self-government belonged equally to both. This is a brief outline of what he styled popular sovereignty in the Territories. His views at large upon it are to be found, not only in numerous speeches in the House and Senate during a period of many years, but in a very compact and condensed form in "Harper's Magazine" of Sept., 1850. This article was republished in pamphlet form, and extensively circulated. It consisted of forty pages, and, however it may have been regarded by extreme partisans of either side at the period of its publication, it unquestionably presents an argument which every student of American history may read with both interest and profit. Among American state papers it is entitled to rank with Madison's celebrated report on the Virginia resolutions of 1799. In 1858, Mr. Douglas was again re-elected to the Senate for another full term, after one of the fiercest and bitterest contests ever before waged in the U. S. for a similar position. At this time he successfully breasted all the combined powers of the opposing party, then styled Republican, under the lead of Mr. Lincoln, his competitor, and that of the Democratic administration at Washington, under the patronage of Mr. Buchanan, the President.

As early as 1852 the name of Mr. Douglas had been brought prominently before the Democratic nominating convention at Baltimore as a candidate for the presidency, but, at his own instance, was not pressed by his friends. In 1856, it was again, in like manner, presented to the Cincinnati Convention, but as soon as he discovered that Mr. Buchanan had a majority in that body he gave positive instructions to his friends in that convention, by telegram from Washington, to withdraw his name, and not to allow it to be used in any contest for the nomination under the two-thirds rule. The platform of political principles which had been adopted there before the subject of nominating candidates had been taken up was just such as had governed the whole of his public life, and he gave Mr. Buchanan a cordial support upon his endorsement of them. In 1860, after his triumphant return to the Senate at his last election, he was the most prominent candidate of the Democracy of the U. S. for the presidential nomination at the convention held that year in Charleston, S. C., and very probably would have received it by a two-thirds vote but for the withdrawal of the delegates of the States of Alabama, Arkansas, Florida, Louisiana, Mississippi, South Carolina, and a majority of those from Georgia. On the withdrawal of these delegations the friends of Mr. Douglas moved and carried an adjournment of the convention, to reassemble at Baltimore on a subsequent day. This was done with a view that the Democratic party, in the mean time, in the several States, might fill the seats made vacant in the convention by the withdrawing delegates. The object failed of accomplishment. On the reassembling of the convention another withdrawal of delegations took place. These now met in

another part of the city and put in nomination for the presidency John C. Breckenridge of Kentucky. The Democratic party of the Union was thus irreconcilably torn asunder. Those who adhered to the regularly called convention, which had first met at Charleston, and had adjourned to Baltimore, constituted the larger portion. This body now unanimously put the name of Mr. Douglas in nomination for the presidency, though against what was known to be his wishes. The presidential canvass this year was perhaps the most exciting that had ever occurred since that between Mr. Jefferson and the elder Adams in 1800. Four tickets for President and Vice-President were in the field—Lincoln and Hamlin, supported by the Republicans; Bell and Everett, supported by those styling themselves the American party; Douglas and Johnson, supported by one wing of the Democracy, and Breckenridge and Lane, supported by the other. The chief objection to Mr. Douglas on the part of his former Democratic associates, who refused to support him, was what was called his squatter-sovereignty doctrine. The result of the election, by the popular vote, was, for Lincoln and Hamlin, 1,857,610; for Douglas and Johnson, 1,365,976; for Breckenridge and Lane, 847,953; and for Bell and Everett, 590,631. The result by the college of electors, however, was very different. By this Messrs. Lincoln and Hamlin received 180 votes; Messrs. Breckenridge and Lane, 72; Messrs. Bell and Everett, 39; Messrs. Douglas and Johnson received 12 only.

The great events of 1861 followed in rapid succession. Mr. Douglas was spared their full development. He died after a short illness, at his residence in Chicago, on the 3d of June, 1861, soon after reaching the 48th year of his age. On the 15th of March, a little over two months before his death, and after seven of the Southern States had passed their ordinances of secession, in view of the then threatening prospect of affairs, he spoke, in the Senate, at great length on the general state of the country, and in the course of his remarks used these words in addressing the Republican side: "In my opinion, we must choose, and that promptly, between one of three lines of policy: 1. The restoration and preservation of the Union by such amendments of the Constitution as will ensure the domestic tranquillity, safety, and equality of all the States, and thus restore peace, unity, and fraternity to the whole country. 2. A peaceful dissolution of the Union by recognizing the independence of such States as refuse to remain in the Union without such constitutional amendments, and the establishment of a liberal system of commercial and social intercourse with them by treaties of commerce and amity. 3. War, with a view to the subjugation and military occupation of those States which have seceded or may secede from the Union. I repeat, that in my opinion you must adopt and pursue one of these three lines of policy. The sooner you choose between them, and proclaim your choice to the country, the better for you, the better for us, the better for every friend of liberty and constitutional government throughout the world. In my opinion, the first proposition is the best, and the last the worst."

Soon after the fleet sailed from New York to provision the garrison in Fort Sumter, "peaceably if possible, but forcibly if necessary." After the fall of that garrison, Mr. Douglas, in Springfield, Ill., and at other places, made speeches in which he sustained Mr. Lincoln's call for 75,000 troops to defend the Federal Capital. The last intelligible words uttered by him were a message to his sons, Robert and Stephen, then at college, "to obey the laws and support the Constitution of the U. S."

Mr. Douglas was twice married. His first wife was Miss Martin of North Carolina. She was the mother of his two sons referred to, who were his only surviving children. His second wife was Miss Cutts, a most beautiful and accomplished lady of Washington City. By her he left no child. As a debater Mr. Douglas was never overmatched, either in the House or Senate. His death at the time was regarded in all sections as a great public calamity. However widely many differed with him on some questions, all acknowledged his very great ability, while very few, if any, seriously questioned either his integrity or patriotism.

ALEXANDER H. STEPHENS.

**Douglas (WILLIAM)**, died in 1303, has a celebrated name in Scotch lore on account of his feud with Robert Bruce, who devastated his domains and carried away as prisoners of war his wife and his children.

**Douglass (DAVID BATES)**, an eminent American civil and military engineer, born at Pompton, N. J., Mar. 21, 1790, graduated at Yale College Sept. 18, 1813, and Oct. 1, 1813, was appointed a second lieutenant in the corps of engineers U. S. A. He entered upon duty at West Point as commander of sappers and miners, and was later commander of the post. In the war with Great Britain he commanded

in 1814 his company of sappers and miners on the northern frontier; participated in the battle of Niagara and siege of Fort Erie, followed by the memorable sortie from that work Sept. 17, 1814, breaking the enemy's lines and compelling him to retire. For "distinguished and meritorious services in superintending the construction of defensive works, in command of battery, etc.," on this occasion, he was promoted first lieutenant and brevet captain. On the close of the war he returned to West Point, 1815, and during the subsequent fifteen years was variously engaged as professor of natural and experimental philosophy, of mathematics, and of engineering till 1831, when he resigned to enter upon the profession of civil engineering. During these years he was engaged upon important inspections, surveys, and estimates for important canals and other works of internal improvement. He was also astronomical surveyor of the commission for determining the U. S. boundary from Niagara to Detroit in 1819; was consulting engineer of the board of commissioners of internal improvements of Pennsylvania. Having become greatly interested in the introduction of inclined planes into operation in place of locks for canal navigation, and having accepted from the Morris Canal Company the appointment of chief engineer of the same, which duty he found required all his time, his sense of duty led him to resign his position in the army Mar. 1, 1831; he was at once appointed chief engineer of the Morris Canal Co., and devoted himself entirely to the improvement with which he had become identified. The inclined plane proved a success. In Oct., 1830, a trial of the plane at Montville was made, and in six minutes and a half a boat containing 200 persons passed a plane 1040 feet long, with a descent of 70 feet, and advancing 770 feet. The canal was carried forward to a successful completion in 1832. During this year he was appointed professor of natural philosophy and civil engineering in the University of the City of New York, but relinquished this position in 1833, though his name was continued on the rolls of the college as professor of civil engineering and architecture till 1840. In 1833 he surveyed the Brooklyn and Jamaica R. R., Long Island; was one of the engineers of the Croton Aqueduct from 1833 to 1835, during which time he made the surveys, plans, and estimates for supplying the city of New York with water from the Croton River, the entire duty falling upon him in consequence of other professional engagements which occupied the entire time of the engineer named in connection with Major Douglass. His report showed so clearly the practicability of the project that the necessary legislation to procure its execution was obtained in May, 1834, and Major Douglass as chief engineer completed his plans and laid out the line of the aqueduct until Oct., 1836, at which date, owing to difference of views which existed between himself and the board of commissioners, he was removed; but his reports and surveys were adopted and followed in the construction of that important work. From 1837 to 1840, in addition to other duties, he was chief engineer of Greenwood Cemetery, which he planned and the location of which he selected; his engineering ability as well as his artistic taste and skill are shown in the present development of that beautiful city of the dead. In 1840 he resigned his superintendence of Greenwood to accept the presidency of Kenyon College, O., with which institution he remained till 1844, when he returned to New York, and was engaged until 1848 as chief engineer to plan and lay out the Albany and Quebec cemeteries; in important engineering work at Brooklyn, such as providing for a supporting wall for Brooklyn Heights, the supplying of that city with water, etc., and in developing the landscape features of Staten Island. In 1848 he accepted a call from Geneva College, N. Y., as professor of mathematics, which position he retained during the remainder of his life. Died at Geneva, N. Y., Oct. 9, 1849. At the request of the cemetery board his remains were removed to Greenwood Cemetery.

G. C. SIMMONS.

**Douglass (FREDERICK)**, an American orator, originally a slave, was born in Talbot co., Md., about 1817. He learned to read and write by stealth, ran away from his master in 1838, and became a resident of New Bedford, Mass. In 1841 he began to give public lectures against slavery. He gained distinction as a public speaker, published his "Autobiography" in 1845, and visited England, where he made eloquent anti-slavery speeches. He afterwards became the editor of the "North Star," a journal published at Rochester, N. Y. In 1870 he began to edit the "National Era." In 1872 he was the first in the list of presidential electors chosen by the Republican party of the State of New York; U. S. marshal, D. C., 1877-81.

**Douglassville**, on R. R., capital of Douglas co., Ga. (see map of Georgia, ref. 3-F, for location of county), 27 miles W. of Atlanta. Pop. in 1880, 286.



**Dour**, a town of Belgium, department of Hainaut, 9 miles W. S. W. of Mons. It derives its prosperity from mines of coal and iron, iron-works, weaving, and bleaching. Pop. 8501.

**Douro** [Sp. *Duero*; anc. *Durius*], a large river of Spain and Portugal, rises in Old Castile, in the province of Soria. It flows generally westward through the provinces of Valladolid and Zamora until it touches the N. E. extremity of Portugal. It next runs south-westward, and forms part of the boundary between Spain and Portugal. Resuming a westward direction, it traverses the northern part of Portugal, and enters the Atlantic 3 miles below Oporto. Its total length is nearly 500 miles. Rocks, sandbanks, and the rapid current render its navigation difficult. In Spain it is a narrow but deep river, pressed in between precipitous banks. But, in spite of its unequal fall, it could easily be made navigable, on account of the great mass of water it carries. In Portugal it is a stately stream, forming a large lake-like basin just before disemboguing. Its mouth is narrow, however, and somewhat embarrassed by sand. Of its many affluents the Pisuerga, which joins it just S. of Simonia, is the most important.

**Douven** (JAN FRANCIS), a celebrated Dutch portrait-painter, born at Roermond Mar. 2, 1656, died in Prague 1710. He studied under Gabriel Lambertin at Liège, and in 1684 settled at Dusseldorf, at the court of the duke of Neuburg. After painting the duke, the duchess, and the whole ducal court, he went first to Vienna, where he painted the emperor, the empress, and the whole imperial court; then to Madrid, where he painted the king, the queen, and the whole royal court; then to Denmark, and so on. He was, indeed, the court-painter of Europe at that time. He painted three emperors and three empresses, five kings and seven queens, besides a great number of princes and princesses.

**Douville** (JEAN BAPTISTE), born at Hambye, in the department of Manche, France, Feb. 15, 1794, killed on the banks of the Sao Francisco in Brazil about 1837. He had from early youth a passion for travelling and exploration, and a large inheritance enabled him to realize his wishes. He visited India, Kashmir, Khorassan, Persia, and Asia Minor, and was admitted a member of the Société de Géographie in Paris. In 1826 he went to South America, and resided for some time at Montevideo and for some time at Rio Janeiro. On Oct. 15, 1827, he left Rio Janeiro, and on May 13, 1831, he landed at Havre. Shortly after, he laid before the Société de Géographie an elaborate report of his explorations of the interior of Central Africa and of the numerous important discoveries he had made. The Société was charmed, and awarded him its great gold medal. The report was printed in four volumes. The public was enthusiastic; all maps and text-books were altered in accordance with it. In 1832, however, an article in the "Quarterly Review" and another in the "Revue des deux Mondes" proved the whole report to be a fraud; it was probably simply an extract from old reports made by Portuguese missionaries and never printed.

**Dove** (in natural history). See PIGEON.

**Dove** [supposed to be derived from a root akin to "dive;" Lat. *columba*; Ger. *Taube*]. The dove in Christian art is used as a symbol of purity and an emblem of the Holy Spirit. Issuing from the lips of dying saints and martyrs, it represents the soul purified by suffering. Holding in its mouth an olive branch, it is the emblem of peace. In Catholic churches the pyx or ciborium containing the host is sometimes in the form of a dove. It is mentioned more than fifty times in the Bible. It was the only bird which could be offered as a sacrifice among the Jews, and, as it was cheap, it was often selected for that purpose by poor people. In order to supply the demand for it, the raising of doves was from early time a pursuit among the Jews, and dealers in that kind of birds had their stalls on the premises of the temple.

**Do've** (HEINRICH WILHELM), an eminent German physicist, born at Liegnitz, in Silesia, Oct. 6, 1803, graduated at the University of Berlin in 1826. He became professor of physics in that university in 1829, after which he made researches into the laws of climate and atmospheric phenomena. He published, besides other works on meteorology, electricity, etc., "Meteorological Researches" (1837), "On Electricity" (1848), and a "Treatise on the Distribution of Heat on the Surface of the Globe," which was published in 1853 by the British Association. D. Apr. 5, 1879.

**Dove** (RICHARD WILHELM), an eminent German jurist, son of the preceding, born in Berlin in 1833, became in 1859 privatdocent at the University of Berlin, in 1862 professor at the University of Tübingen, in 1865 at Kiel, and in 1868 at Göttingen. In 1871 he was elected to the Ger-

man Reichsrath, where he voted with the national liberal party. He began in 1860 the publication of the "Zeitschrift für Kirchenrecht," the leading periodical in Europe on all questions relating to church law, of which he was the chief editor until his death. Died Apr. 5, 1879.

**Do'ver** (anc. *Dubris*), a city and seaport of England, in the county of Kent, on Dover Strait, 66 miles E. S. E. of London and 27 miles from Calais, in France. It is the point in England that is nearest to the Continent, and is the terminus of the South-eastern Railway. It stands at the entrance of a deep depression in an amphitheatre of chalk-hills and cliffs. This city is defended by Dover Castle, which is built on chalk-cliffs 320 feet high, and is a fortress of great strength and extent. This castle is said to have been founded by the ancient Romans. Dover contains a custom-house, a town-hall, a theatre, and a military hospital. The harbor is protected by a stone pier built of solid masonry, 60 feet wide, and extending about 1800 feet into the sea. Dover is the chief port of communication between England and France, and is only 21 miles distant from the nearest part of the Continent. Steamers ply daily between this port and Boulogne and Calais. Dover returns two members to Parliament, and is one of the Cinque Ports. A submarine cable was laid from Dover to Calais in 1850. With respect to its physical condition, the place is one of the healthiest in England, and the agreeable variation in the surroundings, of open downs and steep cliffs, makes it a favorite summer resort. Pop. in 1881, 30,270. (See BREAKWATER, by GEN. J. G. BARNARD, U. S. Army.)

**Dover**, capital of Pope co., Ark. (see map of Arkansas, ref. 2-C, for location of county), about 90 miles N. W. of Little Rock. Pop. in 1880, 368.

**Dover**, capital of Delaware and of Kent co. (see map of Delaware, ref. 3-H, for location of county), is on R. R., 48 miles S. of Wilmington and about 5 miles W. of Delaware Bay. It has a State-house, with a State library containing 50,000 volumes, a large court-house, a fine U. S. post-office building, very fine residences, 7 churches, 1 national bank, 1 State bank, 2 weekly newspapers, 1 job-printing office, 2 fruit-packing houses, 4 fruit evaporating houses, 1 large water and steam flouring-mill, sash and fruit-crate factory, gasworks, 1 foundry, 1 machine-shop, 1 carriage manufactory, 1 glass factory, 1 public school building, with 8 departments; 3 select schools, the Conference Academy for boys and girls, and a Mount Holly system of waterworks at a cost of \$22,000. It is the centre of a great fruit-growing section. Pop. in 1870, 1906; in 1880, 2811; in 1885, about 3500. ED. "DELAWAREAN."

**Dover**, capital of Piscataquis co., Me. (see map of Maine, ref. 5-D, for location of county), on R. R. and Piscataquis River, 53 miles N. W. of Bangor. It has a heavy trade, and manufactures of woollens. Pop. in 1880, 602.

**Dover**, city and R. R. centre, capital of Strafford co., N. H. (see map of New Hampshire, ref. 8-G, for location of county), is on Cochecho River, 63 miles N. of Boston and 12 miles N. W. of Portsmouth. It is at the head of sloop-navigation and at the lower falls of the river, which has here a fall of thirty-two feet and affords abundant water-power. It contains a city-hall, public high school, a flourishing private academy, and a city library of considerable value. Here are several large cotton-mills and an extensive printery belonging to the Cochecho Manufacturing Company. Dover has also manufactures of shoes, woollen cloths, flannels, oil-cloths, glue, etc. It was founded in 1623, and is the oldest town in the State. Pop. in 1870, 9294; in 1880, 11,687.

**Dover**, Morris co., N. J. (see map of New Jersey, ref. 2-D, for location of county), on R. R., the Morris Canal, and on Rockaway River. It has several iron-forges, iron-foundries, steel-works, spike-factories, and rolling-mills. Pop. in 1880, 2958; in 1885, 3170.

**Dover**, capital of Stewart co., Tenn. (see map of Tennessee, ref. 5-D, for location of county), on the Cumberland River, 75 miles W. by N. from Nashville and 1 mile E. of Fort Donelson. A national cemetery is situated a quarter of a mile W. of Dover. Pop. in 1870, 270; in 1880, 317.

**Do'ver's Powder** [named from Dr. Dover, its inventor, an English physician], (*Pulvis Ipecacuanhæ et Opii*), consists of ipecacuanha and opium in fine powder, sixty grains each; sulphate of potassa, a troy ounce; rubbed together to a very fine powder. Dover's powder acts as a sudorific, and where the brain is unaffected and the tongue and skin moist is of great service. Its composition now differs considerably from that given in Dover's formula.

**Dover, Strait of** [Fr. *Pas de Calais*; Lat. *Fretum Gallicum*], the strait which separates England from France, and connects the English Channel with the North Sea. It

is about twenty miles wide at the narrowest part. The depth varies from six to twenty-nine fathoms. The English side of the strait is bordered by chalk-cliffs, some of which are about 600 feet high. Chalk-cliffs also occur on the French shore.

**Dov'refield**, a mountainous plateau in Norway, forming the northern end of the central mass of the Scandinavian system. It extends along the N. side of the Rauma Valley, which separates it from the Langfeld plateau, to the sources of the Lougen, and thence N. E. to those of the Glommen. Its highest peak is the Sneebættan, 7613 English feet, formerly considered the highest in Scandinavia.

**Dow**, or **Douw** (GERARD), a celebrated Dutch painter, born at Leyden April 17, 1613, was a pupil of Rembrandt. He excelled in chiaroscuro and in technical skill, and finished his works with excessive delicacy. Among his works, which are small in dimensions, are "The Charlatan," "The Dropsical Woman," "The Dentist," and "The Village Grocer." He died in Feb., 1675.

**Dow** (LORENZO), an eccentric Methodist preacher, born in Coventry, Conn., Oct. 16, 1777. He labored in many States of the Union, and also in England and Ireland. He was distinguished for his courage and zeal, and for some singularities in his habits. Died Feb. 2, 1834.

**Dow** (NEAL), a reformer, born at Portland, Me., in 1803. As a member of the legislature of that State he procured in 1851 the passage of a law to prohibit the sale of ardent spirits, which is called the "Maine law." He became a brigadier-general of Union volunteers early in 1862, and was taken prisoner near Port Hudson in July, 1863.

**Dow'ager** [Fr. *douairière*, from *douaire*, a "dower"], a widow endowed; that is, who either enjoys a dower from her deceased husband, or has property of her own brought by her to her husband on marriage, and settled on herself after his decease. This is called her dowry. In England the queen-dowager, as the widow of the king, enjoys most of the privileges which belonged to her as queen-consort, but no man can marry a queen-dowager without special license from the king. A queen-dowager does not lose her regal title when she marries a subject.

**Dow'agiac**, city, Cass co., Mich. (see map of Michigan, ref. 8-II, for location of county), on R. R. and the Dowagiac River, 105 miles E. of Chicago. Pop. in 1870, 1932; in 1880, 2100; in 1884, 2349.

**Dow'el**, a name given to a pin used horizontally for joining two pieces of material in a building, the dowel being inserted in its socket in the one piece before the other substance with its socket is forced into its place.

**Dow'er** [from the Fr. *douer*, to "endow"], in the common law of England, is an estate for life which a widow has in one-third part of all the lands and tenements of which her husband was seized beneficially, or of an estate of inheritance at any time during the marriage.

1. *The Nature of the Estate.*—Dower passes through three stages. While the husband lives it is but an inchoate right and incapable of enforcement. Should the husband sell to a stranger and leave her destitute, she would have no claim to the land while the husband lived. On her husband's death, and before dower is assigned, she has a right of action. After dower is assigned she has an estate in the land. The rights of dower depend upon a rule of law which is founded on public policy. The law of the place where the land is situated governs it.

2. *The Requisites of Dower.*—These are threefold—marriage, seizin of the husband, and his death. The leading questions on this subject concern seizin. By this is meant beneficial ownership of a present estate of freehold, which may descend to the husband's heirs. There can be no dower in an estate for years, however long it may last. Nor can there be in a reversionary estate which is preceded by a prior estate of freehold or for life owned by another person, though there may be where the prior estate is for years. The widow of a trustee cannot be endowed, as he is not a beneficial owner. This proposition would be applied to the widow of a deceased partner, who could only be endowed subject to the adjustment of the affairs of the partnership. Formerly, the trust estate itself was not the subject of dower. This rule does not prevail in the U. S., and dower may sometimes be had in money, which by a legal fiction is a substitute for land. Whenever the husband's estate is defeated by a superior title, dower falls with it.

3. *Assignment of Dower.*—As dower is one-third part of the husband's estate, it must be assigned either by the parties or by act of the law. Certain legal rules must regularly be followed, when dower is said to be assigned of common right. These may be relaxed by agreement under seal, when the assignment is said to be against common right.

4. *Barring of Dower.*—The right cannot be destroyed

by the mere act of the husband. Creditors also take subject to this claim. It can in general be barred only by the wife's own act, as by joining in a conveyance with the husband, or by a jointure settled before marriage. The husband often in his will, either expressly or by implication, gives his wife property in lieu of dower. In this case she may, after his death, elect to take such property or her dower, but cannot take both.

This right occasioned much inconvenience in England by impeding the conveyance of property. For this reason, by the Dower act of Aug. 29, 1833, the right of dower was virtually placed entirely in the hands of the husband in the case of all marriages contracted after Jan. 1, 1834. The husband may now dispose of his lands by will or otherwise, free from any claim of dower on the part of his wife. If, however, he dies intestate, his widow, under the statute of distribution, receives not merely for life, but absolutely, one-third of his personal estate. In the U. S. the general rules of the English common law still prevail. As a general rule, also at least one-third of the husband's personal estate is given to the wife, as by the English statute of distribution. T. W. DWIGHT.

**Dow'las** [supposed to be derived from *Doullens* in France, which was noted for its manufacture], a strong, coarse linen fabric much used by the working class, is manufactured in the north of England and in Scotland.

**Dow'latâbâd**, a fortified and decayed town of Hindostan, in the Nizam's dominions, 10 miles N. W. of Aurrangâbâd. It is defended by a rock-fortress which occupies the summit of an isolated rock about 500 feet high. The lowest third of this rock is perpendicular, so that the summit is accessible only by a passage excavated in the interior. Near this town are the cave-temples of Elora.

**Dow'ler** (BENNET), M. D., born at Elizabethtown (now Moundville), Ohio co., Va., April 16, 1797, was educated at the University of Maryland, and has long been a leading physician of New Orleans. He has published many valuable contributions to the periodical literature of the profession, and is the author of a "Tableau of the Yellow Fever of 1853," etc. (1854). He is editor of the "New Orleans Medical and Surgical Journal," and a member of many American and European scientific associations. He founded the New Orleans Academy of Sciences.

**Dow'ling** (JOHN), D. D., was born in the county of Sussex, England, May 12, 1807, and became a resident of the U. S. in 1832, and an eminently successful writer and Baptist preacher of New York City. He has published a "Vindication of the Baptists," "Defence of the Protestant Scriptures" (1843), "History of Romanism" (1845), and other works. D. July 4, 1878.

**Down**, or **Dune** [Fr. *dune*, from the Celtic *dun*, a "hill"], a name of the sandbanks or sandhills which the sea gathers and forms along its shores. The term *dune* is also applied in England to large tracts of poor hilly land which is covered with short grass and appropriated to pasturage. It is specially applied to two broad ridges of undulating chalk-hills S. of the Thames. From the middle of Hampshire these extend eastward—the one (the North Downs), through Surrey and Kent, to Dover, and the other (the South Downs), through the south-eastern part of Hampshire, to Beachy Head. Between the two ridges, the former of which is nearly 120 miles long, lies the valley of the Weald, from which the chalk strata are supposed to have been removed by denudation. The highest point of the down is 880 feet above the level of the sea. These uplands produce fine aromatic grass, on which the famous South Down sheep are pastured.

**Down**, a county in the N. E. part of Ireland, in Ulster, is partly bounded on the N. by Belfast Lough and on the E. and S. E. by the Irish Sea. Area, 954 square miles. The chief rivers are the Bann and the Lagan. The surface is mostly hilly or undulating, and the southern part is occupied by the Mourne Mountains, the highest peak of which is 2796 feet high. The soil of many parts is fertile. The chief articles of export are linen fabrics, hosiery, grain, butter, pork, and hides. The fisheries of this county are important, though they are very far from being developed as they ought to be. Capital, Downpatrick. Pop. in 1881, 272,207.

**Down'cast** is a name which is sometimes given in mines to the shaft through which air for ventilation descends. A fire is kept up at the bottom of a flue or "up-cast," and the impure air ascends through this flue, while a fresh supply of air descends through the "downcast." In other mines various forms of the blowing-machine are used to secure ventilation.

**Downe**, VISCOUNTS (Ireland, 1680).—HUGH RICHARD DAWNAY, eighth viscount, born July 20, 1804, succeeded his father in 1857.

**Downes (JOHN)**, an American naval officer, born at Canton, Mass., in 1784, entered the navy in 1802. He served as lieutenant of the *Essex*, under Capt. Porter, against the British (1812-14). He captured an Algerine frigate in 1815, and became a captain in 1817. Having taken command of a squadron in the Pacific in 1832, he chastised the people of Quallah Batoo in Sumatra for outrages on American seamen. Died Aug. 11, 1854.

**Downes (JOHN)**, U. S. N., born Aug. 25, 1822, in Massachusetts, entered the navy as a midshipman Sept. 4, 1837, became a passed midshipman in 1843, a lieutenant in 1851, and a commander in 1862. He commanded the iron-clad *Nahant* at the bombardment of Fort McAlister, Mar. 3, 1863, and in the first attack upon Fort Sumter of April 7, 1863, and is mentioned in Rear-Admiral Dupont's "detailed report" of the latter fight as one of those "who did everything that the utmost gallantry and skill could accomplish in the management of their untried vessels." He participated in the capture of the Confederate iron-clad *Atlanta*, and is thus spoken of in Rear-Admiral Dupont's report of that affair, dated June 19, 1863: "Commander Downes, with his usual gallantry, moved as rapidly as possible towards the enemy, reserving his fire until he could get into close action, but lost the opportunity, from the brief nature of the engagement, of using his battery." Died Sept. 21, 1865.

FOXHALL A. PARKER.

**Downieville**, capital of Sierra co., Cal. (see map of California, ref. 3-C, for location of county), is on the Yuba River, 62 miles N. E. of Marysville. It is surrounded by high mountains, and has deep gravel, hydraulic, placer, and quartz mines in its immediate vicinity. It contains a court-house, foundry, a graded school, and waterworks. Altitude, 3000 feet. Pop. in 1870, 704; in 1880, 650.

**Downieville Butte**, a mountain-peak in Sierra co., Cal., about 12 miles E. N. E. of Downieville. Altitude, about 8800 feet above the sea.

**Down'ing** (ANDREW JACKSON), an American landscape-gardener and pomologist, born at Newburg, N. Y., Oct. 31, 1815. He was almost entirely self-taught. In 1841 he published an excellent "Treatise on the Theory and Practice of Landscape Gardening." His "Fruit and Fruit Trees of America" (1845) is highly esteemed, and has passed through many editions. He began in 1846 to edit the "Horticulturist," published monthly at Albany. Among his other works is "Cottage Residences" (1842). He was a man of fine taste, and had a high reputation as a landscape-gardener. He was drowned in the Hudson River July 28, 1852, when the steamboat *Henry Clay*, on which he was a passenger, was burned. (See GEORGE W. CURTIS, "Memoir of A. J. Downing," prefixed to a volume of "Rural Essays," edited by Mr. Curtis after Downing's death.)

**Down'ingtown**, R. R. junction, Chester co., Pa. (see map of Pennsylvania, ref. 6-I, for location of county), in Chester Valley, 32 miles W. of Philadelphia. It has waterworks, a carriage and a shoe factory, a limestone quarry, a young ladies' academy, and the Chester Valley Academy for young men and boys. Pop. in 1870, 1077; in 1880, 1480.

**Downpat'rick**, or **Down**, a seaport of Ireland, the capital of the county of Down, is near the mouth of the Quoyle (which enters Lough Strangford), 21 miles S. S. E. of Belfast. It has a cathedral, a court-house, and a hospital; also manufactures of linen, soap, and leather. It is said to be the oldest city in Ireland, and was burned by Edward Bruce in 1315. The see of Down was united with that of Connor in 1442, and with that of Dromore in 1842. Pop. 3621.

**Downs**, **The**, a portion of the North Sea off the S. E. coast of Kent, England, between the North and South Forelands, is important as a shelter for shipping, which is protected by Goodwin Sands, a natural breakwater. This large natural harbor of refuge is 8 miles long and 6 miles wide, having an anchorage which varies from four to twelve fathoms in depth. It is safe except during a S. wind. In time of war it is a place of rendezvous for the royal navy.

**Down'shire**, MARQUESSES OF (1789), earls of Hillsborough (1751), Viscounts Hillsborough (1717), Viscounts Kilwarlin (1751), Barons Hill (Ireland, 1717), earls of Hillsborough and Viscounts Fairford (1772), and Barons Harwich (Great Britain, 1756).—ARTHUR WILLS BLUNDELL TRUMBULL SANDYS RODEN HILL, fifth marquess, born Dec. 24, 1844, succeeded his father Aug. 6, 1868.

**Dow'ry** [from the Fr. *douer*, to "endow;" Lat. *dos*; Fr. *dol*], the marriage portion brought by a wife to her husband. This term is often confounded with *dower*, but it has a different signification.

**Doxol'ogy** [Gr. *δοξολογία*, from *δόξα*, "praise," and *λόγος*, a "word," "expression"], a form of praise said or sung in divine service, commonly at the close of a prayer. The

Great Doxology, as it is called, is an expansion of the angelic hymn, and is sung in the Roman Catholic Church at the celebration of the Eucharist. It begins with the words "Gloria in excelsis Deo." The Lesser Doxology is the "Gloria Patri," the substance of which appears in the metrical doxologies in use amongst Protestants generally.

**Doyen** (GABRIEL FRANÇOIS), born in Paris 1726, died in St. Petersburg June 5, 1806. He studied under Carl Vanloo, and gained the great prize in 1746. After nine years' study in Italy, especially in Rome and Naples, he returned to Paris in 1753. His pictures attracted very little attention; they were even condemned. But he was too proud to yield to the bad taste reigning. He concentrated all his powers on the magnificent picture "Virginia's Death," and it took the public by storm. His masterpiece, however, is "Sainte Geneviève des Ardente," in the church of Saint Roch in Paris (1773). In 1791 he removed to St. Petersburg, as director of its academy of art.

**Doyle** (SIR C. HASTINGS). See APPENDIX.

**Doyle** (RICHARD), an English artist and caricaturist, born in London in 1826, was a son of John Doyle, a popular artist, whose political sketches were signed "H. B." He contributed satirical designs to the London "Punch." Died Dec. 11, 1883.

**Doylestown**, on R. R., capital of Bucks co., Pa. (see map of Pennsylvania, ref. 5-J, for location of county), 25 miles N. of Philadelphia, has waterworks, gasworks, a public library founded in 1836, and two private academies. It is much frequented by summer visitors from Philadelphia. Pop. of borough in 1870, 1601; in 1880, 2070.

**Do'zy** (REINHART), a Dutch Orientalist, born at Leyden Feb. 21, 1820, graduated in the university of that city in 1844. In 1850 he became professor of history at Leyden. Among his works is "Researches into the Political and Literary History of Spain during the Middle Ages" (1849; 2d ed. 1860).

**Dracæ'na Dra'co**, or **Dragon Tree**, a tree belonging to the order Liliaceæ, some examples of which grow to prodigious size in the Canaries and India. The height is not proportioned to the thickness of the stem, and the head is crowned with short branches having tufts of sword-shaped leaves. It produces a part of the resin called DRAGON'S BLOOD (which see). A specimen in the island of Teneriffe is described by Humboldt as having a stem about forty-five feet in circumference in 1799. It had the same measurement in 1402. It was worshipped by the Guanches, and its hollow trunk was converted by their conquerors into a chapel. This extremely old tree has been lately reported to have fallen.

**Drach'enfels** (i. e. "dragon's rock"), a mountain-peak in Rhenish Prussia, on the Rhine, about 8 miles S. E. of Bonn, has an altitude of 1056 feet. It rises abruptly from the river, and is renowned in Byron's verses commencing—

"The castled crag of Drachenfels  
Frowns o'er the wide and winding Rhine."

Its summit, crowned by a ruined castle, commands a beautiful prospect.

**Drachm**, or **Dram** [Gr. *δραχμή*; Fr. *drachme*; Lat. *drachma*; see below]. There are two drachms in our system of weights—namely, the avoirdupois drachm, which is one-sixteenth part of an avoirdupois ounce; and the apothecaries' drachm, which is the eighth part of a troy ounce. The orthography *dram* is commonly employed in avoirdupois weight, and *drachm* in apothecaries' weight. In apothecaries' measure a fluidrachm is one-eighth of a fluidounce. *Drachma* was also the name of a silver coin, the unit of the monetary system of ancient Greece. The Athenian drachma was equivalent to six oboli, or nearly twenty cents, and weighed from sixty-three to sixty-six grains. Other Greek states had drachmas of different values.

**Dra'co** [Δράκων], a Greek physician, son of the celebrated physician Hippocrates, to whom some of the writings that pass under the name of the latter are ascribed.

HENRY DRISLER.

**Dra'co**, or **Dra'con** [Gr. *Δράκων*], an Athenian legislator who was archon in 620 B. C., and was the author or compiler of the first written laws among the Athenians. This code was extremely severe and sanguinary, and made even petty larceny a capital crime. It remained in force until the time of Solon, who substituted milder penalties. The term *draconic* is sometimes applied to laws which are excessively severe.

**Draco**, or **The Dragon**, a constellation of the northern hemisphere. It was from observations upon the star γ Draconis that Bradley was led to his brilliant discovery of the aberration of light. It is a star nearly in the solstitial colure, and consequently the minor axis of the small ellipse

which its apparent place describes in the heavens lies in the meridian at its transit.

**Draco** [Δράκων], of Stratonicea, in Caria, a Greek grammarian, of whose life few traces are found, but who flourished probably about 125 A. D. Suidas and Eudocia assign to Draco a great number of works on grammar, on metre, and on the poems of Pindar and Alcæus, which have all, with one exception, perished. There is extant a treatise on Greek metres (περί μέτρων τραγητικῶν), which Hermann considers an epitome of Draco's work, with numerous interpolations from other quarters by a later hand. This was edited by Hermann, Leipsic, 1812.

HENRY DRISLER.

**Dracontium** [Gr. δρακόντιον, a "little dragon," probably from the burning taste of some species], a genus of plants of the natural order Aracæ. The *Dracontium polyphyllum*, a native of Guiana, India, and Japan, has a powerful action on the nervous system, and is used as a remedy for asthma. The flower emits an intolerable stench when it first opens. The *Dracontium* of the U. S. Pharmacopœia is the skunk-cabbage (*Symplocarpus foetidus*), which has similar medical properties. It is kindred to the true *Dracontium*, and like it has a strong offensive odor.

**Dracontius**, a Christian poet of Spain who lived under Theodosius II., about 431 A. D. Isidorus ascribes to him a poem in hexameter verse entitled "Hexæmeron," which is a poetical narration of the six days of Creation. This poem was somewhat changed and enlarged by an account of the seventh day by Eugenius, bishop of Toledo, in the seventh century. A supplement to his work was written by the author in elegiac verse, addressed to the younger Theodosius. Both works are contained in the edition of Carpozov, Helmstädt, 1794. (For further information consult BÄHR'S "History of the Christian Poets of Rome," vol. i., p. 59.)

HENRY DRISLER.

**Draft** [originally *draught*; Ang.-Sax. *drôht*, past part. of *dragan*, to "draw;" literally, "something drawn," hence a "drawing"], a bill of exchange; an order for the payment of money drawn by one person upon another; also a tentative copy of a legal document or other formal writing, made for the purpose of adjusting the matter which is to be admitted into the fair copy, or to be engrossed, as it is often called.

**Drag** [Ang.-Sax. *dreage*, from *dragan*, to "drag," allied to the Ger. *träge*, "slothful," "slow"], the name given to inventions used for the purpose of slackening the speed of vehicles. It consists of a mechanical combination of rods and levers, which may be operated upon by the driver without leaving his seat. By means of a handle a species of shoe is pressed against one of the wheels with sufficient force to retard the motion. It is more frequently called a brake.

**Drag'oman** [Fr. *dragman*; It. *dragomano*, a corruption of the Arabic *tarjuman*, "interpreter"], a name given in the Levant to an interpreter or guide for foreigners. The ordinary dragoman corresponds to the Italian *cicerone*. The dragoman of the Sublime Porte is an important Turkish officer, who forms the medium of communication between his own government and foreign ambassadors. The term is also applied to the interpreters attached to European embassies and consulates in the Levant. They are usually natives of Italian extraction. They and their families are not subject to the Turkish laws, but are under the protection of the embassies which they serve.

**Drag'on** [from the Gr. δράκων, a "serpent," a "dragon;" Lat. *draco*; Fr. *dragon*; Ger. *Drachen*], small, inoffensive East Indian lizards of the genus *Draco*, called winged dragon, or flying dragon (*Draco fimbriatus* and *volans*), remarkable for an expansion of the skin on each side, forming a kind of wing, which sustains the animal like a parachute. Other species, the dragon lizards (*Adn*), belonging to the Tegidae, are natives of America only. They have the tongue forked like a serpent, back and tail crested, and are sometimes six feet long. They have no parachute; they are bold and resolute in self-defence.

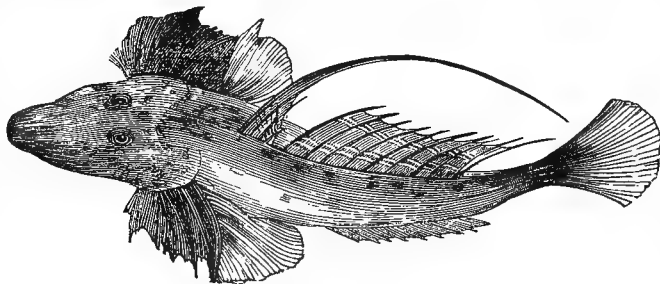


Flying Dragon: *Draco volans*.

The name DRAGON has also been given to a fabulous monster, represented in the mythology of many nations as a huge winged serpent. In the New Testament the word is used for the personification of sin, and in Christian art it is the type of sin and idolatry. Hercules, Perseus, and Apollo in Greek mythology, and Thor in the Scandinavian, were renowned as dragon-slayers, as was Saint George in the early Christian legends. The dragon is still an heraldic bearing in Europe.

Among the Chinese the dragon was believed to be a being of superhuman power, a sort of deity; and hence became a symbol of divinity. According to Chinese tradition, some of the earliest emperors of that country are represented as having the form of flying dragons, and representations of such dragons belong to the heraldry of the imperial coat-of-arms.

**Drag'onet** (*Callionymus*), a genus of fishes belonging



Gemmeous Dragonet.

to the Gobiadae, or goby family. They have no air-bladder, the ventral fins are larger than the pectorals and placed under the throat, and the gill-openings are reduced to a small hole on each side of the nape. One of the finest species is the gemmeous dragonet (*Callionymus lyra*), of a golden color, variegated with sapphire-blue. They are found on the European coasts.

**Dragon-Fly** [Fr. *démouille*; Ger. *Stechfliege*], the



Dragon-Fly: *Agrion*.

popular name of a family (the Libellulidæ) which includes an immense number of species of neuropterous insects. They have large globular heads, strong mandibles, eyes lateral, large, and projecting, antennæ short, four narrow, gauze-like wings, strongly reticulated, and the abdomen often remarkably slender. They are found in northern countries, but they are most common in the warmer climates, and frequent marshes, lakes, and rivers. Their food is insects, which they devour with great voracity. They are sometimes known as "devil's darning-needles," and are often regarded by the ignorant with groundless dread.

**Dragonnade**, a name of the persecutions which the French Protestants suffered in the reign of Louis XIV., which were so called because dragons (Fr. *dragons*) were employed as instruments of the persecution. A body of

dragoons led by a bishop and intendant marched through the provinces, requiring the Protestants to abjure their religion, and persecuting those who refused.

**Dragon's Blood, or Gum Dragon** [Lat. *sanguis draconis*], a resin obtained from various trees growing in warm climates. Among these are the *DRACENA DRACO* (which see), the red sandal-wood (*Pterocarpus Santalinus*) of the East Indies, the *Pterocarpus Draco*, a leguminous tree of South America, and the *Calamus Draco*, an East Indian rattan palm. The dragon's blood of commerce is of a dark reddish-brown color, smooth, and brittle, and dissolves in oil, alcohol, and ether. The solution is used for staining leather, wood, and even marble. The resin is also an ingredient of some varnishes and lacquers. It comes from the Moluccas, Socotra, Brazil, and Teneriffe.

**Dragoon.** See CAVALRY, by GEN. WADE HAMPTON.

**Draguignan**, a town of France, capital of the department of Var, about 40 miles N. E. of Toulon. It is charmingly situated in a valley between hills which are covered with vineyards and olive trees. It has a court-house, a botanic garden, and many public fountains; also manufactures of woollen fabrics, hosiery, silk stuffs, brandy, pottery, and oil. Pop. in 1881, 9133.

**Drainage**, the removal of the excess of water from the soil, either by means of canals and open ditches, or by underground sewers, pipes, and hollow tiles. The drainage of cities is noticed under SEWER (which see). No part of farm-husbandry pays a larger profit upon capital invested than the judicious drainage of land. There is very little ground that is not too wet in rainy weather and too dry in our frequent and long-continued droughts. Thorough drainage not only relieves the first-mentioned evil, but, strange as it at first appears, it greatly mitigates the bad effects of dry weather. When soil is drenched with water and dried by evaporation, it becomes hard, especially if it be argillaceous; land that is dried by drainage is porous and permeable to the dews and showers; while the soil deepened by drainage permits growing crops to put forth longer roots, and thus become secured against drought.

It appears also that good drainage diminishes the relative number of fevers, especially those of a malarial origin, while it is almost certain that excessive moisture in the soil is a fruitful cause of consumption. So important is this subject considered in England that Parliament in 1846 offered in the Drainage act to advance money on easy terms to landholders for the purpose of improving the drainage of land. The act has proved a very great blessing to the country.

Underground drainage is the best for land that is not decidedly marshy; and of all underground drains those made with tiles (hollow cylinders of porous burned clay) are the most effective. The tiles should be laid near enough to the surface to effect a thorough drying after rains, and deep enough to escape the plough. It is very important to avoid curves and angles in the vertical plane of drains, because any earth which may enter the tiles will be sure to lodge at depressed points, and spoil the drains.

Draining lakes and marshes is a matter requiring great capital and much engineering skill, but it is sure to become a very important question in our Southern and Western States. In Holland, steam-pumps, wind-mills, and tide-gates are used extensively. The great Haarlemmer-meer was drained and is kept drained by steam-power.

**Drainage of Cities.** See SEWER, by GEN. Q. A. GILLMORE.

**Drake** (BENJAMIN M.), D. D., a distinguished minister of the Methodist Episcopal Church South, born in North Carolina Sept. 11, 1800. He joined the Tennessee Conference in 1820, but the next year was transferred to the Mississippi Conference, in which he rose to an imperial position. He built the first Methodist church in New Orleans, was president of Elizabeth Female Academy (the first Methodist school established in Mississippi), and was president of Centenary College. He was greatly loved and revered. He died in Mississippi in 1860. T. O. SUMMERS.

**Drake** (CHARLES D.), a jurist, a son of Dr. Daniel Drake, was born at Cincinnati, O., April 11, 1811. He served as midshipman in the navy (1827-30), and was admitted to the Ohio bar in 1833. In 1834 he removed to St. Louis, where he became eminent as a lawyer and politician, was U. S. Senator (1867-71), and was appointed chief-justice of the U. S. court of claims in 1871. He has published "Law of Attachments" (1854) and "Life of Dr. Daniel Drake" (1871).

**Drake** (DANIEL), M. D., born at Plainfield, N. J., Oct. 20, 1785. In infancy he was brought to Kentucky, then almost a wilderness, and received a very limited preparatory education. At fifteen he was apprenticed to Dr. Go-

fort, and attended lectures in the University of Pennsylvania, where he took the degree in medicine in 1815. Soon after this he accepted a professorship in the University of Transylvania at Lexington, Ky.; in 1819 he founded the Medical College of Ohio at Cincinnati; then filled a chair in the Jefferson Medical College, Philadelphia; was called twice to the school in Louisville, and finally returned to Cincinnati, where he died. He had an intense love for the great West, especially for Cincinnati; was ever active in the profession, establishing journals, sustaining hospitals, blind asylums, the temperance cause, and doing all he could for Church and State. Dr. Drake was a true philanthropist, a noble patriot, a sincere Christian. Among his works is a "Systematic Treatise on the Principal Diseases of the Interior Valley of North America, etc." (2 vols., 1850-54). Died Nov. 6, 1852. PAUL F. EVE.

**Drake** (Sir FRANCIS), an English navigator, born in Devonshire about 1540. He served as a captain under Sir John Hawkins in his expedition to the Spanish Main in 1567, obtained a commission from Queen Elizabeth in 1570, cruised in the West Indies, and enriched himself by plunder taken from the Spaniards. He conducted in 1572 an expedition against the Spanish in America, captured valuable prizes, and saw the Pacific from the Isthmus of Darien. He sailed in 1577 with five vessels on a marauding expedition against the Spaniards. He entered the Pacific, sacked several towns of Chili and Peru, and captured a galleon laden with silver. Hoping to find another passage to the Atlantic, he sailed northward to lat. 48° N., but he failed, and took shelter in the Bay of San Francisco. He next steered to the Moluccas, returned by the Cape of Good Hope, and arrived at Plymouth in Sept., 1579. He was the first Englishman who circumnavigated the globe. The queen rewarded him with knighthood. He was appointed commander of a fleet in 1587, when Spain was preparing the Armada. He entered the harbor of Cadiz, where he destroyed nearly one hundred vessels and captured immense booty. The exploit was called "singeing the king of Spain's beard." He was vice-admiral of the fleet which in 1588 opposed the Invincible Armada. In 1592 he was elected to Parliament. He died near Puerto Bello Dec. 27, 1595.

**Drake** (FRANCIS SAMUEL), an American author, born at Northwood, N. H., Feb. 22, 1828, was a son of the well-known antiquary and historian, S. G. Drake, noticed below. He published a valuable "Dictionary of American Biography" (1872), the most complete work that has been published on the subject, and prepared a volume of memoirs for the Mass. Society of the Cincinnati, and a "Life of General Henry Knox" (1873). D. Feb. 22, 1885.

**Drake** (FRIEDRICH), a German sculptor, born at Pyrmont June 23, 1805, was a pupil of Rauch. He gained a high reputation by statues and busts of many eminent Germans of the present century, including the Humboldts, Rauch, and Oken, and two colossal statues of King Frederick William III. Among his other works is an allegorical group of the "Eight Provinces of Prussia" (1844), in the castle of Berlin. D. 1882.

**Drake** (JOSEPH RODMAN), an American poet, born in the city of New York Aug. 7, 1795. He studied medicine, graduated about 1815, and married in 1816 a daughter of Henry Eckford, a noted naval architect. He became an intimate friend of Fitz-Greene Halleck. Among his works are "The Culprit Fay" and verses on the American flag, which are greatly admired. Died Sept. 21, 1820.

**Drake** (SAMUEL GARDNER), an historical writer, born at Pittsfield, N. H., Oct. 11, 1798. For many years a school-teacher in a country district, he removed in 1828 to Boston, where he opened an antiquarian bookstore, the first of its kind in the U. S. He was one of the founders of the New England Historical and Genealogical Society, and published, besides other works, "Indian Biography" (1832), "The Book of the Indians" (1833), "History and Antiquities of Boston" (1856), and "Annals of Witchcraft in the U. S." (1869). Died 1875.

**Dram.** See DRACHM.

**Dram'a** [Gr. *δρᾶμα*, from *δρᾶω*, to "do," to "act;" literally, an "acting," a "performance;" Fr. *drame*; Ger. *Dutch*, Dan., Sp., and Port. *drama*; It. *dramma*; Sw. *dram*] signified originally the exhibition of human actions (especially those which reveal the feelings and passions) upon the stage. The ancient Greek drama, comedy as well as tragedy, had its origin in the worship of Bacchus (Dionysus). The Dionysian dithyrambs sung at the festivals of Bacchus sometimes expressed wild and boisterous gaiety, at other times passionate sorrow. From the former was at length developed the old Greek comedy, which may be said to have attained its highest perfection in the plays of ARISTOPHANES (which see); from the latter arose the Greek



tragedy, which found its most perfect expression in the immortal works of Æschylus, Sophocles, and Euripides.

The Roman drama was derived from the Greek, to which, in the opinion of all the most distinguished critics, it was much inferior. The most celebrated Roman dramatic poets were Plautus and Terence, who appear to have taken Menander and Philémon (of the New Greek comedy) as their models, and whose productions have exercised considerable influence on the modern comedy. In tragedy ancient Rome produced one truly great poet, Seneca.

The Hindoo drama, quite independent in its origin of the drama of Europe, has produced some works of great merit, the most celebrated of which is the "Sakountalâ, or the Lost Ring," of Kâlidâsa (who is supposed to have lived about 50 B. C.)—a work which has received the highest commendation from some of the most eminent critics of modern Europe, and has been pronounced not unworthy of the genius of Shakspeare. This remarkable production, instead of being divided into five acts, like the classic and modern drama, consists of seven acts.

The Chinese also have a drama, but greatly differing in some respects from that of the Western nations; a single piece, it is said, being often extended through no inconsiderable portions of several successive days.

In modern times the drama has been cultivated with success, it may be said, by all the principal European nations, but more especially by the Italians, the Spaniards, the French, the English, and the Germans. For a long period the French were generally supposed to surpass all other nations in the genius and skill of their dramatic writers, as well as in the admirable performance of their actors. The French critics usually insisted on the strictest adherence to the rules of the classic drama, and particularly to what are commonly termed "the three unities." Until the time of Lessing the German theatre was scarcely more than a reflection of that of Paris, but that great author and critic taught his countrymen to throw off the trammels and affectations of a foreign school, and to give entire freedom to the cultivation of the national genius. Since that time the German authors, taking the English for their models rather than the French, but without servilely following any, have produced the finest dramatic works that have appeared in Europe since the time of Shakspeare. Among the German dramatic writers, Goethe and Schiller, by universal consent, occupy the foremost rank. Denmark has also produced some eminent dramatic writers, among whom ŒLENS-LÆGER (which see) is the most celebrated. Italy can scarcely be said to have produced any dramatic poets of the highest order; among her best are perhaps Goldoni in comedy, and Alfieri, Manzoni, and Silvio Pellico in tragedy. The Spanish drama has given to the world many productions displaying rare genius, but none that are worthy to be placed by the side of the greatest dramatic works of Greece, England, Germany, or France. The most celebrated names in Spanish dramatic literature are those of Lope de Vega and Calderon; the former surpassing all that is recorded in the history of the human mind in the marvellous fertility of his genius; the latter pre-eminent for the brilliancy of his imagination, as well as for the fertility of his invention, but neither of them producing any work of the very highest order.

The French drama justly holds a very high place in European literature. It is not too much to say that in comedy the writers of no other nation, either in ancient or modern times, have equalled the French. The best plays of Molière may be said to be not only unrivalled, but unapproached, by those of any other author, Shakspeare alone excepted. In tragedy, Corneille, Racine, and Voltaire all exhibit genius of the very highest order, but Racine, in the natural, graceful simplicity, as well as in the exquisite finish, of his productions, is generally admitted to have approached most nearly to the most perfect specimens of the ancient Greek tragedy.

Though the dramatic literature of England presents us with fewer writers of the highest order than that of France, the former can boast of one whose dramatic genius surpasses everything to be found in ancient or in modern times. While in his best comedies Shakspeare is perhaps not inferior to Molière, in his tragedies, not merely in the exhibition of the conflict of the mightiest human passions, but also in his representation of the workings of the most intricate and subtle of human motives, he has no equal nor second among the sons of men.

In the opinion of many critics the highest exhibition of poetic genius is to be found in the tragic drama, which naturally combines the fire and passion of lyric inspiration with that representation of outward circumstances, conduct, and events which belongs to epic poetry. It thus unites every advantage for the exhibition of human character. It not only shows us the external conduct, but in the various soliloquies and discourses of the *dramatis personæ* it re-

veals to us the hidden thoughts and passions of the soul. In this last respect, it has a great superiority over epic poetry, in which, though the expression of feeling occasionally occurs, it is always made subordinate to the events of the story.

J. THOMAS.

**Dram'burg**, a town of Prussia, in the province of Pomerania, 53 miles E. of Stettin, has a normal school and large woollen factories. Pop. 5473.

**Dram'men**, a seaport-town of Norway, in Aggershuus, on both sides of the river Drammen, near its entrance into the Christiania Fiord, about 24 miles S. W. of Christiania. It has a college, and manufactures of sailcloth, ropes, etc. Large quantities of timber are exported from this port. Pop. 15,458.

**Dranesville**, a village of Fairfax co., Va. (see map of Virginia, ref. 4-H, for location of county), 17 miles W. by N. of Washington. was the scene of a very spirited engagement and Federal victory Dec. 20, 1861.

**Draper** (HENRY), M. D., LL.D. See APPENDIX.

**Draper** (JOHN C.), M. D., LL.D. See APPENDIX.

**Dra'per** (JOHN WILLIAM), M. D., LL.D., a distinguished chemist and writer, born near Liverpool, England, May 5, 1811, was educated at the University of London, and emigrated to the U. S. in 1833. He graduated as M. D. in the University of Pennsylvania in 1836, was professor of chemistry and physiology at Hampden-Sidney College (1836-39), and became professor of chemistry in the University of New York in 1839. In 1841 he was appointed professor of chemistry in the newly-founded medical department of that university. In 1839 he took the first photographic portrait ever taken from the life. He discovered many of the fundamental facts of spectrum analysis, and published them (1841-50). He published, besides other works, "Human Physiology, Statistical and Dynamical, of the Conditions and Course of Life in Man" (1856), a "History of the Intellectual Development of Europe" (1863), and a "History of the American Civil War" (3 vols., 1867-68), and numerous monographs on mathematics, chemistry, and optics. D. Jan. 4, 1882.

**Draper** (LYMAN C.), an author, was born near Buffalo, N. Y., Sept. 4, 1815. Since 1833 he has edited four volumes of the Wisconsin Historical Society's "Collections," and has written much upon the history and biography of the West. He published in 1857 an account of Madison, the capital of Wisconsin.

**Draper** (SIMEON) was born in 1804, and became a merchant in New York. He was the active political friend of W. H. Seward, fulfilled for many years important public duties, was appointed provost-marshal of New York in 1862, and collector of the port in 1864. Died Nov. 6, 1866. He was a man of ability, generosity, and integrity.

**Dra'pery** [Fr. *draperie*, from *drap*, "cloth"], cloth or woollen stuffs, clothing, or apparel. The dealers in such commodities are called *drapers* in England. Drapery in painting and sculpture is the clothing applied to the human figure, the various costumes and modes of dress used by different nations and classes of people. The ancient Greeks, although they often executed nude statues of heroes and gods, surpassed all other artists in the representation of drapery and costume. The art of disposing the folds of drapery forms a considerable part of the painter's and sculptor's study, and requires good taste and judgment.

**Dra'prier Let'ters, The**, were written under the signature of "M. B. Drapier" by Dean Swift. They attacked the government for granting a patent in 1722 to a man named Wood, in order to supply a deficiency of £108,000 in the copper coinage of Ireland. They created an almost unparalleled sensation in Ireland on their first appearance in 1723. Harding, their printer, though prosecuted and imprisoned by the Crown, refused to betray the author. The patent was abandoned after £40,000 in halfpence had been coined, and Wood was compelled by the popular indignation to leave the country.

**Draught**, or **Draught of Water**, a nautical term for the depth a ship sinks in water when afloat. The draught is marked from the keel upward—on the stem and on the stern-post.

**Draughts** [probably because a move was formerly called a "draught;" Fr. *le jeu de dames*; It. *dama*; Ger. *Damen*, probably from *dameh*, the Egyptian name of the game], commonly called **Checkers** in America, a game played by two persons upon a board divided into sixty-four squares of alternate colors, each person having twelve pieces or counters, distinguished by their color from those of the opposite party. The success of the game depends upon the skill of either party in capturing all the pieces of an adversary, or hemming them in so that no further move can be made. The counters of each player are placed before

him upon the first three lines of squares of the same color, and each piece is moved diagonally forward one square to the right or left. It is the duty of each player to take the piece of the other when a vacant square is found behind it, which is done by jumping over into that square, and removing the piece "jumped" or passed over. Several pieces may be jumped at one time when the diagonals forward are exposed, and the taking piece is placed upon the square behind the one taken last. When the last row on the opposite side of a board is reached, the piece is called a king, and is crowned by placing one of the counters before captured upon it; and this king can then be moved diagonally forward or backward, one square only at a time. If a piece is touched it must be moved if possible. The piece exposed must be taken by the player having the move; in case he neglects to do so, his adversary may remove the piece which should have made the capture. When lots are drawn for the first move, he who gains the choice may move or require his adversary to do so. The game is supposed to have originated more than 2000 years B. C., and to have preceded chess. It was introduced into Europe from Egypt three or four centuries ago.

**Draughts'man**, a person who draws pictures, plans, or maps; one who delineates or draws a sketch or design. The term is not usually applied to those who produce original designs.

**Drave** [anc. *Dravus*; Ger. *Drav*; Slavonic *Drava*], a river of Europe, rises in the Tyrol, and flows nearly eastward, through Carinthia and Styria, to the western frontier of Hungary. It afterwards runs south-eastward, and forms the boundary between Hungary on the left and Croatia and Slavonia on the right, until it enters the Danube 14 miles E. of Essek. Its total length is nearly 400 miles. It is navigable for 200 miles or more.

**Draw'back**, a loss of advantage, success, profit, or value; anything that deducts from a step gained; a discouragement or hindrance. Commercially, an allowance made by the government to merchants on the re-exportation of certain imported goods liable to duties; also a repayment or remission of a duty laid on any article produced in a country and suitable for the foreign market, when such article is entered for exportation. In some cases this allowance or remission consists of the whole of the customs or excise duties; in others, of a part only. In the U. S. drawback has been regulated by various acts of Congress. Such duties are, of course, an enhancement of the natural price of the commodity on which they are imposed. The object of the allowance or remission is to establish or stimulate a trade with foreign countries in the commodity. Adam Smith, in his "Wealth of Nations," thus speaks of the remission or repayment of the latter form of duty: "To allow," he says, "the merchant to draw back, upon exportation, either the whole or a part of whatever excise or inland duty is imposed upon domestic industry, can never occasion the exportation of a greater quantity of goods than what would have been exported had no duty been imposed. Such encouragements do not tend to turn towards any particular employment a greater share of the capital of the country than what would go to that employment of its own accord, but only to hinder the duty from driving away any part of that share to other employments. They tend not to overturn that balance which naturally establishes itself among all the various employments of the society, but to hinder it being overturned by the duty; they tend not to destroy, but to preserve what it is in most cases advantageous to preserve, the natural division and distribution of labor in the society." These remarks are subject to this qualification: provided the drawback is equally applicable to all domestic productions that are sought to be exported. It might, perhaps, be shown also, by experience, that the practice of giving drawbacks is liable to abuse; for, supposing a great fall in the value of some excisable article, it may be exported with a view, partly or entirely, to get the drawback. An important species of commerce would thus be fostered. Of course the government must guard against deceptions by exercising an oversight of the packing, weighing, tying, and sealing of such goods, of their ownership, of the time when such goods were charged with the duties, and of the exportation; and in some particulars it requires a verification by oath.

REVISED BY T. D. WOOLSEY.

**Draw'bridge**, the name applied to the whole or part of a bridge which may be moved to admit or hinder communication. There are several varieties of these structures. They are respectively known as bascules or lifting bridges, from their turning vertically on a hinge; swivel or swing bridges, from moving horizontally on a pivot; and rolling bridges, from being propelled on friction rollers. They are principally used on navigable streams to permit vessels to pass and at the portals of fortifications.

**Draw'ing**, in the fine arts, is the delineation of form in contradistinction to color, light, and shade, and, as it includes a knowledge of anatomy, proportion, and perspective, is the foundation of everything in art, and the most important feature of a finished painting. In power and beauty of drawing the Italian and Flemish schools stand pre-eminent. At the period when Greek art had attained its highest perfection drawing was a regular branch of education, as it is at present in the public schools of Germany, Switzerland, and other European nations. In Massachusetts drawing is taught in the public schools of the larger towns, and artisans, mechanics, and others who may desire it receive gratuitous instruction in free-hand as well as mechanical drawing in the evening schools. Similar instruction is given in several of the larger cities of other States. (See INDUSTRIAL DRAWING.)

**Draw-plate**, a metal plate placed before or over a fire-place, for the purpose of forcing the air through the fire; also a steel plate with graduated orifices, through which metals are drawn into bars or wires.

**Drayton** (MICHAEL), an English poet, born in Warwickshire in 1563. His chief work is "Poly-Olbion" (1613), a poetical description of the mountains, rivers, valleys, and forests of Great Britain, with the traditions connected with them. He was appointed poet-laureate in 1626. Among his numerous works are "The Barons' Wars" (1596) and "Nymphidia," a fairy poem (1627). Died in 1631.

**Drayton** (PERCIVAL), U. S. N., born Aug. 25, 1812, in South Carolina, entered the navy as a midshipman Dec. 1, 1827, became a passed midshipman in 1832, a lieutenant in 1833, a commander in 1855, and a captain in 1862. He served in the South Atlantic squadron from the fall of 1861 to the summer of 1863, commanding the steamer Pocahontas at the battle of Port Royal, and the iron-clad Passaic during the bombardment of Fort McAlister of Mar. 3, 1863, and at the first attack upon Fort Sumter of April 3 of the same year. He is handsomely mentioned in several of the official despatches of Rear-Admiral Dupont, who in his last report speaks of him as an officer "of the highest professional capacity and courage." He commanded the Hartford at the great battle of Mobile Bay, Aug. 5, 1864, and is thus commended by Farragut in his detailed report of the events of that glorious day: "The Hartford, my flag-ship, was commanded by Captain Percival Drayton, who exhibited throughout that coolness and ability for which he has been long known to his brother-officers. But I must speak of that officer in a double capacity. He is the fleet-captain of my squadron, and one of more determined energy, untiring devotion to duty, and zeal for the service, tempered by great calmness, I do not think adorns any navy. I desire to call your attention to this officer, though well aware that in thus speaking of his high qualities I am only communicating officially to the department that which it knew full well before." Early in 1865, Drayton was appointed chief of the bureau of navigation, in the discharge of which high office he died (Aug. 4, 1865), universally regretted. FOXHALL A. PARKER.

**Drayton** (WILLIAM), an American officer, the father of the preceding, was born in St. Augustine, Fla., Dec. 30, 1776. He served as colonel in the war of 1812, became a member of Congress in 1825, and was a leader of the Union party of South Carolina in 1830. He was chosen president of the U. S. Bank in 1839, as the successor of Nicholas Biddle. Died May 24, 1846.

**Drayton** (WILLIAM), born in South Carolina 1733, died there in 1790. He was educated in England, and studied law for four years at the Middle Temple, London, but returned to America in 1754, and was in 1768 appointed chief-justice of the province of East Florida. During the war he was for some time suspended. After the war he was judge of the admiralty court of South Carolina, and afterward judge under the U. S. government.

**Drayton** (WILLIAM HENRY), an American patriot, born in South Carolina Sept., 1742. He wrote political works, was chosen chief-justice of South Carolina in 1776, and president of that State in 1777. In 1778 he became a member of the Continental Congress. He died Sept. 3, 1779, leaving in MS. a "History of the Revolution," which was published by his son (2 vols., 1821).

**Dray'ton-in-Hales**, or **Market-Drayton**, a town of England in Shropshire, on the Tern, 19 miles N. N. E. of Shrewsbury. It has manufactures of paper and of hair seats for chairs. Here the partisans of the house of York defeated the Lancastrians in 1459. Pop. in 1881, 5188.

**Dream** [Lat. *somnium*; Fr. *songe* and *rêve*; Gr. *Traum*], a series of thoughts, feelings, and acts of the imagination occurring in sleep. In some cases the reasoning powers are abnormally active in dreams, but in general the mental action is incongruous. Dreams usually are evidence of im-

perfect sleep. They take their character from some preceding state of the mind, and are often modified by the conditions of the health. The Bible speaks of dreams as being sometimes prophetic or suggestive of future events. This belief has prevailed in all ages and countries, and there are numerous modern examples, apparently well authenticated, which would appear to favor this hypothesis. The interpretation of dreams was a part of the business of the soothsayers at the royal courts of Egypt, Babylon, and other ancient nations.

**Drebbel, van** (CORNELIS), a Dutch philosopher, born at Alkmaar in 1572. He removed to England about 1620, and was patronized by James I. He invented several curious machines, and wrote two works entitled "On the Nature of the Elements" and "Quintessence" (1621). He is said to have invented the thermometer, but the statement has been disputed. Died in London in 1634.

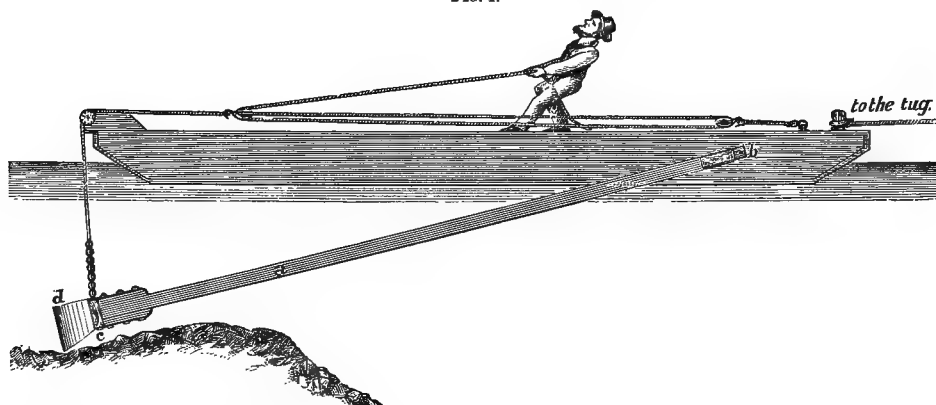
**Dredging and Scouring**, terms applied to those processes by which materials are removed from the bottom of ship-channels and harbors, and the navigable depth of water increased thereby. By *dredging* is meant more particularly the raising of the materials to the surface by mechanical appliances, and their transportation and deposition elsewhere, while *scouring* implies their gradual and progressive removal by the force of the current. In order to increase the effective scouring-power of streams it is customary to narrow and straighten their natural waterway by bulkheads, jetties, and other works of improvement; and sometimes the drainage waters in inland, and

the ebb flow in tidal streams, are held back by gates, and let out through the channel at stated periods with great violence. This method of scouring, called *flushing* or *flushing*, is a very efficient mode of dredging in the few locations favorable for its application. At Ramsgate, Dover, and other places in England large scouring-basins or reservoirs to retain the water have been constructed. To facilitate the scouring, the bottom may be loosened up by dragging heavy rakes over it during the period of strongest current. The oldest dredging-machines were probably of this character, and were used in Holland. They consisted of floating frames, with teeth or bars projecting down to the bottom from the under side, which stirred up the sand and mud as the machine was floated along by the current.

Where bars are short, with deep water on either side, or where the bottom is lumpy, scrapers have been advantageously employed to smooth off the bottom. The material scraped from the shoal places subsides in deep water, and the available depth is thereby increased. The scrapers may be attached to a tug moving up and down the channel, or to a scow towed by a tug. Fig. 1 shows a side view of a scow and scraper designed and used by Major Houston, U. S. corps of engineers. On each side of the scow there is a long arm *a* pivoted at *b*, and connected at the lower end by a crossbar *c*, to which the scrapers *d*, three in number, are attached side by side. Each scraper is a semi-cylinder of  $\frac{1}{4}$ -inch boiler iron, 3 feet in diameter and about 24 feet long on the longest side, open at both ends, the lower end terminating obliquely to the axis, like a scoop.

The effective velocities of currents in moving materials

FIG. 1.



Scale, 1 inch to 8 feet.

of various kinds and sizes, as established by different observers, are as follows:

0.170 miles per hour	will just begin to work on fine clay.
0.340 " " "	will lift fine sand.
0.454 " " "	will lift sand.
0.682 " " "	will sweep along fine gravel.
1.364 " " "	will roll along round pebbles nearly one inch in diameter.
2.045 " " "	will move slippery, angular stones the size of a hen's egg.

Sir John Leslie gives the formula  $V = 4\sqrt{a}$  for finding the velocity required to move rounded stones or shingle, in which  $V$  denotes the velocity of the water in miles per hour, and  $a$  the edge of the stone if a cube, or the mean diameter if a rounded stone or boulder.

The mode of deepening channels by stirring up the bottom in streams where there are effective currents in one, or alternately in both directions, has been successfully followed at the mouth of the Mississippi River. The apparatus used was a large double-ender dredge-boat, of like shape and construction at both ends, provided with two strongly built, four-bladed propellers, one at each end, on separate shafts, powerfully driven by separate engines, and with water compartments or tanks, such that when they are empty and the coal-bunkers full, the boat will draw fourteen feet, and when full twenty-two feet. The blades of the propellers extend about two feet below the vessel's keel. When operating, the boat is sunk by means of her tanks to a draught fully equal to and generally exceeding the soundings on the bar; she then steams alternately up and down the channel, cutting her way through and stirring up the bottom with the propellers. The material thrown into suspension is carried off by the current and subsides in deep water. In exceptional cases the boat, when drawing fifteen feet, has cut her way through where there were but ten feet of water. The up-stream or stern end of the

boat has a deflector a few feet in rear of the propeller. When steaming down stream on an ebb current, the effect of this deflector is to carry upward into the upper and stronger current the backwater from the propeller, and consequently the solid material with which it is charged. Upon one occasion the amount excavated by this dredge-boat in four days, working twenty-eight and a quarter hours, was upwards of 22,000 cubic yards, but this is considerably in excess of the average results. Auxiliary scrapers are also used with this boat to stir up the bottom on each side of the propellers. To guard against stoppage from accidents, two boats are deemed necessary to maintain a constant depth of twenty feet at low tide. (See Fig. 2.)

In tidal streams the inward and outward flow of the tidal wave is a most efficient scouring agent for maintaining the channel at the greatest practicable depth of which it is capable; and a judicious regulation and control of the tidal currents, by giving uniformity in depth and width to the channel, and straightening it wherever practicable, has in many instances converted a narrow, crooked, and shallow stream into a deep and navigable channel. A recognized principle in hydraulic engineering is that the flow of the tidal wave should be *facilitated*, and not *obstructed*; hence a deepening of the water-way should always accompany a reduction in width. The tidal wave is propagated with greater velocity in deep than in shallow channels, the ratio of velocities for different depths being approximately as the square roots of those depths.

*Scoops* of various forms, filled by drawing them along the bottom, and then raising them to the surface and emptying them into scows, have been used in many places—a device which was afterwards extended by attaching a series of scoops or buckets to an endless belt or chain attached to the side of the vessel, or over an opening amidships, and working over pulleys or wheels so arranged that the chain can be lowered or raised to suit various depths of water.

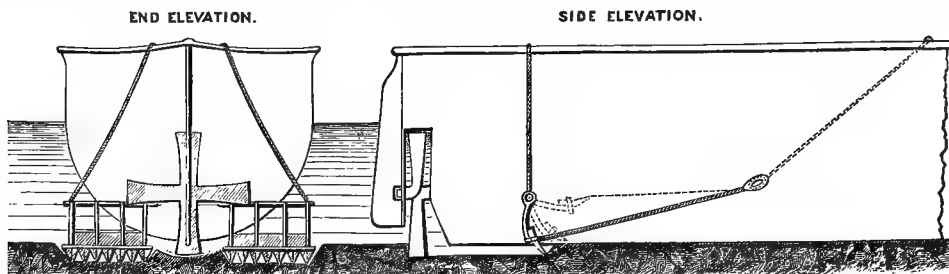
The buckets descend empty, fill themselves at the bottom, and when they rise over the upper wheel discharge into troughs leading to scows alongside.

Fig. 3 shows a longitudinal section, and Fig. 3a an enlarged view of buckets and lower wheel, of a powerful steam-dredger used on the river Clyde, Scotland. The hull is of boiler plates and angle iron, being 161 feet long, 29 feet breadth of beam, and 10 feet greatest depth of hold. An endless band, carrying 40 dredge-buckets of nearly 14 cubic feet capacity each, works through a well amidships, passing over two wheels, one at either end of an iron bucket-girder 90 feet long, and weighing 125 tons when working, inclusive of the contents of the ascending buckets

and hoisting chains. The axis of the upper wheel is stationary at the height of about 30 feet above the water, and the girder revolves about this axis sufficiently, by raising and lowering the submerged end, to allow the dredging to be carried on at any depth from 6 feet to 30 feet. One man by means of a lever on deck has complete control of raising and lowering the bucket-girder. The main frame carrying the girder and its gear is well secured and braced, so as to distribute the strain it has to bear over a large portion of the hull.

The dredged material is delivered, after passing over the upper wheel, into inclined shoots at either side of the vessel, with suitable arrangements, worked by steam, for closing

FIG. 2.



one shoot and opening the other simultaneously. At the bow there are three large independent double-powered crab winches, combined in one machine for convenience in handling by one man. These crabs control one 1½-inch head chain and two ¾-inch side mooring chains, provided for guiding the dredger to the cutting place. At the stern four similar crabs are placed to work the stern and side moorings. By these appliances provision is made for moving the vessel ahead, astern, and athwartship. Surging heads are also fitted to the crabs to haul the hopper barges alongside, also hand gear to work the surging heads independent of steam. Friction gearing is provided and adapted to work these moorings at three different speeds. The main gearing and girder hoisting gear are also fitted with adjustable friction-wheels, to prevent accidents in case of undue strain coming on the buckets or girder. Steel has

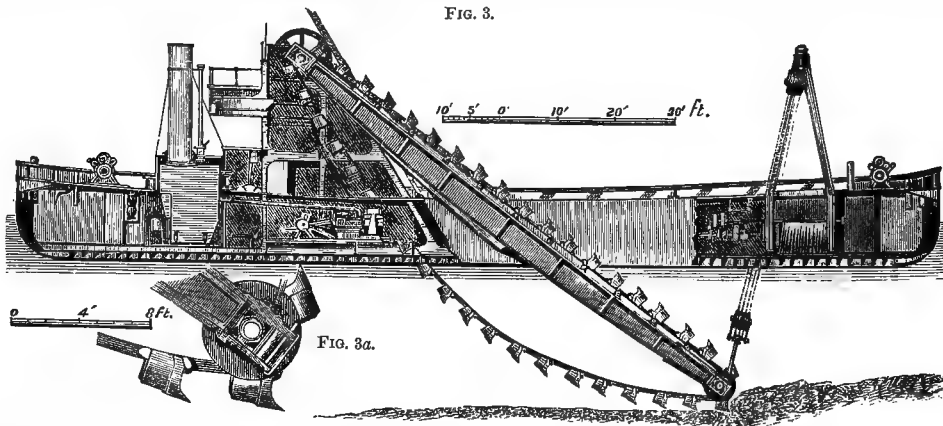
been used in various parts of the machinery of this dredger, such as the dead-eye brackets for suspending the top end of the bucket girder, bars for upper and lower tumblers, bearings of lower tumbler shaft, spindles of bucket rollers, bucket cutting lips, and bushes for the bucket link-eyes.

The working power consists of a pair of horizontal condensing engines to drive the buckets, hoisting gear for bucket girder, and bow crabs. Two pairs of non-condensing engines are also provided to drive the stern crabs, side shoots, etc. A donkey double-acting pump connected to bilges and sea feeds the boiler, etc.

This dredger working at full speed in 10 or 15 feet of water can raise about 500 tons or 380 cubic yards of ordinary soil per hour.

This method of dredging, considerably modified, was applied on a very extensive scale in excavating the Suez

FIG. 3.



Canal, but the dredgings, instead of being always delivered into scows alongside, were generally deposited on the banks of the canal through long shoots having but a slight inclination. The dredge-boats were built of boiler iron, and the largest ones were 108 feet long, 27 feet broad, and 10½ feet deep in the hold, with 5 feet draught of water. The engine was vertical, direct acting, and condensing, with two cylinders, and nominally 35 horse-power, the boiler heating surface being 1163 superficial feet. The capacity of some of the dredge-buckets was 10.6 cubic feet, and others 14.74 cubic feet. The upper rollers, over which the endless chain carrying the buckets passed, were in some dredges 37 feet 5 inches above the water, and in others 48 feet. For the former the shoots to deliver the materials on the canal banks were 195 feet long, and for the latter 227½ feet long. The shoots are not supported by the dredger, but are constructed each upon a separate barge, and are sustained by a lattice girder resting upon the barge on telescopic supports, so that it can be raised and lowered by a hydraulic hoist and set at different angles of inclination. To accommodate the changes of inclination, the attachment of the shoot to the dredger is made by means of a hori-

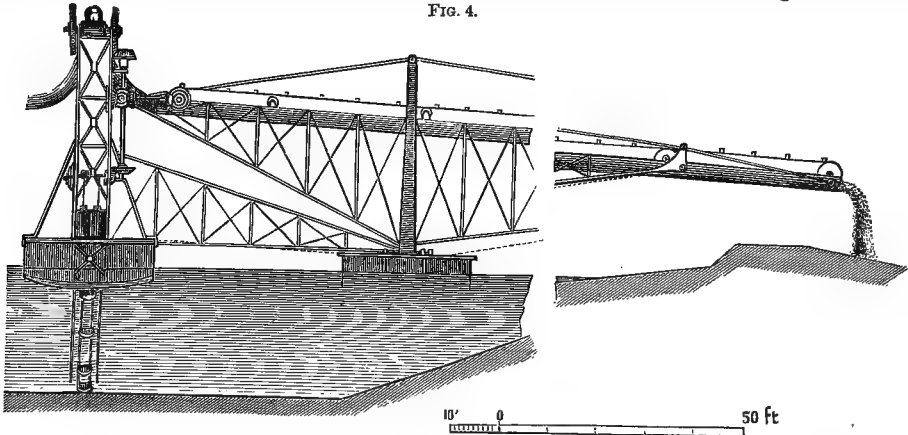
zontal joint, and the lattice girder can also be revolved horizontally on its supports, so that it can be turned parallel to the sides of the barge and of the canal when moving it from place to place. The shoot is semi-elliptical in cross section, being 1 foot 11½ inches deep and 5 feet 11 inches wide. To aid the flow and discharge of the dredgings, a stream of water is thrown into the upper end of the shoot by two rotary pumps placed upon the dredge; and in case this supply is insufficient a portable engine located on the barge supporting the shoot, and working a pump capable of throwing 5000 cubic feet of water per hour, is set in motion. This pump delivers its water along the entire length of the shoot, through a pipe pierced with holes at short intervals. The shoot is further provided with an endless chain, carrying scrapers which move along in the bottom whenever the dredgings are not voided freely by water alone. Fine sand confined within a channel will descend rapidly on an inclination of 4 to 5 feet in 100, when washed with half its bulk of water. For clays a descent of not less than 6 to 8 feet in 100 is necessary, but less water is required.

Fig. 4 shows a section of dredge with long shoot. A

portion of the shoot and supporting girder, about 73 feet in length, is omitted for want of space. Where the banks of the canal were too high to use the long-shoot dredger, an elevating apparatus was employed, consisting of a portable tramway supported by two parallel lattice girders, the

lower end, about 10 feet above the water, resting upon a barge in the canal, and the shore end, 45 feet above the water, upon a truck running upon a railway laid along the bank of the canal. In operating this apparatus the dredgings are first delivered from the dredge into boxes arranged

FIG. 4.

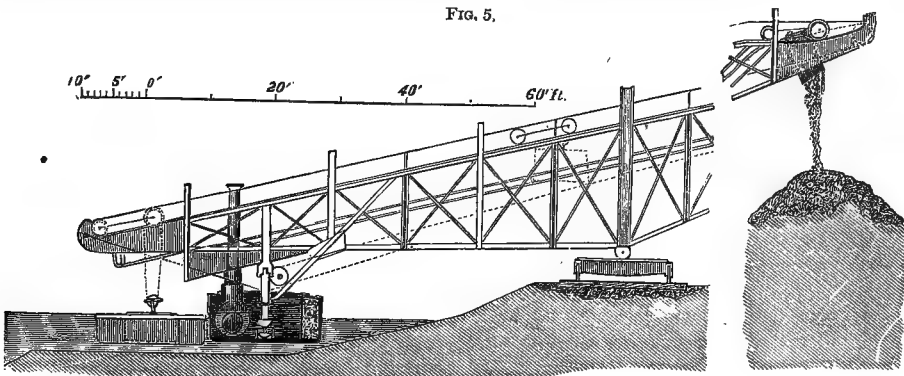


side by side upon a raft or float; the raft is then floated under the lower end of the tramway, and the boxes are hooked on, one after another, to the lower side of the tramway truck, and conveyed to the upper end of the tramway and tipped by steam-power. This arrangement is shown

at Fig. 5, a portion of the shore end being omitted for want of room. The tipping is effected by two wheels attached to the lower rear edge of the box which run up a steep incline at the upper end of the tramway.

*Wheel Dredgers.*—Instead of an endless chain to carry

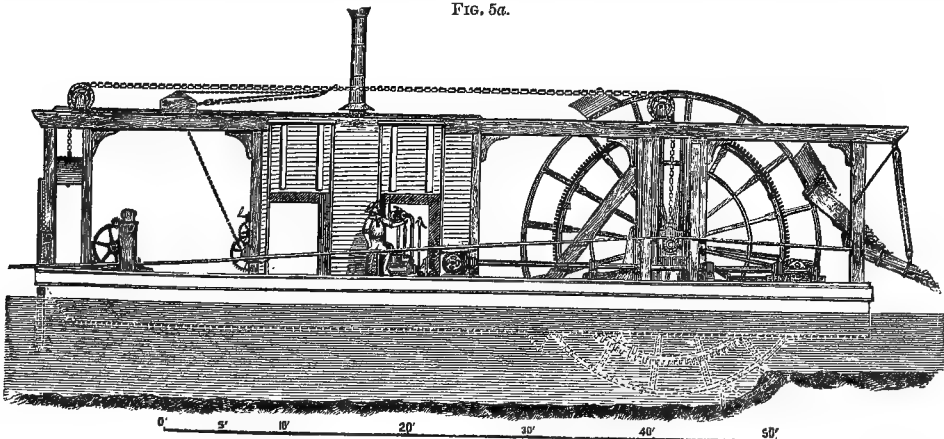
FIG. 5.



the buckets, these are sometimes placed upon the perimeter of a wheel 25 to 30 feet in diameter, or larger according to the depth to be dredged. This wheel is set in a well in the boat, its axle or shaft working in boxes that can be lowered or raised by suitable machinery as the depth requires. As the wheel revolves the buckets scoop themselves full at the bottom, and in ascending lift in succession the upper end of a shoot adjusted against the perimeter of the wheel,

which, falling back to its place, causes the bottom of the bucket to unlatch, and the contents to be discharged into the shoot, and thence into a scow alongside. The dredge-boat is drawn along by a cable leading to the engine at the precise rate which the progress of the excavation requires. Under favorable circumstances a 24-foot wheel carrying four buckets has been known to excavate 1200 cubic yards in ten working hours. (See Fig. 5a.)

FIG. 5a.



*Clam-shell Dredgers.*—Each dredge-boat operates but one bucket, which is in two parts hinged together horizontally, something like a clam shell, with arrangements by which it is opened and closed by the same power which lowers and

raises it through the water. The bucket being open and suspended from the end of a crane-jib, descends vertically through the water until it rests on the bottom. It is then filled by closing together the two parts, when it takes the



form of a short horizontal trough or hollow semi-cylinder closed at the ends. It is then raised out of the water, swung round over a scow, opened and emptied.

The two parts of the bucket—each being a quarter of a hollow cylinder with closed ends—are hinged along their common axis, and from their outer upper edges tie-rods or links extend to a crossbar directly over the centre or axis. This crossbar works in guides up and down. By raising the crossbar in the guides the two parts of the bucket are opened; by lowering it to its lowest point the bucket is closed. This raising and lowering of the crossbar in the guides—and consequently the opening and closing of the bucket—is effected by two chains passing over pulleys at the end of the crane-jib and down to separate drums operated by the engine. One chain is attached directly to the crossbar, and supports the weight of the open bucket whilst descending to the bottom. The other chain is made fast to the groove of a pulley placed below the crossbar, and (by means of two smaller pulleys on either side of it fixed to

the same shaft) working on the principle of the wheel and axle, transmits its leverage (by means of chains fastened to the grooves of the smaller pulleys) to the under side of the crossbar. The strain being brought upon this last-mentioned chain after the bucket reaches the bottom, the crossbar is by this means hauled down, the two parts of the bucket are closed, and the bucket filled before it commences to ascend. When working in hard material like compact clay, hard sand, or gravel, the cutting edges of the bucket are provided with sharp teeth.

The hoisting apparatus consists of a pair of horizontal engines, which by means of a friction-clutch can be made to drive either of the chain drums at pleasure. The bucket is guided in its descent by a pair of wooden poles attached to the guides of the crossbar, and working up and down through eyes near the end of the crane-jib. For raising stones, logs, fragments of wreck after blasting, etc., a strong grapple with steel-pointed prongs is used in place of the bucket.

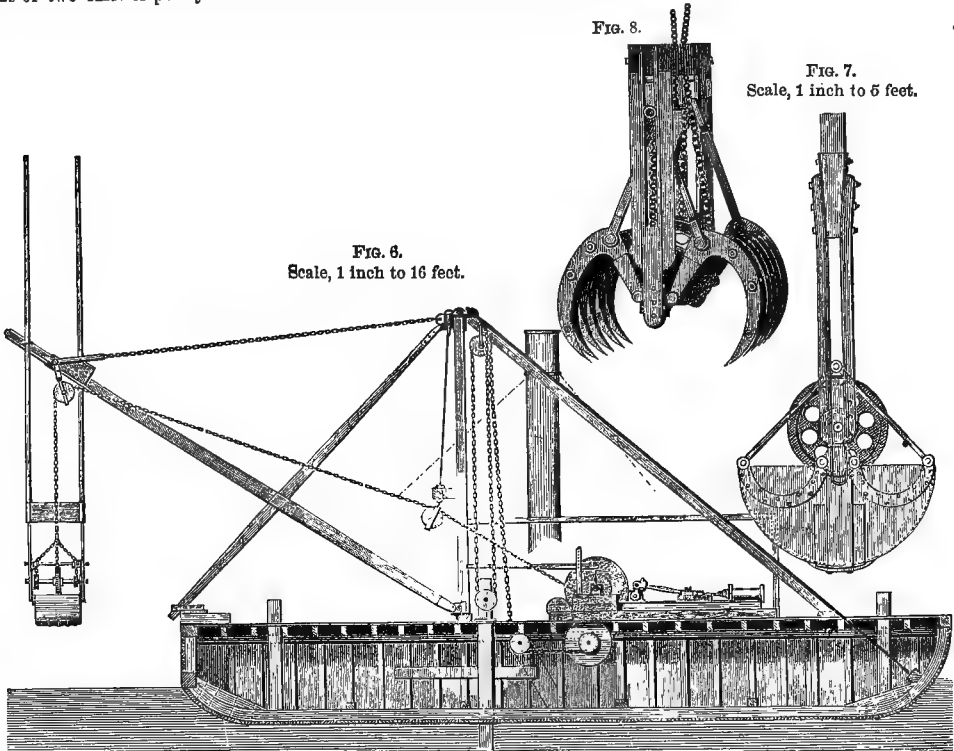


Fig. 6.  
Scale, 1 inch to 16 feet.

Fig. 7.  
Scale, 1 inch to 5 feet.

Perhaps the best type of the clam-shell dredger is that manufactured by Messrs. Morris & Cuming of New York City. Fig. 6 is a longitudinal section of their dredger above described; Figs. 7 and 8 give enlarged views of the bucket and grapple. For these dredges two sizes of buckets are usually made; the smallest weighs 3500 to 4000 pounds, with  $1\frac{1}{2}$  cubic yards actual capacity, or 2 yards when heaped up, and the largest weighs 6500 or 7000 pounds, with 3 cubic yards actual capacity, or  $4\frac{1}{2}$  to 5 yards when heaped up. The teeth are made from 6 to 9 inches long. The grapples also are of various sizes, the largest being 5 feet along the hinge, and 8 feet wide between the points of the prongs when open. In 25 feet of water three lifts can be made in two minutes with the 3-yard bucket. The largest dredge-boats are 80 feet long and 30 feet wide, and the smallest 60 feet long and 25 to 30 feet wide. The power for the heavy grapple is supplied by two 20-inch cylinders with 20 inches stroke, 45 pounds steam-pressure, and making from 40 to 60 revolutions per minute; for the large buckets, two 12 $\frac{1}{2}$ -inch cylinders with 30 inches stroke, 75 pounds steam-pressure, and making from 60 to 70 revolutions per minute; and for the small buckets, two 10-inch cylinders with 24 inches stroke, 75 pounds steam-pressure, and making from 60 to 70 revolutions per minute.

In Baltimore harbor a machine with a 3-yard bucket, operating partly in soft mud and partly in oyster shells, in 26 working days, of which 7 were lost by breakages and bad weather, leaving only 19 days' work of 10 hours each, raised 26,334 cubic yards, or a daily average of 1386 cubic yards. The best day's work was 1980 cubic yards. The average depth of water-way was 21 feet, with occasional lumps with 16 feet soundings. The depth to be attained was

24 feet. Another machine with bucket of the same size, in 26 days, of which two were lost, raised 48,800 cubic yards. In the same harbor, operating in soft mud in a 16-foot channel, to make it 24 feet deep, a machine with a  $1\frac{1}{2}$ -yard bucket, working 26 days, of which  $7\frac{1}{2}$  were lost, raised 23,310 cubic yards. The best day's work of 10 hours was 1665 cubic yards. Another machine of the same size, working 21 days, of which two were lost, raised 19,109 cubic yards. The aggregate quantity raised by the four dredgers during the respective periods above specified, agreed to within about 150 cubic yards with the return made by the engineer inspector, upon which payment for the work was made. At South Amboy, a dredger with a 3-yard bucket, working in stiff mud mixed with sand, in deepening a 9-foot channel to 15 feet, raised 73,000 cubic yards in 35 working days, an average of 2085 yards per day of 10 hours. In the same place a 3-yard bucket, working 12 consecutive days, raised 19,200 cubic yards, an average of 1600 cubic yards per day of 10 hours. Another 3-yard machine averaged 1383 cubic yards per day of 10 hours. The falling off in the two last-mentioned cases was attributed to an increase in the proportion of sand in the material raised. In Boston harbor a Morris & Cuming 3-yard bucket, working 26 days in stiff whitish-gray clay, raised only 3335 cubic yards, or 128 $\frac{1}{2}$  yards per day of 10 hours. In this case the teeth did not penetrate more than 8 or 9 inches, tearing up the clay in large lumps, but not so as to fill the bucket. At the foot of Pike street, New York, a  $1\frac{1}{2}$ -yard bucket, working 6 days in mud, gravel, and cobble-stones, raised 4075 cubic yards, or 679 cubic yards per day of 10 hours.

In making shallow cuts much time is lost in moving

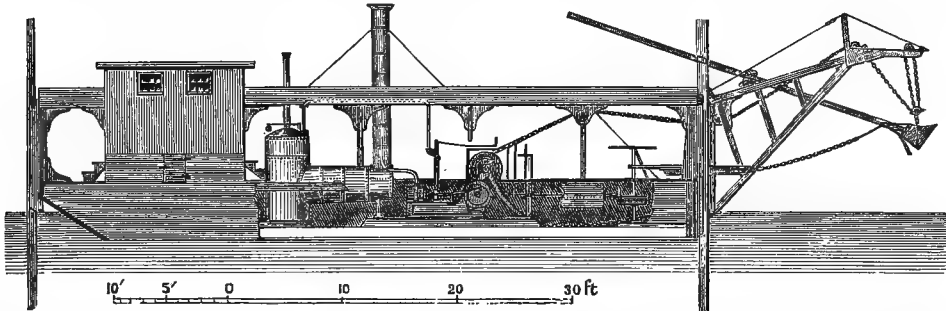
the dredger forward. A small Morris & Cumming dredger with a 1-yard bucket, working in a mixture of soft mud and sand in the Savannah River, to deepen a 10-foot channel to 12½ feet, had to be moved for every 15 yards raised. In 11 working days of 8 hours 4054 cubic yards were raised, or 369 yards per day. Only one scow could be kept alongside, in consequence of the tide. The actual time lost in floating and changing scows was 4 hours out of 8. The dredger working from a fixed position would therefore have doubled the amount of work actually performed.

The crew required for working the small dredger consists of captain, who handles the levers; engineer, who tends to the fire and machinery; and five deck-hands; on board

the larger dredgers about eight deck-hands are required. When the dredged material has to be deposited at any considerable distance, it has been found that with a tow of from one to one and a half miles, one tug and two scows will keep a dredger in constant work. When the tow is increased to 7 or 8 miles, two or three tugs with seven or eight scows are required. The power of the tugs varies from 50 to 100 horse-power, and the sizes of their cylinders range from 16 to 30 inches diameter. The crew of a tug-boat consists usually of captain, engineer, fireman, cook, mate, and two or three deck-hands. Each scow has also one man constantly on board to attend the doors.

*Single-Scoop Dredgers* (Fig. 9).—By these machines

FIG. 9.



dredging is performed with a single bucket, shaped, as the name implies, like a scoop or dipper, having a swinging door closing with a catch at its back, by which it is emptied. This bucket is fixed to a beam or handle of a length suitable for any depth of water in which the dredger is intended to work. The bucket with its handle is worked from a crane, which has its post set on a movable platform placed in the centre of the bow of the dredge-boat. The crane-post, jib, and stay are each built of two parallel timbers, secured to one another at the foot of the stay, neck of the post, and end of the jib. The bucket handle works in the space left between these parallel timbers. This beam or handle is slotted for the greater portion of its length, and on the back, on either side of the slot, has two racks working on pinions whose shaft is fixed upon the crane-jib about one-third its length from the post. These racks are kept in contact with their pinions by a friction-roller pressing on the front of the handle, and made fast by a link passing through the slot to the shaft of the pinions. When digging, in order to prevent the handle rising on its pinions when the hoisting chain is lifting the bucket through its cut, a hand-lever, worked by the crane-man and connected with the pinions by an endless chain passing round a rag wheel on the pinion shaft, stops their motion, and consequently the rising of the handle, and compels the bucket to describe an arc of a circle with the pinion shaft as its centre. Immediately the bucket has made its cut the leverage is taken off and the handle rises on its pinions. The hoisting chain is fastened near the nose of the bucket, passes over a shive at the outer end of the crane-jib, returns through a pulley on the bucket, is carried over a second shive at the end of the crane-jib, and, guided by pulleys through the centre of the swinging points of the crane, is then carried to the hoisting drum operated by the engine. Another chain, called the backing chain, is fastened to the lower part of the handle near the bucket, and is carried to the backing drum. The backing chain is used for bringing the bucket back from its centre of gravity to any point near the bow of the dredge-boat where the cut is to be commenced. The bucket and handle are lowered by their own weight, regulated by the hoisting chain, and placed in position by the backing chain. The hoisting apparatus consists of a pair of horizontal engines, which by means of clutches or friction bands move either the hoisting or backing drums independently of one another.

An improvement on the ordinary crane, which had a radius of about nineteen feet, has been lately applied to the scoop machine manufactured by Messrs. Osgood of Troy—namely, an extension of the end of the crane-jib, by which a longer cut ahead can be made by the bucket and a greater width of bottom covered by the swing of the crane, thus saving time which would otherwise be lost in moving the machine. The extension of the jib is carried out nearly horizontally, the bucket being suspended as before described, with the exception that the outer shive at the end of the jib becomes a travelling one, with a tendency to keep a position directly over the bucket. In making a cut, therefore, the outer shive, starting from the inner edge of the horizontal extension, follows the bucket in its cut, which is not immediately the arc of a circle with the pinion as a centre, but a continual forward thrust until the travelling

shive is at the outer end of the extension, and not until then does the pinion become the centre from which the arc is described for the remainder of the cut. When the extension is used, the strain is carried from its outer end to the neck of the crane-post by tie-rods, as shown in the drawing. In machines with the larger-sized buckets the cranes have a counterpoise attached. In very hard ground the bucket is taken off and a pick or plough attached, with which the ground is broken up, to be afterwards picked up with the bucket. The method of operating is as follows: the bucket, being clear of the water, is drawn back by the backing chain, at the same time descending by the slackening of the hoisting chain and its own weight; as it strikes the water and is drawn back, the pressure closes the swinging door or back of the bucket, when it is immediately caught and held fast by the catch. Having reached the bottom, the strain is brought upon the hoisting chain, and the backing chain slackened. The bucket then travels forward as before described, the racks and pinions being stopped at the proper time by the lever applied by the crane-man. The bucket having passed through its cut, the leverage is taken off, the bucket and handle raised, and the crane on its movable platform swung to either side as desired. A line attached to the catch of the swing door at the back of the bucket, which by the raising has come to be the under side, is then pulled by the crane-man, the back opened, and the bucket emptied.

These machines are made of various sizes, those most commonly built having buckets of 3, 1½, and 1¼ cubic yards capacity. The dimensions of boat for the larger machines are about 65 feet length, 26 feet beam, and 6½ feet depth of hold, and having a hoisting chain of 1½ inches. Their power is derived from a pair of 15-inch cylinders with 12 inches stroke. The dimensions of boat for the smaller machines are somewhat less, being about 60 feet length, 24 feet beam, and 5 feet depth of hold, the power being derived from 7 to 10 inch cylinders, with from 12 to 15 inches stroke.

The larger machines of this pattern, with 3 yards capacity of bucket, when working in soft mud under the most favorable circumstances—that is to say, from a fixed position—will average in 20 feet of water about 2000 cubic yards per day of 10 hours. Under ordinary circumstances it may be expected, in a series of working days of 10 hours each, to average about 1300 cubic yards of soft mud or 800 cubic yards of gravel and sand.

In the slips of New York a machine with a bucket of 1½ cubic yards capacity, 7-inch cylinders with 12 inches stroke, a steam-pressure of 60 pounds, and with 200 revolutions, working in soft mud, in 12 days of 10 hours lifted 10,302 cubic yards, or 859 yards per day. The best day's work was 968 yards. The same machine working in soft mud at Wallabout, Brooklyn, with a cut of from 2 feet above to 10 feet below low water, in 131 working days of 10 hours lifted 72,621 cubic yards, or nearly 555 yards per day of 10 hours. At the same place the same machine, working in gravel and sand, with a cut of from 15 to 22 feet below low water, in 14 days lifted 5591 cubic yards, or nearly 399 yards per day of 10 hours.

Another machine, with a 1¼-yard bucket, and with cyl-

inders of 10 inches diameter and 15 inches stroke, cutting to a depth of 10 feet through a meadow at the junction of the Delaware and Schuylkill rivers, the material seemingly consolidated mud, in 26 working days of 10 hours lifted 12,532 cubic yards, an average of 482 yards per day. The same machine, near Philadelphia, working from a fixed position, picking up soft mud which had been dumped under it from scows, and loading into cars, lifted 1000 cubic yards in 10 hours: its average, however, was about 800 yards per day. These working days include the time lost in repairing chains and other slight damages incidental to the best running machines.

The crew of one of these dredgers consists of engineer, fireman, and two or three deck-hands, including crane-man.

A tug of 100-horse power can, with 4 scows of about 150 yards capacity each, keep one of the smaller machines busy when the tow does not exceed three miles. The smaller dredger consumes about  $1\frac{1}{2}$  tons, and the tug about  $1\frac{1}{2}$  tons, of coal per day. A tug is usually manned by a captain, engineer, fireman, cook, and one or two deck-hands.

**Pump Dredger.**—A novel device for utilizing the powers of the centrifugal drainage pump has recently been put in successful operation by the writer in deepening the channel over the bar at the mouth of the St. John's River, Fla. Upon this bar the ocean swell which constantly prevails is of such exceptional magnitude and violence that the usual method of dredging into lighters or scows, ordinarily pursued in still water with either of the dredgers above mentioned, is entirely impracticable. The plan adopted was to provide a suitable steamer by charter, and fit her out with a 9-inch centrifugal drainage pump, two branches of 6-inch suction pipe, and timber bins on deck for holding the sand pumped up from the bottom; the pump engine to be driven by steam from the steamer's boiler, and the sand to be discharged overboard at selected points by flooding the bins with clear water from the pump.

The steamer is 132 feet long on the keel,  $24\frac{1}{2}$  feet broad on the beam, and when ballasted to an even keel draws about  $5\frac{1}{2}$  feet of water. She was modelled with a view to speed, and carries only 100 tons on a draught of 7 feet, is strongly built with side wheels and short guards, has one low-pressure engine of 120-horse power, and ample boiler capacity. A boat with more beam and a fuller model fore and aft under the water-line would have been better.

**The Pump.**—A No. 9 centrifugal drainage pump of the Andrews patent is located on the main deck aft, about 35 feet from the stern-post. Its suction and discharge openings are each 9 inches in diameter. To the suction opening there are connected, by a 2-way branch-pipe, two 6-inch suction-pipes, instead of one 9-inch, as usual, the object being not only to work on both sides of the boat simultaneously, but to render the necessary handling of the pipes as easy and prompt as possible. There is, on the other hand, considerable disadvantage in working with two suction-pipes instead of one, on account of a greater amount of friction for an equivalent suction capacity; for while a 9-inch pipe has an area of 81 circular inches, two 6-inch pipes have an aggregate area of only 72 circular inches. The friction surface is therefore increased as 27 to 36, making the disadvantage from or loss by friction from this cause as 2 to 3. As a partial compensation for this increased amount of friction, an increased velocity is given to water in suction-pipes of less aggregate area than the discharge-pipe, and a larger proportion of sand is thereby carried up.

It was necessary also to encounter another disadvantage by using several bends, of which there were two in each of the suction-pipes and one in the discharge-pipe, those in the suction being each one-eighth of a circle, and that in the discharge-pipe one-fourth of a circle. These bends reduce the delivery at the rate of 10 per cent. for each turn of 90°, and about 6 per cent. for each turn of 45°, the reductions in each case being calculated upon the quantity passing the preceding bend. Thus, the first one-eighth bend in the suction reduces the quantity to 94 per cent., the second to 88 per cent., and the one-fourth bend in the discharge to 79 per cent. The disadvantages, therefore, under which the apparatus labored may be briefly summed up as follows: 1. The loss by friction due to the use of two 6-inch, instead of one 9-inch, suction-pipe is increased 50 per cent.; 2. The unestimated loss by friction due to the use of suction-pipes three times as long as the height to which the material is to be raised; 3. The loss of 21 per cent. by bends in the suction and discharge-pipes.

The engine used to drive the pump consists of two cylinders connected upon one crank at right angles to one another, and 10 inches in diameter by 10-inch stroke each. Steam is conveyed from the steamer's boiler to the pump-

engine through a 3-inch iron pipe, the usual pressure carried upon the boiler being about 25 pounds to the square inch. This pressure develops about 26 useful horse-power (after deducting 25 per cent. for friction of engines and difference of pressure in the cylinder and boiler), and gives a speed of about 180 revolutions per minute to the engine shaft. On this shaft is a pulley 42 inches in diameter, carrying a rubber belt 12 inches wide, communicating the power to the pump-shaft through a pulley 24 inches in diameter, thus giving the pump-disk and wings about 315 revolutions per minute. This speed in the No. 9 pump is equal to the work of raising 3000 gallons of clear water per minute 30 feet high through a 9-inch straight vertical pipe. The actual height raised above the water on the St. John's bar varies with the amount of sand taken on board, from 10 to 11 feet, but as the pipes are 50 feet long, with bends, and are in two branches instead of one, and as a mixture of sand and water is heavier and more impeded by friction than clear water, the loss by friction from all these causes combined reduces the useful working of the pumps considerably below the average attainable under more favorable conditions. For these reasons, although 200 revolutions of the pump-disk per minute will easily raise 3000 gallons of clear water 12 feet high through a straight vertical 9-inch pipe, 300 revolutions are required to raise 2500 gallons of sand and water 11 feet high through the two inclined suction-pipes having two turns each, discharged through a pipe having one turn. To prevent the ends of the suction-pipes being lifted off the bottom by the pitching of the boat, and as a precaution against accident, a portion of each pipe is made flexible, being composed of 6-inch rubber hose stretched over a coil of wire. In addition the ends are loaded with an iron frame or drag, each weighing about 250 pounds, which is intended to move flat along the bottom during the operation of dredging. To the under surface of this frame, directly below the mouth of the pipe, a number of teeth or knives are attached to stir up the sand and aid its entrance into the pipes. A chain attached to each drag, and leading to the deck of the steamer on either side, takes the strain from the pipe when the drag is down and the steamer in motion. Tackles are arranged for lifting the pipes from the bottom when not dredging, or when pumping clear water to discharge the sand from the bins.

For receiving the sand, bins are located along the main deck, fore and aft, on each side of the steamer's engine, each bin being provided with a sliding gate over the steamer's side, which can be opened and closed at pleasure. The bottom of the bins slopes downward towards the gates. They are filled from two open troughs, one from each branch of the discharge-pipe, provided at suitable intervals with valves or gates, so that the load can be distributed to the bins wherever desired.

The proportion of sand that can be pumped depends greatly upon its specific gravity and fineness. The calcareous and argillaceous sands flow more freely than the silicious, and fine sands are less liable to choke the pipe than those that are coarse. When working at high speed, 50 to 55 per cent. of sand can easily be raised through a straight vertical pipe, giving for every 10 cubic yards of material discharged 5 to  $5\frac{1}{2}$  cubic yards of compact sand. With the appliances used on the St. John's bar the proportion of sand seldom exceeded 45 per cent., generally ranging from 30 to 35 per cent. when working under the most favorable conditions. In pumping 2500 gallons, or 12.6 cubic yards, of sand and water per minute, we would therefore get from 3.7 to 4.3 cubic yards of sand. During the early stages of the work, before the teeth under the drag had been properly arranged to aid the flow of sand into the pipes, the yield was considerably below this average, not often exceeding, and frequently falling below, 2 cubic yards of sand per minute during the time actually employed in pumping.

The manner of conducting the dredging may be briefly described as follows: The steamer, with the suction-pipes up, first crosses the bar to the outside, then turns around and steams slowly over the bar with just sufficient speed to maintain steege-way, lowering the pipes and starting the pump as soon as the outer edge of the bar is reached. Arriving at the inside, the pump is stopped, the pipes raised, and the steamer turned round again. She then crosses slowly to the outside, pumping as before; and the quantity of sand discharged into the bins during these two passages over the bar is a load, whether great or small. While the steamer is turning around on the outside, preparatory to taking in another load, the side gates of the bins are opened, the suction-pipes are raised from the bottom, and the pump is run at full speed on clear water. By this means, assisted to some extent when necessary by men in the bins with hoes, the sand is all discharged into deep water by the time the steamer has again reached the outer edge of the bar, when the dredging is resumed. The time

required to turn the steamer twice is 12 to 13 minutes, one half of which, or the time occupied in making the turn on the inside, is lost, as neither the work of dredging the sand nor discharging it from the bins is in progress during that interval.

The last work carried on with this dredger was during the first few months of the fiscal year ending June 30, 1873, for a period of 74 days, of which 23 days were lost by bad weather. The expenses were the same as for working days, the boat being under charter.

The average time worked per day was 6 hours; the average quantity of sand removed per hour was 78 cubic yards; the average quantity of sand removed per day was 468 cubic yards, the total quantity in 51 working days being 23,868 cubic yards; the average cost for the entire period was  $31\frac{1}{2}$  cents per cubic yard. The least cost during any one month for dredging and dumping the sand was in July, 1872, when it amounted to  $23\frac{1}{2}$  cents per cubic yard; the least cost during any one week was  $19\frac{1}{2}$  cents per cubic yard; the least cost during any one day was 15 cents per cubic yard.

With a centrifugal drainage pump sand can be easily discharged at a height of 30 feet above the level of the water; and when the distance to which it has to be conveyed is so great that open troughs from the discharge-pipe to the dumping-ground cannot have sufficient inclination to secure a free flow of the sand and water, it would be necessary to make the discharge through pipes, increasing the power expended in proportion to their length, so as to ensure a velocity that will transport the sand and prevent choking. The pump itself should in all cases be placed as low as possible, and it would generally be practicable to locate it from three to five feet above the surface of the water.

The first or contractor's cost of dredging under these circumstances, with a 9-inch pump, would probably not exceed 8 or 9 cents per cubic yard, inclusive of running expenses, wear and tear of machinery, and all stoppages for repairs and other contingencies. Indeed, assuming the pump on St. John's bar to have worked continuously in raising sand 10 hours per day, except Sundays, during the month of May, 1872, with the same average results per hour actually attained while pumping, thus charging the six working days of each week with the expense of seven, the cost of raising the sand into the bins would have been only  $8\frac{1}{2}$  cents per cubic yard, and if it could at the same time have also been continuously discharged to the dumping-ground through either open troughs or pipes, no additional expense, except a trifle for increased power, would have been incurred. There were, moreover, constant losses encountered on the bar while actually pumping which would not occur in still water, and of which no account has been taken, due to the pitching of the boat, which frequently lifted the ends of the suction-pipes from the bottom. It is therefore considered safe to estimate the contractor's cost of removing sand at 9 cents per cubic yard when the conditions are such that the work of raising the sand and discharging it to the dumping-ground can be carried on simultaneously and continuously. (See DEEP-SEA DREDGING, by COMMANDER CHARLES D. SIGSBEE.

Q. A. GILLMORE.

**Dred Scott Case** (the case of *Scott v. Sandford* in the Supreme Court of the U. S. in 1856, 19 Howard R., 393). A slave named Dred Scott was carried by his master (Sandford) from Missouri into Illinois and Wisconsin, and thence back to Missouri. Scott was descended from African ancestors, who were slaves. He brought an action in the circuit court of the U. S. to assert his title to freedom. The judgment of that tribunal was carried by writ of error to the Supreme Court. It was there decided by a majority of the court that if Scott were assumed to be free, he was not a "citizen of a State," so as to bring the action; and further that he was still a slave. Accordingly, the case was dismissed for want of jurisdiction on the part of the circuit court. In reaching the conclusion that he was still a slave, the court held that the act of Congress which prohibited a citizen from holding slaves in the Territories of the U. S. north of thirty-six degrees and thirty minutes N. latitude was unconstitutional and void. The action of the court has been severely criticised in respect to this last point, as being unwarranted after the decision was made that Scott, considered as a freeman, was not a citizen. It is maintained, on the other hand, that both questions under the pleadings were properly decided. Some recent information as to the circumstances under which the decision was rendered will be found in letters of Justices Campbell and Nelson in Tyler's "Life of Chief-Justice Taney," pp. 382-385. The chief-justice, when delivering the opinion of the court, made an historical survey of the public opinion of the civilized world, at the time of the formation of the American Constitution, concerning the

African race. Among other things he said: "They (the Africans) had for more than a century before been regarded as beings of an inferior order, and altogether unfit to associate with the white race, either in social or political relations, and so far inferior that they had no rights which the white man was bound to respect." Much injustice has been done him by an erroneous statement, still occasionally repeated, that the chief-justice had himself affirmed that the negro had "no rights which the white man was bound to respect." T. W. DWIGHT.

**Dreisse'na** [named in honor of Dr. Dreyssen, a Belgian naturalist], a genus of fresh-water lamellibranchiate mollusks of the mussel family (Mytilidae), differing, however, from the true mussel in having the mantle closed except at the branchial and anal slits. *Dreissena polymorpha*, a Russian species, is remarkable for its recent arrival into English waters, where it has invaded even the water-pipes of London. Ten species are fossil in Europe.

**Drelincourt** (CHARLES), a French Protestant minister, born at Sedan July 10, 1595. He preached at Charenton near Paris, and gained great popularity. He was also distinguished as a writer of polemical theology. Among his very numerous works was "Consolations against the Fear of Death" (1651), which was translated into English, and passed through many editions. Died in Paris Nov. 3, 1669. —His son, CHARLES DREINCOURT (1633-97), physician to William III. and Queen Mary, was the author of numerous medical works.

**Drenthe**, a province of the Netherlands bordering on Prussia, has an area of 1032 square miles. The surface is level, and partly occupied by marshes. A large portion of the soil is poor. The rearing of cattle is the principal branch of industry. Pop. in 1870, 108,056. Capital, Assen.

**Drepan'ius** (LATINUS PACATUS), a Gallic rhetorician, born in Aquitania, in the south of Gaul, is classed among the Latin Panegyrist. He attained the rank of proconsul A. D. 390, and under this title was addressed by Ausonius in one of his poems, in which he pays a high tribute to the poetical abilities of Drepanius. Of his poetry nothing remains, but the panegyric which he delivered in the presence of the emperor Theodosius in 389 A. D., when he was sent to congratulate the conqueror on the overthrow of Maximus, is extant, and is contained in the collection entitled "Panegyrici Veteres," edited by Jaeger, Nuremberg, 1799, 2 vols. 8vo. It is published separately also by Arntzen, 1753, 4to, Amsterdam. HENRY DRISLER.

**Dres'den**, the capital of the kingdom of Saxony, and one of those places in Europe which almost every traveler visits at least once in his life, if not twice, is situated in a beautiful valley on both sides of the river Elbe, 116 miles by railway S. of Berlin and 62 miles E. S. E. of Leipzig; lat.  $51^{\circ} 3' 16''$  N., lon.  $13^{\circ} 44'$  E. It is divided by the Elbe into the old town and new town, the latter of which is on the right bank of the river, here crossed by a fine stone bridge. Railways extending in several directions connect Dresden with Berlin, Leipzig, Prague, and other cities. The Altstadt has narrow streets bordered by high houses. The most remarkable public edifices are the royal palace, founded in 1534; the prince's palace; the Japanese palace or Augusteum; the Brühl terrace; a handsome church called Frauenkirche, which has a tower 355 feet high; the Roman Catholic church, with a tower 378 feet high; and the Sophienkirche. Dresden has a royal public library which contains 450,000 volumes; an academy of art; a museum of natural history; an opera-house; a theatre; a mint; two gymnasia; a polytechnic school, realschulen, two normal schools, one female high school, two schools of commerce and veterinary medicine, and asylums for the blind and for the deaf and dumb; and a celebrated picture-gallery, which is considered the richest collection in Germany. It contains nearly 1500 paintings, mostly by Italian and Flemish masters. In the royal palace are the celebrated "Green Vaults," containing a very large and valuable collection of gems, articles of vertu, etc. This city has manufactures of silk and woollen stuffs, jewelry, porcelain, silver-ware, gloves, carpets, musical instruments, chemical products, and painters' canvas. Steamboats navigate the Elbe between this place and the sea. The environs of Dresden are delightful, and are furnished with fine gardens and promenades. The city was founded about the eleventh century, and became the capital of Saxony in 1270. It is of Slavonic origin, but in the thirteenth century came into the possession of the margrave of Misnia. By the division of the territory in 1485 it fell to the Albertine line, which has held it ever since. It was fortified in 1510, and suffered severely in the Thirty Years' war, and also in 1813, when it was the head-quarters of Napoleon's army. In 1866 it was occupied by the Prussians, who evacuated it the following spring. (See DRESDEN, BATTLE OF.) Pop. in 1881, 220,818.

**Dresden**, on R. R., capital of Weakley co., Tenn. (see map of Tennessee, ref. 6-B, for location of county). It has a high school. Cotton and corn are the chief exports. Pop. in 1870, 355; in 1880, 314.

**Dresden, Battle of.** Dresden was occupied by a French army of 30,000 men, when, on the 23d of Aug., 1813, the army of the allies appeared before it. Napoleon, with the main army, came to relieve it, and entered the city on the 26th of the same month. Schwarzenberg, the commander of the allied army, immediately assaulted and bombarded the city. Having been repulsed by a sally of the French guard on the 26th, he renewed the attack on the 27th, when a great pitched battle was fought, Napoleon gaining the victory.

**Dress** [from the Fr. *dresser*, to "make straight," to "adjust"], the general name for the artificial vesture worn more or less by nearly all the human race. Among savage nations such coverings were originally made of the skins of animals, the inner bark of plants, etc., and were worn sometimes for protection against the weather, and sometimes from a desire of ornament. As civilization advances these primitive coverings give place to manufactured fabrics of silk, wool, cotton, and flax. Profane history has no mention of a time when clothes were unknown to the human race; and the distinction between the dresses of the different sexes appears to have been observed from immemorial time. Homer mentions the "trailing robes" of the Trojan ladies, and the oldest sculptures seem to confirm this view.

**Dres'sing**, a term applied to gum, starch, and other substances used to stiffen and prepare linen, cotton, and similar fabrics.

**Dressings**, in architecture, mouldings and simple sculptured decorations around doors and windows.

**Dreux** (anc. *Durocasses*), a town of France, department of Eure-et-Loir, on the river Blaise, about 50 miles W. S. W. of Paris and 22 miles N. of Chartres. It has a fine Gothic church, a town-hall, and a theatre; also manufactures of serge, woollen hosiery, hats, etc. Within the precincts of the old half-ruined castle from the twelfth century which crowns the hill overlooking the town a chapel of great magnificence was begun in 1816 by the dowager-duchess of Orleans, and completed by Louis Philippe. Here the Catholic army led by Constable Montmorency defeated the prince of Condé and the Huguenots in 1562. Pop. 8254.

**Dreux-Brézé** (PIERRE SIMON LOUIS MARIE DE), born at Brézé, in the department of Maine-et-Loire, France, June 2, 1811, the third son of that marquis de Dreux-Brézé who had been grand-master of ceremony to Louis XVI. He studied in the seminary of St. Sulpice, and was in 1835 appointed vicar-general to the archbishop of Paris, and in 1849 bishop of Moulins. Though the youngest bishop in the Gallican Church, he soon became one of the most prominent leaders of the Ultramontane party. He discharged his parish priests, in spite of the constitutional law of the Gallican Church which makes the parish priests irremovable, and the papal encyclical of Dec. 8, 1864, he read in his diocese, though the government had refused to authorize it.

**Drew** (DANIEL), a noted New York capitalist, was born in Carmel, Putnam co., N. Y., July 29, 1797, commenced active life as a cattle-drover, became conspicuous in the steamboat business, still later in that of railroads, especially in the fortunes and misfortunes of the Erie road, and at last was recognized as a chieftain in the stock speculations of Wall street. He was also distinguished for liberality to certain educational interests of the Methodist Episcopal Church, having founded the Drew Ladies' Seminary at Carmel, N. Y., and the Drew Theological Seminary at Madison, N. J. Died at New York City Sept. 18, 1879.

**Drew** (SAMUEL), a noted Wesleyan theologian and metaphysician, was born at St. Anstall in 1765, settled in London in 1819, and died at Helston in 1833. He was an intimate friend of the famous Dr. Adam Clark, and of Dr. Thomas Coke, the first American Methodist bishop, whose "Life" he wrote. Among his other works, the principal are "Essay on the Immateriality and Immortality of the Soul" (1802), "Essay on the Identity and General Resurrection of the Human Body" (1809), and "History of Cornwall" (1820-24). "His theological writings, though showing more of ingenious subtlety than of logic, are surprising examples of intellectual power in a special direction, and have given him a widespread, if not a permanent, fame." (*Stevens's History of Methodism.*)

**Drew Theological Seminary** was founded in 1868 at Madison, N. J., by a donation of about half a million dollars from Daniel Drew. (See above.) It was organized chiefly by the Rev. Dr. J. McClintock, who became its first president. (See McCLINTOCK.) Its real estate and build-

ings are ample and beautifully located, and its faculty effective. It is under the control of the Methodist Episcopal Church.

**Dreyse, von** (JOHANN NIKOLAUS), the inventor of the "needle-gun," was born at Sümmerda, in Prussia, Nov. 20, 1787. He was the son of a locksmith, worked from 1809 to 1814 in a Paris gun-factory, established after his return to Germany, in his native town, an iron-ware factory, and devoted his attention chiefly to the improvement of fire-arms. After several attempts, he perfected the famous NEEDLE-GUN (which see) in 1836. It was introduced into the Prussian army in 1840. In 1841 he established an extensive gun and ammunition-factory. He died Dec. 9, 1867. —His son, FRANZ VON DREYSE, born Mar. 2, 1822, has considerably enlarged the establishment.

**Driffield, or Great Driffield** (not to be confounded with Little Driffield, a village in the neighborhood), is a market-town of England in the East Riding of York. It stands in the centre of a fertile and well-cultivated agricultural district stretching along the foot of the Wolds, and is connected with the harbor of Hull by a navigable canal. Its weekly corn and cattle markets are very important. Pop. in 1881, 8364.

**Drift**, in geology (more fully **Glacial Drift**), is a term applied to boulder clay and collections of stones and earth formed in the tertiary period by the agency of glaciers. Some geologists limit the term *drift* to material that has been recently moved by water, thus including sands, marls, and gravels, stratified and unstratified. Such deposits are sometimes called *diluvium*. They include the remains of animals that have recently inhabited the earth, and of some species which are now extinct. Human remains have also been found in these drift deposits in sufficient abundance to render it probable that the human race existed contemporaneously with the elephants, rhinoceroses, and gigantic deer of the tertiary period. These remains render the drift one of the most interesting of deposits. (See GEOLOGY, by PROF. J. W. DAWSON, LL.D., F. R. S., and GLACIER, by J. BALL, F. R. S.)

**DRIFT**, in navigation, signifies the deviation in a ship's course caused by the action of a contrary wind, or the angle which the line of a ship's course makes with the meridian when she is driven by the wind or waves, and is not governed by the helm.

**Drift-way**, a small subterranean gallery driven in advance of a tunnel, is the first operation in tunnelling, and everything depends on its being correctly planned and located.

**Drill, or Drilling** [Ger. *Drillich*], a strong and fine linen fabric of a satin-like finish, used for summer clothing for gentlemen. Ordinary plain drills are worked with five shafts.

**Drill.** See BLASTING, by GEN. J. G. FOSTER, U. S. Army. **Drill**, an old English word for an ape, is supposed by Huxley to be the source of the name *mandrill* (i. e. a "man-like ape"), but the latter word appears to be the original one. (See MANDRILL.) The term drill is now applied especially to the *Cynocephalus leucophaeus*, a baboon of Africa.

**Drill**, in agriculture, the sowing of crops in rows by means of various machines of comparatively recent invention. The advantage of this mode of cultivation is, that it admits of destroying the weeds and stirring the soil between the rows of plants. Wheat is cultivated in drills in parts of Europe with great success.

**Drill, Military**, the name given to the instruction of soldiers and the exercises through which they are required to pass. There are many varieties of drill, that of the cavalry, infantry, and artillery being all different. The battalion-drill, company-drill, squad-drill, and skirmish-drill likewise vary in the routine of exercises. In the navy, also, the drilling of seamen is different, according to their duties.

**Drip**, in architecture, the same as CORONA (which see).

**Dris'ler** (HENRY), LL.D., an American scholar, born Dec. 27, 1818, graduated at Columbia College in 1839, was classical instructor in its grammar-school for several years, appointed tutor of the Greek and Latin languages in the college (1843), adjunct professor in the same department (1845), professor of Latin (1857), and transferred to the chair of Greek on the death of Dr. Anthon, in 1867; in the same year was acting president of the college during President Barnard's absence as a commissioner to the Exposition Universelle in Paris. For several years after leaving college he was engaged with Dr. Anthon on his series of classical text-books, etc. Besides several pamphlets and school-books, his contributions to classical learning are an enlarged edition of Liddell and Scott's translation of Passow's "Greek Lexicon" (1846), and a revised and



greatly enlarged edition of Yonge's "English-Greek Lexicon" (1870).

**Driver**, also called the **Spanker**, in navigation, is a large quadrilateral sail hoisted on the mizzen gaff, and extended at the bottom by a boom called the *driver-boom*. It is the principal "fore-and-aft" sail, and is very important in an adverse wind.

**Driving Wheel**. In machinery, this term is applied to the wheel which communicates the motion to the pinion, or the second wheel deriving its motion from the first, which may be either a multiplying or diminishing wheel. The large wheels of locomotive engines are also called driving wheels.

**Drogheda**, a seaport-town of Ireland, in Leinster, on the boundary between the counties of Louth and Meath, and on the river Boyne, 4 miles from its entrance into the sea, and 25 miles N. of Dublin; lat. 53° 44' N., lon. 6° 12' W. The Dublin and Belfast Railway here crosses the Boyne by a viaduct ninety-five feet high. It has a Roman Catholic cathedral, a custom-house, and several convents; also manufactures of cotton and linen fabrics, steam-engines, etc. Vessels of 400 tons can ascend the river to this port, from which grain, cattle, linen, hides, butter, and ale are exported, mostly to Liverpool. Pop. 13,510.

**Drogheda**, MARQUESSES OF (1791), earls of Drogheda (1661), Viscounts Moore (1621), Barons Moore (Ireland, 1616), Barons Moore of Moore Place, Kent (United Kingdom, 1801).—HENRY FRANCIS SEYMOUR MOORE, third marquess, K. P., P. C., born Aug. 14, 1825, succeeded his uncle in 1837.

**Drohobicz**, a town of Austria, in Galicia, is on a tributary of the Dniester, 18 miles S. E. of Sambor. It has a castle, two handsome churches, a monastery, and extensive salt-works. Pop. 15,714.

**Droitwich** (anc. *Saline*), a town of England, in Worcestershire, on the Bristol and Birmingham Railway, 7 miles N. E. of Worcester. It derives its prosperity chiefly from its trade in salt, for which it has been famous from remote times. Here are brine-springs rising from a depth of 200 feet through new red sandstone, and yielding annually about 100,000 tons of salt, said to be the best in Europe. Pop. in 1881, 3210.

**Drôme**, a department in the S. E. part of France, has an area of 2519 square miles. It is bounded on the W. by the river Rhone, and drained by the Drôme. The surface is partly hilly and mountainous. Coal, copper, iron, lead, and marble are found here. The highlands are covered with forests of oak, pine, beech, and chestnut. Among the staple productions are grapes, olives, chestnuts, silk, and wine of excellent quality. The wine called L'Hermitage is celebrated. Drôme is intersected by the Lyons and Avignon Railway. Capital, Valence. Pop. in 1881, 313,763.

**Drom'edary** [from the Gr. *δρόμος*, a "running," so named from its swiftness], (*Camelus dromedarius*), the name given to the Arabian and African camel, a species differing from the Bactrian camel in having only one hump on the back. It has also more slenderness and symmetry of form. Its usual pace is a trot, which it often maintains for many hours together at the rate of nine miles an hour. The dromedary surpasses other camels in speed, and can travel several days without drink. It is extensively used as a beast of burden in Africa and Arabia. (See CAMEL.)

**Drontheim**. See TRONDHEIM.

**Dropping Tube**, in chemistry, a slender tapering tube open at both ends, but terminating at the lower in a narrow orifice, used to supply liquids in delicate experiments, drop by drop. A bulb to hold the liquid is blown near the upper extremity. The flow is regulated by placing the finger on the open upper end, so as partially or entirely to close it.

**Drop'sy** [a corruption of the old English *hydropsey*; Gr. *ὑδρωψ*, from *ὑδωρ*, "water;" Lat. *hydropis*; Fr. *hydropisie*; Ger. *Wassersucht* (i. e. "water-sickness")], a disease characterized by excess of the natural secretion of fluid in any of the serous cavities of the body or in the areolar tissue. If the cerebro-spinal fluid be increased, it constitutes *hydrocephalus*, or "water on the brain." If the excessive secretion (exudation) takes place from the pleura, it is called *hydrothorax*, or "dropsy of the chest." If the fluid collect in the abdominal cavity, the disease is called *ascites* (from the Gr. *ἀσκή*, a "skin" or leathern bag for water or wine, alluding to the form of the patient's body), a disease which may arise without assignable cause, but which most frequently comes from cirrhosis of the liver, a contracted, hardened condition of that organ, mechanically obstructing the portal circulation, and thus leading to transudation of serum from the blood-vessels. Habitual intemperance is its most frequent cause. General dropsy of the serous and areolar tissues is called *anasarca* (from the Gr. *ἀνά*,

"throughout," and *σάρξ* (gen. *σαρκός*), the "flesh"). Obstructive organic disease of the heart and degenerative diseases of the kidneys are the most frequent causes of general dropsy, which is therefore a very important symptom. *Hydropericardium*, or "water on the heart," *hydrarthrus*, or effusion into a joint, *hydrorachis*, which is seated in the spinal canal, and *hydrocele*, in the scrotum, are forms of dropsy. Ovarian dropsy or ovarian tumor is a fluid collection occurring in ovarian cysts, which may be unilocular (of one sac) or multilocular (composed of many aggregated cysts), the whole frequently forming a mass of enormous size. Thus far, its only successful treatment consists in the removal of the cysts by excision, one of the boldest, and, on the whole, one of the best, of the more recent surgical operations.

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**Dros'era** [from the Gr. *δρῶρεός*, "dewy"], a genus of perennial herbaceous plants of the order Droseraceæ, popularly called sun-dew, several species of which are natives of the U. S. and of England. From the glands of the leaves exude drops of a clear fluid glittering like dewdrops; hence the name. The flower opens only in sunshine.

**Drosera'ceæ** [from *Drosera*, one of the genera], a natural order of herbaceous exogenous plants which grow in bogs or marshy places in many parts of the world. They mostly have glandular hairs, and hypogynous, pentamerous flowers. The fruit is a 1-celled pod or capsule. This order comprises the Venus's flytrap (see *DIONÆA*) and the *Drosera* (sun-dew), several species of which are natives of the U. S.

**Drosom'eter** [Gr. *δρῶσος*, "dew," and *μέτρον*, "measure"], an instrument for measuring the quantity of dew which falls upon the surface of an exposed body. It is in the form of a balance; the body under observation is supported by one arm, while the weights are placed in a scalepan attached to the other, and protected from the dew.

**Dros'en**, a town of Prussia, in the province of Brandenburg, has a normal school, tanneries, cloth-factories, and important cattle-markets. Pop. 5357.

**Dros'te zu Visch'ering, von** (CLEMENS AUGUST), FREIHERR, a German archbishop, born Jan. 22, 1773, became vicar-general in 1805, assistant bishop of the diocese of Münster in 1825, and archbishop of Cologne in 1835. In consequence of difficulties with the Prussian government in regard to mixed marriages, which the archbishop forbade the priests to solemnize unless they received the promise that all the children should be brought up in the Catholic religion, he was imprisoned in the fortress Minden in 1837, but was released in 1841, and died Oct. 19, 1845. His imprisonment called forth an extraordinary excitement in Germany, and greatly strengthened the influence of the Catholic Church.

**Drouyn de Lhuys** (ÉDOUARD), a French diplomatist, born at Paris Nov. 19, 1805. He was appointed director of the commercial bureau in the ministry of foreign affairs in 1840. Having voted in the Chamber of Deputies against the ministry, he was removed from office in 1845. He was minister of foreign affairs in the first cabinet of Louis Napoleon in 1848, was sent as minister to London in 1849. He was again appointed minister of foreign affairs in July, 1852, resigned in 1855, and was restored to that position in Oct., 1862. He again resigned in 1866. D. Mar. 1, 1881.

**Drown** (THOMAS MESSINGER), M. D. See APPENDIX.

**Drown'ing**, death by long-continued submersion in water. The recovery of persons after apparent death from drowning is a very important subject. The following rules are derived from the experience of the best physicians: (1) It is necessary in all cases to keep the body cool until respiration be re-established, since the application of warmth (both in frozen and nearly drowned persons) seems to arouse those dormant energies that absolutely require the aëration of the blood, which failing, death ensues. (2) Respiration must be artificially established, either by direct inflation of the lungs by the breath or the bellows, or, much better, by the "Marshall Hall method" or some of its modifications. The patient being in a horizontal position to facilitate the exit of water from the lungs, and the head being slightly raised, the lungs are alternately inflated and compressed by gently rolling the body from a prone to a half-prone position (upon one side), and reversing the process. The lungs may also be inflated by retracting the arms with some force, and by pressure upon the thorax. (3) Expose the face and chest to the air, unless the weather be very cold. (4) Rub the limbs upward, and as soon as dry clothing can be procured put it upon the patient. (5) Avoid the use of the galvanic battery, which is always dangerous, even in experienced hands. (6) Continue these operations until, if possible, natural respiration be re-established. Cases are reported where artificial respiration had to be kept up

for hours before signs of life appeared. Similar treatment should be employed in all cases of so-called "asphyxia" from whatever cause. (See RESUSCITATION.)

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**DROWNING**, as a capital punishment, was formerly practised in various parts of the Old World. In the Anglo-Saxon codes women convicted of theft were condemned to be drowned. The ancient Burgundians condemned a faithless wife to be smothered in mud. This form of punishment was common in the Middle Ages, and seems to have been principally inflicted upon women. It was not abolished in Scotland till 1685, and in Austria it lasted till 1776.

**Droylsden**, a village of England, in Lancashire, on the Lancashire and Yorkshire Railway, 4 miles E. of Manchester. It has extensive manufactures of cotton and several dye-works. It has increased rapidly in recent times. Pop. in 1881, 11,254.

**Droyssen** (JOHANN GUSTAV), a German historian, born at Trepton July 6, 1808. He became in 1833 lecturer on history in the University of Berlin, in 1840 professor at Kiel, in 1851 at Jena, and in 1859 at Berlin. He published, besides other works, a "History of Alexander the Great" (1833), a "History of Hellenism" (2 vols., 1836-43), a "Life of Field-marshal Count Torck von Wartenburg" (4th ed. 1863), and an "Outline of the Science of History" (3d ed. 1869). His "History of Prussian Politics" (vol. i.-iv., 1855-70) is his most important work. D. June 19, 1884.

**Droz** (FRANÇOIS XAVIER JOSEPH), a French author and moralist, born at Besançon Oct. 31, 1773. He produced in 1806 an "Essay on Happiness," and gained the Montyon prize in 1824 for his treatise "On Moral Philosophy." His reputation is founded chiefly on his "History of the Reign of Louis XVI." (3 vols., 1839-42). Died Nov. 4, 1850.

**Druey** (CHARLES), a Swiss politician, born in 1799, was a leader of the liberal party. He was president of the provisional government formed in 1845, and was an opponent of the Sonderbund. He promoted the adoption of the new constitution in 1848, and was president of the federal council in 1850. Died Mar. 29, 1855.

**Drug** [Fr. *drogue*; It. *droga*], any substance used in the preparation of medicine. In commerce, the term includes also dyestuffs, chemicals, varnishes, etc.

**Drugget**, a coarse woollen fabric used for covering carpets or as a substitute for carpets. It was formerly used for clothing by the women of the lower classes.

**Druïds** [Gr. *δρῦναι*; Lat. *druide*, thought by some to be derived from the Celtic *deru*; Gr. *δρῦς*, an "oak," a tree which they revered, but perhaps from the Celtic *de-ronyd*, "God's speaker"], the priests of the ancient Celtic religion. In Cæsar's time they formed an exclusive class, which shared with the nobility and the knights the rule over the people, and were free from taxes and from military service. They presided at the sacrifices, instructed the youth, and guarded the secret doctrines of religion. They acted as judges in the difficulties between different tribes, and exercised the art of prophecy and of sacred minstrelsy. They were also skilled in medicine, in astrology, the division of time, and other branches of knowledge, which were kept secret from the masses of the people. They practised the sacrifice of human beings, recognized a ruling destiny and the immortality of the soul, and revered the oak and mistletoe as sacred. Their political importance ceased on the subjection of Gaul to the Romans, and their religious service was abolished by a decree of the emperor Claudius. There were also druidesses of several ranks. Of the druidical doctrines little is known.

**Druids, Orders of.** In London in 1781 a club of "Druids" was founded for mutual entertainment. The society thus begun gradually extended, forming an organization for reciprocal assistance in cases of sickness or death. A system of ceremonies was adopted similar to that of the Freemasons, but professedly based on traditions handed down from the ancient Druids. As the society extended, many changes were introduced, and the original organization in course of time was divided into a great number of independent "Orders of Druids." The oldest branch of the society holds its sessions in London. Another branch, calling itself the "Order of Druids in England," is very numerous in that country, having more than one thousand lodges. The whole number of members belonging to the different orders in Great Britain, Australia, and the U. S. is estimated at above 100,000. The first lodge in the U. S. was founded in New York in 1833. The society continued to extend, and at length arose the "Grand Grove of the U. S. of the United Ancient Order of the Druids," under whose auspices there have been established over one hundred "groves," numbering in all over 15,000 members. Of latter time different degrees have been instituted. In America, besides the degree conferred at the

first entrance, there are five others. Degrees have also been instituted in England, but they are different from those used in the U. S. Though of purely English origin, the German element in the orders of Druids has of late obtained a decided preponderance in the U. S., so that nearly if not quite two-thirds of the "groves" conduct their proceedings in the German language.

**Drum** [Fr. *tambour*; Ger. *Trommel*], a martial musical instrument, is a hollow cylinder of wood or metal having skin or parchment stretched across one or both ends, on which the drummer beats with a wooden stick called a *drum-stick*. The military drum is used to give various signals, as well as for music. There are three kinds of drums—the *side* drum, the big or *bass* drum, and the *kettle* drum. The first of these is suspended at the side of the drummer, who beats on one end of it only. Strings of catgut, called *snare*s, are stretched across the other end; hence it is often called a *snare* drum. The bass drum is beaten on both ends. The kettle drum is of hemispherical form, and has but one head or parchment. It was formerly used in martial music, but is now confined to the orchestra.

**Drum**, in architecture, the upright part of a cupola above or below a dome. The term is generally applied to the lower part. The solid part or vase of a Corinthian or Composite capital beneath the acanthus leaves is called a drum. The term drum is applied in machinery to a hollow cylinder fixed upon a shaft for the purpose of driving another cylinder by a band.

**Drum**, the name given in the eighteenth century to a crowded fashionable assembly, so styled, says Smollett, "from the noise and emptiness of the entertainment." A large assembly of the kind was called a "drum-major."

**Drum** (SIMON H.), an American officer, born in 1807 in Pennsylvania, graduated at West Point in 1830, and Aug. 18, 1846, captain Fourth Artillery. He served at the Military Academy as assistant instructor 1830-32; on Black Hawk expedition 1832; chiefly at sea-board posts 1833-36; in Florida war 1836-37 and 1838-39; removing Cherokees to the West 1838; suppressing Canada border disturbances 1839-41; as assistant quartermaster 1846; in the military occupation of Texas 1846; and in the war with Mexico 1846-47, engaged at Vera Cruz, Cerro Gordo, Contreras (recaptured Capt. O'Brien's guns lost without dishonor at Buena Vista), Molino del Rey, Chapultepec, and assault of the city of Mexico, where, after entering the Belen Gate, and while directing the fire of a captured 9-pounder (added to the battery commanded by him) with consummate skill, indomitable energy, and most conspicuous gallantry, he was killed Sept. 13, 1847, aged forty.

GEORGE W. CULLUM.

**Dru'mann** (KARL WILHELM), a German historian, born near Halberstadt June 11, 1786. He obtained the chair of philology at Königsberg in 1817. His most important work is a "History of Rome" (6 vols., 1834-44), which is highly esteemed. Died July 29, 1861.

**Drum'fish** (*Pogonias chromis*), a marine fish of the U. S. coasts, found as far S. as Florida. It derives its name from the peculiar sound it emits, somewhat resembling the beat of a drum. It produces this sound after it is caught as well as when in the water. It is caught in great numbers on the south shore of Long Island, and when young is delicate eating. It sometimes reaches eighty pounds in weight. The *Pogonias fasciatus* of the American Atlantic coasts emits the same sounds. These fishes are of the family Scienidæ, many members of which can produce remarkable sounds.

**Drum'mer**, a person who beats on a drum. Each company of U. S. infantry has one fifer and one drummer, who rank as privates. They execute signals, perform at parades, drills, and reviews, and attend the wounded on the battle-field. The drummers and fifers collectively constitute the regimental music or drum-corps, and are under a principal musician, sometimes called a drum-major.

**DRUMMER** is also used to denote in a general way any person soliciting custom, but in this sense the word seems to have, if not an odious, at least a somewhat humorous or jocular, sense.

**Drummond** (THOMAS), CAPTAIN R. E., a Scottish engineer, was born in Edinburgh in Oct., 1797. He was well versed in mathematics and skilful in mechanics. He was one of the royal military engineers employed in the trigonometrical survey of Scotland. In 1825, while engaged in this operation, he made successful experiments with incandescent lime to render distant objects visible. (See DRUMMOND LIGHT.) He was appointed under-secretary for Ireland in 1835. Died April 15, 1840.

**Drummond** (WILLIAM) of Hawthornden, a Scottish poet, born of a noble family, Dec. 13, 1585, was liberally educated. He studied law in France, from which he re-

turned in 1609. He resided on his beautiful paternal estate of Hawthornden, where he passed his life in retirement and in literary pursuits. He married Elizabeth Logan about 1630. In 1619, Ben Jonson travelled several hundred miles in order to visit Drummond, who wrote "Notes of Ben Jonson's Conversation" on this occasion. These notes are among his most interesting productions. He was author of sonnets, and a poem called "The River Forth Feasting." Died Dec. 4, 1649.

**Drummond Island**, in Lake Huron, is the most western of the Manitoulin Islands, and belongs to Michigan. It is 20 miles long and 10 miles wide.

**Drummond Light** [named from Thomas Drummond, its inventor], also called **Lime Light**, **Calcium Light**, etc., an intense light produced by throwing the oxyhydrogen blowpipe flame upon a pencil of lime, which is thereby raised to very vivid incandescence. If magnesia or metallic magnesium be used instead of lime, the light is very rich in actinic rays, and hence is useful in photography. Zirconia is often employed instead of lime, on account of its non-volatility.

**Drunkenness.** See DIPSOMANIA and INTEMPERANCE.

**Drupa'ceæ** [from *DRUPE*, which see], a natural order of plants, regarded by most botanists as a sub-order of the Rosaceæ. It is characterized by polypetalous regular flowers, a solitary carpel, the style of which proceeds from the apex, and a drupaceous fruit. The peach, apricot, plum, and cherry are examples.

**Drupe** [Lat. *drupa*; Gr. *δρῦπνα* (from *δρῦνής*, "over-ripe," "ready to fall from the tree")], in botany, a 1-celled, superior indehiscent fruit, having a single seed or kernel, usually enclosed in a hard and bony *endocarp* called a stone, as a peach or a plum. The outer part of the fruit, which is succulent or fleshy, is called the *sarcocarp* or *mesocarp*. The term *putamen* is applied to the hard, stony substance which encloses the kernel.

**Dru'ses**, a people of mixed race (largely Persian and Arab), almost limited to the Lebanon, Wady-el-Teim, and the Hauran, speaking the Arabic language, and professing a religion of which until quite recently almost nothing was known. They number, some say, nearly 100,000; others say, only about 50,000. They are industrious, hospitable, and very proud of their birth and pedigree. Their chief business is the production and manufacture of silk. For about 800 years they have maintained a distinct religion and an independent nationality. Their creed is an offshoot of Mohammedanism, probably developed by the Shiites, or more especially by the so-called Batiniya, or Batenians, the most radical branch of the Shiites. In some of its fundamental tenets, however, it is directly opposed to the very spirit of Mohammedanism, and seems to approach Christianity. It emphasizes the unity of God as strongly as Mohammedanism. "There is no god but God," the Druses say, and he is unknowable to man. But, though he cannot be grasped by the senses, he becomes known to man through revelation, they add; and then follows a doctrine of incarnation not altogether unlike the Christian doctrine, but an abomination to all Mohammedans. The highest, and also the last, of these incarnations was, according to the Druses, that of Hakim Bramrillahi, the sixth of the Fatimites, caliph from 1019 to 1044. Hakim was a half-insane tyrant; and when his favorite, Ismael Darosi, a Persian by birth, one day began to expound to the audience assembled in the great mosque of Cairo that Allah had revealed himself in Hakim, that Hakim was an incarnation of Allah, a riot immediately ensued, and it could not be suppressed until Darosi was expelled from the country. He went to the regions of the Lebanon, and his doctrine was accepted by the people living there; hence their name Druses. His morals were very easy. Chastity was not enjoined; drunkenness was not prohibited. But, though the new sect, thus formed, even developed a literature, its later history is very obscure. Externally, the Druses saw fit to profess Mohammedanism, and nothing was known about their peculiar creed and their sacred books until the latter part of the eighteenth century. A terribly bloody war between them and the Maronites led, in 1800, to European intervention on behalf of the Christians. (See MARONITES. See also the EARL OF CARNARVON'S "Druses of the Lebanon," 1860; REV. JOHN WORTADET, "Researches into the Religions of Syria," 1860; H. GUYO, "La théogonie des Druses," Paris, 1863; and "La nation Druse," Paris, 1864.)

**Dru'sus** (CLAUDIUS NERO), a Roman general, born in 38 B. C., was a younger brother of the emperor Tiberius. His mother Livia was a wife of the emperor Augustus. He married Antonia, a daughter of Mark Antony. In 13 B. C. he defeated the Germans near the Rhine. Having conquered the Siambri and Frisii, he extended the Roman

empire to the German Ocean and to the river Elbe. For these victories he received the surname of GERMANICUS. He died early in 9 B. C., leaving two sons, Germanicus and Claudius, the latter of whom became emperor.

**Drusus** (MARCUS LIVIUS), a Roman orator and politician, who became tribune of the people in 122 B. C. as a colleague of Caius Gracchus. He supported the cause of the senate and optimates, opposed the policy of Gracchus, and gained popularity by planting colonies. He was elected consul for 112 B. C.

**Drusus** (MARCUS LIVIUS), called DRUSUS JUNIOR, was a son of the preceding and an uncle of Cato Uticensis. He is said to have been ambitious, proud, and arrogant, and a champion of the senate or aristocratic party. Having been chosen tribune of the people for 91 B. C., he courted the popular favor by passing an agrarian law. He formed a design to admit the Italotes to the right of citizenship. His official conduct was condemned by the senate. He died in 91 B. C.

**Dry'ad** [Gr. *δρῦάς*, plu. *δρῦάδες* (from *δρῦς*, an "oak" or any tree); Lat. *dryades*]. In Greek mythology, the dryads were nymphs or goddesses supposed to preside over woods and groves.

**Dry Bank Light**, on the Florida Reef, stands on Sombrero Shoal, near Dry Bank, Coffin's Patches, and Sombrero Key, in lat. 24° 37' 36" N., lon. 81° 6' 43" W. It is an open framework of iron 149 feet high, with a fixed white dioptric light of the first class.

**Dryden**, on R. R., Tompkins co., N. Y. (see map of New York, ref. 5-F, for location of county), 32 miles N. of Owego. It has one large woollen-factory, a tannery, a graded school, and a magnetic spring. Here is the Dryden Spring Place, a resort for invalids. Pop. in 1870, 672; in 1880, 779.

**Dryden** (JOHN), an eminent English poet, born at Aldwinckle, Northamptonshire, on the 9th of Aug., 1631, was a grandson of Sir Erasmus Driden, created a baronet in 1619. He was a pupil of Dr. Busby, and entered Trinity College, Cambridge, in 1650. Having graduated as master of arts in 1657, he became a resident of London. He wrote "Heroic Stanzas on the Death of Cromwell" (1658), and celebrated the restoration of Charles II. in 1660 by a poem entitled "Astræa Redux." His first drama was the "Wild Gallant" (1662). He married Lady Howard, a daughter of the earl of Berkshire, in 1663, and produced in 1667 a poem called "Annus Mirabilis, or Year of Wonders." In 1668 he was appointed poet-laureate, with a salary of £200 annually. He afterwards wrote numerous comedies and tragedies, among which are "Marriage à la Mode," "All for Love" (1678), and "Aurungzebe." His political and poetical satire of "Absalom and Achitophel" (1681) is a very famous and brilliant production directed against the party of which Lord Shaftesbury and the dukes of Buckingham and Monmouth were the leaders. He announced his conversion to the Roman Catholic religion by his allegorical poem called "The Hind and the Panther" (1687). He produced in 1696 a metrical translation of Virgil, which Pope commended as "the most noble and spirited translation I know in any language." It is, however, deficient in fidelity. Among his other works are an excellent prose "Essay on Dramatic Poesy" (1660) and an "Ode for Saint Cecilia's Day." He died May 1, 1700, and was buried in Westminster Abbey. His later works exhibit a purer taste than his dramas.

**Dry Dock.** See DOCKS, by S. H. SHREVE, C. E.

**Dry Fogs.** See DARK DAY, in APPENDIX.

**Drying Machine**, a term applied to various inventions for extracting the moisture from fabrics. A machine most commonly used by dyers and large laundry establishments, called an "extractor," consists of two cylinders, one within the other. The inner one is the receptacle for the goods, and is made to revolve with great rapidity, expelling the water through perforations made in the sides. The outer cylinder receives the water, and from thence it is carried off by means of a pipe. By this process the drying is not quite complete, but what remains is expelled by drying in a hot chamber or in the open air. A more simple drying machine for domestic use is constructed of two wooden or India-rubber rollers mounted one above the other. They are parallel, and arranged in such a manner that the distance between them can be varied at will. The end of the goods being inserted between the rollers, one is turned by a handle, causing both to revolve and the clothes to pass between, thus extracting the moisture by pressure.

**Drying Oil**, the name given to linseed and several other seed-oils used in painting, and which have the property of drying quickly. The process of drying is hastened by heating the oil with oxide of lead. (See OILS and PAINTS.)

**Dryobalanops.** See CAMPHOR.

**Dry'ophis** [from *δρῦς*, a "tree," an "oak," and *ὄφης*, a "serpent"], a genus of snakes belonging to the Colubridæ, are natives of tropical America and the East Indies. Like the *Dendrophis*, to which they are allied, they have elongated forms and live on trees.

**Dry Pile**, a kind of voltaic pile or battery, constructed without liquids, and furnishing a feeble electric current. The dry piles of Zamboni and De Luc consist of disks of copper and zinc papers placed in pairs back to back and piled up or packed in glass tubes, with the copper surfaces all in the same direction.

**Dry Point**, a sharp etching-needle used by engravers to incise fine lines in a copper plate which is not covered with etching-ground. No acid is applied to eat the lines made by the dry point, which produces very delicate work.

**Dry Process.** See PHOTOGRAPHY, by PROF. H. B. CORNWALL, E. M.

**Dry Rot**, called also **Sap Rot**, is a diseased state incident to timber, which reduces its substance to a mass of dry dust by decomposing the fibres. It is caused by various species of fungi, among which are *Merulius lachrymans* and *Polyporus destructor*. In the navy-yards of Great Britain great ravages have been ascribed to some species of *Sporotrichum*. The ends of the timber are generally affected by this disease, and the decay often makes great progress without being suspected. The chief causes of dry rot are stagnation of air, as under the floor of a building or behind a wainscot, and imperfect drying of the timber. That which is well seasoned will resist the fungi for many centuries, as is shown by wood brought from the frieze of the Parthenon, which had been placed there more than 2300 years ago. Various substances have been used for the prevention of dry rot, one of the most successful of which is a solution of corrosive sublimate introduced into the pores of the wood by an air-pump. (See PRESERVATION OF TIMBER.)

**Dry'-stove**, a glazed structure designed for the protection of the plants of dry, arid climates; a hot-house in which the air is kept less moist than in the bark stove. It is particularly adapted to succulent plants. The temperature should be higher than that of a green-house.

**Dry Tortu'gas** [Sp. *tortuga*, a "tortoise"], a group of ten small, low, barren islands belonging to Monroe co., Fla., situated over 40 miles W. of the most western of the Florida Keys proper. On the south-westernmost island, called Loggerhead Key, stands a brick lighthouse 150 feet high, with a fixed white dioptric light of the first order; lat. 24° 38' 5" N., lon. 82° 52' 53" W. There is also a smaller light for Dry Tortugas Harbor (lat. 24° 37' 47" N., lon. 82° 52' 53" W.). This lighthouse stands inside Fort Jefferson, an important fortification on Garden Key. The Dry Tortugas served as a place of imprisonment for persons under sentence by courts-martial during the late civil war. Several criminals concerned in the conspiracy in which President Lincoln was murdered were confined here.

**Du'alín** [so called because it is a mixture of two different substances], an explosive compound introduced in 1868 by Dittmar, is composed of NITRO-GLYCERINE (which see) mixed with saw-dust, or wood-pulp such as is used in paper-mills; the latter being first treated with nitric and sulphuric acids. The object of the mixture is to diminish the danger connected with the storage and transportation of nitro-glycerine. (See EXPLOSIVES, by GEN. H. L. ABBOT, U. S. Army.)

**Du'alism** [from the Lat. *dualis*, "containing two"], in metaphysics, the doctrine that the universe exists by the concurrence of two principles, the spiritual and the material, each necessarily independent and eternal. The "dualism" of Zoroaster belongs rather to religion than to philosophy. It assumed two independent principles—one good, the other evil—through the collision of which was explained the disorder, moral and physical, of the world. The Gnostics in the second century adopted these views in a greater or less degree. The Greek philosophers are called dualists, inasmuch as the most of them held to the belief that matter and spirit were each self-existent and independent in origin. Their statements of the doctrine differ from each other, and are vague and indistinct. But the Stoical doctrine of a soul of the world, contradistinguished from matter without qualities (*ἀποιος ὕλη*), represents the general drift of the Greek thought. The prevailing mode of thought among Christian theists recognizes the real being of mind and matter in the constitution of man and the order of the universe, while it attributes self-existence and creative power solely to the Supreme Mind. In connection with theories of perception the term Dualism has been used to denote the soul and the modes of matter in relation and opposition while the mind is in the act of ac-

quiring knowledge of the external world. (See HAMILTON'S ed. of Reid, p. 817.) REVISED BY M. B. ANDERSON.

**Duality, Principle of** (in math.). See POLAR.

**Du'al Num'ber**, in grammar, is that form of the noun, adjective, or verb denoting in some languages the number two. For example, in the ancient Greek there were three numbers in grammar, the singular, the dual, and the plural; but the dual was not very often used, and is never found in Æolic or in Hellenistic Greek. It occurred most frequently in the Attic dialect.

**Duane**, du-ān' (JAMES), a mayor of New York, was born in that city Feb. 6, 1733. He became a lawyer and a leading revolutionist in the war of Independence, was a member of Congress (1774-77 and 1780-82), was the first mayor of New York in 1784, and U. S. district judge (1789-94). Died at Duaneburg, his patrimonial estate, Feb. 1, 1797.

**Duane** (JAMES C.), an American officer, born in 1824 in New York, graduated at West Point in 1848, and Jan. 10, 1853, became a colonel of engineers. He served at the Military Academy with engineer troops and as assistant instructor 1848-54; in the construction of fortifications 1849-56; as lighthouse engineer 1856-58; on Utah expedition 1858; at the Military Academy as instructor of practical engineering, etc., 1858-61. In the civil war he served in defence of Fort Pickens, Fla., 1861; in the defences of Washington, organizing engineer troops and equipage, 1861-62; in the Virginia Peninsula 1862, engaged in command of engineer battalion at Yorktown, Gaines's Mill, and construction of field-works, roads, and bridges; in the Maryland campaign as chief engineer of the Army of the Potomac 1862, engaged at South Mountain, Antietam, and several skirmishes; as chief engineer of the department of the South 1862-63, engaged in the attack on Fort McAllister, Ga., and operations against Charleston, S. C.; as chief engineer of the Army of the Potomac 1863-65, engaged at Manassas Gap, Rappahannock Station, Robertson's Tavern, Wilderness, Spottsylvania, Cold Harbor, Petersburg, Hatcher's Run, and Appomattox Court-house. (Brevet lieutenant-colonel and colonel for meritorious and faithful services in the Richmond campaign, and brigadier-general for gallant and meritorious services in the siege of Petersburg and subsequent operations.) He has served since in the construction of the defences of the eastern entrance to New York harbor 1865-68; member of engineer boards 1867-73; now lighthouse engineer of the N. E. Atlantic coast and superintendent of the fortifications in Maine and New Hampshire. Author of "A Manual for Engineer Troops," 1862. GEORGE W. CULLUM.

**Duane** (WILLIAM), an American politician and printer, was born near Lake Champlain, N. Y., in 1760. He passed some years in India and in England, from which he returned to the U. S. in 1795. He then became the editor of the "Aurora," which was published at Philadelphia, and was the influential organ of the Democratic party. He served in the war of 1812 as adjutant-general with the rank of colonel, and published a "Military Dictionary" (1810), besides numerous other works, chiefly upon military subjects. Died Nov. 25, 1835.

**Duane** (WILLIAM JOHN), an able lawyer and statesman, born at Clonmel, Ireland, in 1780, was a son of the preceding. He practised law in Philadelphia, and published, besides other works, "The Law of Nations Investigated in a Popular Manner" (1809). He was appointed secretary of the treasury of the U. S. early in 1833, but was dismissed from office in September of that year by President Jackson, because he refused to remove the deposits of public money from the Bank of the U. S. Died Sept. 27, 1865.

**Duban** (JACQUES FÉLIX), a French architect, born in Paris Oct. 14, 1797. He completed the Palace of the Fine Arts, and became a member of the Institute and commander of the Legion of Honor (1868).

**Du Barts** (GUILLAUME SALLUSTE), born at Montfort in the department of Gers 1544, undertook various diplomatic missions to foreign courts for the Huguenot cause, fought in the Huguenot army, and received a severe wound in the battle of Ivry, Mar. 14, 1600. He published two large epics, "La première semaine," on the creation, and "La seconde semaine," on the period from the creation to the incarnation of Christ (unfinished), which appeared in a collected edition in 1629, were very well received, and were translated into English ("The Weeks") by SYLVESTER (London, 1641.)

**Dubhoy'**, a town of the East Indies, in the dominion of the Guicowar, 38 miles N. E. of Baroach. It was once strongly fortified. It contains handsome gates and a splendid temple. In the last century it had 40,000 inhabitants.

**Dubic'za**, a fortified town of European Turkey, is on

the northern frontier of Bosnia, and on the river Unna about 10 miles from its entrance into the Save, and 23 miles W. of Gradiska. Pop. 6000. On the opposite bank of the Unna is Austrian Dubicza, which is a fortified town.

**Dub'lin**, a county of Ireland in Leinster, has an area of 354 square miles. It is bounded on the E. by the Irish Sea, and is intersected by the river Liffey, which flows into Dublin Bay. The surface is nearly level; the soil is productive and well cultivated. Granite, copper, lead, and carboniferous limestone occur here. Chief town, Dublin. Pop. in 1881, 418,152.

**Dublin** [said to be derived from the Irish *dabh-linn*, i. e. "black pool;" anc. *Eblana*], the capital of Ireland, is in the above county, on the river Liffey at its entrance into Dublin Bay, 66 miles W. of Holyhead and 135 miles W. of Liverpool; lat. 53° 20' 38" N., lon. 6° 17' 30" W. Mean annual temperature, 49° F. The river, which runs eastward, divides the city into two nearly equal parts, which are connected by seven stone and two iron bridges. In the north-eastern and south-eastern parts are many beautiful squares, streets, and terraces, occupied by the aristocratic class. The mercantile business is mostly transacted in the central and north-western portions, where are many residences of the middle class. The city is surrounded by the Circular Road, nearly 9 miles long, which is a favorite drive and promenade of the citizens. The most imposing street of Dublin is Sackville street, which is 120 feet wide and nearly 700 yards long. Among the numerous squares is Stephen's Green, having an area of nearly twenty acres. The most remarkable public buildings are the Bank of Ireland (formerly the Parliament House), Trinity College, the custom-house, the Four Courts, Dublin Castle, occupied by the lord lieutenant, and St. George's church with a steeple 200 feet high. The cathedral of St. Patrick is one of the most interesting buildings of the city. It was founded in 1190 by John Comyn, archbishop of Dublin. In the next century it was burnt down, but was immediately rebuilt in still greater splendor. At the time of the Reformation it was closed, and Edward VI. thought of using the building for a university; but the plan was defeated, and under Mary the church was restored to its primary destination. Near the N. end of Sackville street is a monument to Lord Nelson, which is 134 feet high. Among the literary and scientific institutions are the University (see DUBLIN, UNIVERSITY OF), the Royal College of Science, the Roman Catholic University, the College of Surgeons, the Royal Dublin Society, the Royal Irish Academy, the Hibernian Academy for Paintings, and the National Gallery. Dublin is the seat of a Protestant Episcopal and a Roman Catholic archbishop. In the environs of Dublin, which are remarkably beautiful, is Glasnevin, once the favorite residence of Addison, Steele, Swift, and Sheridan; and Phoenix Park, which contains nearly 2000 acres, and is frequented by great numbers of persons for recreation. The fine scenery of this noble park, the massive public buildings, the spacious squares, the clean granite quays which line the river, and the beauty of the bay which expands before the city, render Dublin one of the most beautiful and agreeable capitals of Europe. Railways extending in several directions connect this place with the chief towns of Ireland. It is the eastern terminus of the Grand and Royal Canals, and has a good harbor, which has been improved by the construction of two breakwaters. A ship-canal, 127 miles in length, to Dublin, is proposed. This city has several glass-works, foundries, and distilleries; also manufactures of poplin, which is much celebrated. Dublin returns two members to Parliament, besides two who represent the university. It is a very old town, but its oldest history is mostly made up of legends. It was taken in the ninth century by the Danes, and, though they were several times expelled, and completely defeated in the battle of Clontarf, they managed to hold the city until 1170. In 1172, Henry II. landed in Ireland at the head of an Anglo-Norman armament. He came also to Dublin, held his court there with great magnificence, and made an alliance with the Irish chiefs. In 1689, James II. took up his residence in Dublin and held a Parliament there; after the battle of the Boyne he speedily departed. On Jan. 1, 1800, the imperial standard of the United Kingdom was hoisted on Dublin Castle. Pop. in 1881, 348,293.

**Dublin**, capital of Laurens co., Ga. (see map of Georgia, ref. 5-I, for location of county), is near the Oconee River, and 120 miles W. by N. from Savannah. Pop. in 1880, 574.

**Dublin, University of**, otherwise called **Trinity College, Dublin**, is said to have been founded in 1320, but having gone to decay, was re-established in 1593 by Queen Elizabeth. It was endowed by the corporation of Dublin and by private gifts, and still further by grants of James I., who in 1613 gave it representation in Parliament, which it still possesses, sending since 1832 two members to

the House of Commons. Its government is modelled upon that of the English universities, but its fellows (since 1840) are at liberty to marry. It has a very full corps of professors in all departments of knowledge, who, like the fellows, are liberally supported from the income of the college. The students are of four classes: (1) Noblemen, baronets, and the sons of noblemen, who have peculiar privileges, and, with the exception of baronets, obtain the degree of B. A. without examination. They pay about \$500 a year in fees. (2) Fellow-commoners, who dine with the fellows, and have one less examination than the third class, at about one-half the cost in fees of the preceding. (3) Pensioners, to which class most of the students belong. Their fees are little more than half as great as those of the second class. (4) Sizar, thirty in number, who pay a nominal fee. Each of the ranks wears a distinctive dress. The examination on entrance is thorough. It is possible to obtain degrees without great exertion, but the honors can be obtained only by severe study. No restriction is made with regard to the admission of those who are not members of the Anglican Church. The fees for graduation are much higher than in American colleges. Dublin University occupies a high rank among European institutions of learning. It has special departments for the study of medicine, divinity, and engineering. Among the eminent graduates were Berkeley, Ussher, Swift, Burke, Goldsmith, and Sheridan. An unsuccessful attempt made Mar. 11, 1873, in the British Parliament to unite the Catholic University, Magee College, Belfast, and the Queen's Colleges of Cork and Belfast to the University of Dublin, and to abolish the Queen's College at Galway, led to the temporary disruption of the Gladstone ministry.

**Düb'ner** (FRIEDRICH), a philologist, born at Hörselgau, in Germany, December 21, 1802. He was from 1826 to 1831 professor at the gymnasium of Gotha, and after 1831 lived in Paris, where he at first took an active part in Didot's new edition of the "Thesaurus" of Stephanus, and was subsequently one of the editors of the "Bibliotheca Græca" of the same publishers. Besides editions of a number of Latin and Greek classics, he published a Greek grammar (1856) and a French-Greek Lexicon (1860). Died Aug. 16, 1867.

**Dubnit'za**, a town of European Turkey, province of Room-Ejee, on the river Djerma, 22 miles S. of Sophia. It has extensive iron-works. Pop. about 7000.

**Dub'no**, a town of Russia, in Volhynia, is on the small river Irwa, 32 miles W. of Ostrog. It has several Greek and Roman Catholic churches. Pop. 7212.

**Dubofka**, a town of European Russia, in the government of Saratow, stands on the right bank of the Wolga, near the influx of the Dubofka. It is mostly built of wood, but has important manufactures of leather, tallow, soap, and tobacco. It has an annual fair, which lasts a whole month. Pop. 12,737.

**Du Bois**, Pa. See APPENDIX.

**Dubois** (GUILLAUME), a French cardinal and prime minister, born at Brives-la-Gaillarde Sept. 6, 1656. He was preceptor to the duc de Chartres, who became duke of Orleans and regent of France in 1715. Having gained the favor of this prince by pandering to his vices, he was appointed a councillor of state. He exhibited much political cunning and talent for intrigue. Among his important diplomatic acts was the treaty between France, England, and Holland called the Triple Alliance (Jan., 1717). He became about 1718 minister of foreign affairs, and, though his morals were depraved, archbishop of Cambray in 1720. He was appointed prime minister in 1722, and retained power until he died, Aug. 10, 1723.

**Dubois** (JEAN ANTOINE), ABBÉ, a French missionary, born in Ardèche in 1765. He spent many years in India, and wrote in English a valuable work on "The Character, Manners, Customs, and Institutions of the People of India" (1816). Died in Paris Feb. 7, 1848.

**Dubois** (PAUL FRANÇOIS), a French politician, born June 2, 1795, at Rennes, became professor of rhetoric at the Lyceum Charlemagne in Paris in 1814. As one of the founders of the "Globe," he contested the restoration of the Bourbons. In 1840 he succeeded Cousin as director of the Normal School, and for many years took a prominent part in public instruction.

**Du Bois-Reymond** (EMIL), a German physiologist, born Nov. 7, 1818, succeeded in 1858 his teacher, Johannes Müller, as professor at the University of Berlin, and became a member of the Academy of Sciences, of which he has been secretary since 1867. He is regarded as one of the foremost writers on physiology, his chief work being "Researches on Animal Electricity" (1857).

**Dubossar'y**, a town of Russia, in the government of



Kherson, on the Dniester, 85 miles N. W. of Odessa, has several factories. Pop. 5547.

**Dubuat** (THE CHEVALIER), an eminent French experimentalist and writer on hydraulics. He may be said to have laid the foundations of hydro-dynamics, being the first who succeeded in ascribing to the different forces, friction, cohesion, etc., which act on fluids in a state of uniform motion, their effective share in determining their velocity. He was the first to ascertain and measure by striking and original observations (long neglected, but which have since claimed attention) the effect of the cohesion and inertia of the air in retarding the motions of the pendulum. His most important work is entitled "Principles d'Hydraulique et de Pyrodynamique," Paris, 1816; the latter subject being the action of heat upon matter in its different states of solid, fluid, and vapor. He was an officer of the "corps du génie" (engineers), in which he became a colonel—subsequently engineer in ordinary to the king.

**Dubufe** (CLAUDE MARIE), a French painter of history and portraits, was born in Paris in 1790. He was a fashionable portrait-painter. Died April 21, 1864.

**Dubufe** (ÉDOUARD), a portrait-painter, son of the preceding, born in Paris Mar. 30, 1820, died there Aug. 12, 1883. He studied under his father, and afterward under Delaroche, for many years painted religious subjects, but after 1846 devoted himself chiefly to portrait painting. The most celebrated of his portraits are of Jules Janin (1846), the empress Eugénie (1853), Rosa Bonheur (1857), Princess Ghika (1861), Gen. Fleury (1869), Dumas fils (1873), Emile Augier (1875). He continued, however, to treat religious or mythological subjects. One of his best pictures was "The Death of Adonis."

**Dubuque**, a city, capital of Dubuque co., Ia. (see map of Iowa, ref. 4-K, for location of county), occupying 13 square miles of plateau and bluff on the W. bank of the Mississippi River, 470 miles N. of St. Louis, 321 miles S. of St. Paul, and 199 miles W. of Chicago. It is the centre of a large and ever-widening railroad system, and during the season of navigation has two lines of steamers plying to St. Louis and St. Paul. It is distinguished for the excellence of its educational institutions. It is the seat of the Iowa Institute of Science and Arts, a widely known and very useful institution. Dubuque is opposite to the point where the line between Wisconsin and Illinois reaches the Mississippi, and is in one of the richest lead-regions known. It was in 1880 the largest city in the State except Des Moines. It is the chief dépôt of the lead region of Iowa, Illinois, and Wisconsin. It is the seat of a Roman Catholic bishop, and contains a large cathedral, a city-hall, a custom-house, five national banks, a German Presbyterian theological school, an Episcopal seminary, and four Roman Catholic seminaries. It has large and increasing manufactures of sash-doors and blinds, shot, steam-engines, farming-implements, machinery, brick, white lead, leather, wooden ware, etc. The census of 1880 shows 346 manufactories; capital, \$3,446,866, average number of hands, 3003; wages paid, \$1,339,730; value of products, \$6,328,889. Four daily and six weekly papers are published here. Dubuque is connected with E. Dubuque (Ill.) by a noble railway iron bridge, which is a "marvel of lightness and strength," and cost several millions of dollars. This city was named in honor of Julien Dubuque, a French trader who, with ten others, settled here in 1788 to mine the ores of lead. This was the first settlement in what is now the State of Iowa. This settlement was abandoned after Dubuque's death in 1810, and the site was not again occupied till 1833. This last was the first permanent settlement in Iowa. It is the entrepôt of a very extensive trade, both by rail and river. Pop. in 1860, 13,000; in 1870, 18,434; in 1880, 22,254; in 1883, about 26,000.  
ED. OF "HERALD."

**Du Cange** (CHARLES DU FRESNE), a French historical writer, born at Amiens Dec. 13, 1610. He was liberally educated and studied law. Among his most important works are a "History of the Empire of Constantinople under the French Emperors" (1657), a "Glossarium ad Scriptores Mediæ et Infimæ Græcitatæ" (2 vols. folio, 1688), and a "Glossarium ad Scriptores Mediæ et Infimæ Latinitatis" (3 vols. folio, 1678, enlarged to 6 vols. folio in 1733-36, and reissued with additions, in 7 vols. quarto, in 1840-50). A new edition began to appear in 1883. He passed many years of his mature life in Paris, where he died Oct. 23, 1688.

**Du'cas** (MICHAEL), [Gr. Μιχαήλ ὁ Δούκας], a Byzantine historian who flourished about 1450, was related to the imperial family of Constantinople. He wrote a "History of the Decadence of the Byzantine Empire, 1355-1453."

This work is a part of the collection called "Historia Byzantina." He retired to Lesbos when the Turks captured Constantinople in 1453. Died after 1463.

**Duc'at** [from the Lat. *dux* (gen. *ducis*), a "leader" or "duke," because it was first coined by Italian dukes; It. *ducato*; Sp. *ducado*], a name of a gold coin which originated in Italy, and was afterwards coined in several countries of Europe. In 1559 the ducat was adopted as a legal coin of the German empire. There was much difference in the value of the ducats which circulated in various countries. Those of Austria, Holland, and Hamburg contain about 52.8 grains of pure gold, and are nearly equivalent to two dollars of our coin. The Spanish silver ducat (*ducado*) is worth about one dollar. The ducat is said to have been first struck in the sixth century by Longinus, duke or *duca* of Ravenna, but Gibbon attributes its origin to the dukes of Milan.

**Du Chaillu** (PAUL BELLOXI), a French traveller, born in Paris, July 31, 1835, the son of a French merchant in Equatorial Africa, was naturalized as a citizen of the U. S. He explored the Gaboon region, etc., and published, besides other works, "Explorations and Adventures in Equatorial Africa" (1861), "A Journey to Ashango Land" (1867), "My Apingi Kingdom" (1871), "Wild Life under the Equator," "Lost in the Jungle," "The Country of the Dwarfs," "Land of the Midnight Sun," etc. He was one of the first travellers who described the gorilla.

**Duchâtel** (CHARLES MARIE TANGUY), COMTE, a French politician, born in Paris Feb. 19, 1803. He became a political friend of Guizot, and minister of finance in Sept., 1836. He resigned in April, 1837, and was minister of the interior from Oct., 1840, until Feb., 1848. Died Nov. 5, 1867.

**Duchâtel** (PIERRE), [Lat. *Castellanus*], a liberal French prelate who was born in Burgundy about 1500. He became a thorough Greek scholar, assisted Erasmus, was a proof-reader at Bâle, studied at Rome, travelled in the East, was made bishop of Tulle by Francis I. (1539), bishop of Mâcon (1544), bishop of Orleans (1551), grand almoner of France (1547), and died at Orleans Feb. 2, 1552. He was a zealous advocate of the interests of the Gallican Church.

**Duché** (JACOB), D. D., an American Episcopal clergyman, born in Philadelphia in 1739. He gained distinction as an eloquent preacher, and was chosen chaplain to the first Continental Congress in 1774. He served as chaplain to several successive Congresses, but after the British occupied Philadelphia he abandoned the popular cause, and wrote to Washington a letter in which he urged him to submit and become a Tory. Duché soon fled to England, but he returned to Philadelphia in 1790. Died Jan. 3, 1798.

**Duchesne** (ANDRÉ), a learned French historian, born in Touraine in May, 1584. He became geographer and historiographer to the king. He wrote many valuable works, among which are "Ancient Historians of the Normans" ("Historiæ Normanorum Scriptores Antiqui," 1619) and "Contemporary Writers of the History of the Franks" (in Latin, 5 vols., 1636-41). Died May 30, 1640.

**Duch'ess** [Fr. *duchesse*], the title given to the wife of a duke or the female possessor of a duchy in her own right.

**Duchobor'zi** (i. e. "champions of the Spirit"), a sort of Quaker sect among the peasantry of Russia. They seceded from the Molokan sect in the eighteenth century, and are at present not very numerous. The sect was founded by one Ilarion Pobirochin, who taught the Trinity and the transmigration of souls, and considered himself, it is said, an incarnation of God. Their doctrinal system, however, is not well known, but their ethical teachings show a striking resemblance to those of Quakers. They refuse to take oaths, to serve in the army, to partake of the sacraments, and they reject a sacerdotal class, a liturgical service, etc. They were banished in consequence to the regions near the Sea of Azof. In 1839 they were exiled to the Trans-Caucasus, where they are now chiefly found.

**Du'cie**, EARLS of (United Kingdom, 1837), Barons Ducie (England, 1763), Barons Moreton (United Kingdom, 1837).—HENRY JOHN REYNOLDS MORETON, third earl, P. C., F. R. S., born July 26, 1827, was M. P. for Stroud 1852-53, and succeeded his father in 1853.

**Ducis** (JEAN FRANÇOIS). See APPENDIX.

**Duck** [from the verb *duck*, to "dive;" Lat. *anas*; Ger. *Ente*; Fr. *canard*], a name applied to many swimming birds of the family Anatidæ, belonging to the old genus *Anas*, which is now divided into many smaller genera. The true ducks, or Anatidæ, frequent fresh water, feeding on both animal and vegetable matter. They are grega-

rious, and the males are larger and handsomer than the females. They are shot for food and for sport, and in Europe they are caught in great numbers by nets. The common domesticated duck is a descendant of the mallard (*Anas boschas*), which is found wild in Europe, Asia, and America. Eight genera of true ducks are found in North America, and several species are common to the Old and New Worlds. The sea-ducks (*Fuligininæ*) differ from the foregoing in having a large flap or lobe under the hind toe. The eider-duck, the canvas-back, and the surf-duck are well-known examples of this sub-family. There are also tree-ducks, which approach the character of geese. The more important birds of this numerous group are described under their alphabetical heads.

The different breeds of domesticated ducks, with the probable exception of certain varieties in China and the neighboring countries, are all descended from the mallard, as above stated; but in domestication the ducks become polygamous, although they always live in pairs when wild. The male also ceases to care for his offspring; and even the females are sometimes not good mothers, so that it is always better to hatch ducks' eggs under a hen. The eggs, from their somewhat rank taste, are less prized than those of the hen; but the flesh of some breeds, such as the Aylesbury duck, is considered a great delicacy. Young ducks should be allowed free access to the water.

**Duck** [from the Dutch *dock*, "coarse linen cloth," "canvas," akin to the Ger. *Tuch*, "cloth"], a name given to a coarse, heavy linen fabric, highly glazed, which is used as a material for clothing by sailors, men employed in smelting-furnaces, and others. Duck is also a heavy cotton or linen fabric used for sailcloth, water-hose, etc.

**Duck-bill**, or **Water-Mole**, English name of *Ornithorhynchus paradoxus*, a monotrematous mammal of Van

**Ducking-Stool**, a contrivance formerly used in Great Britain and in some parts of the U. S. for the punishment of scolds. The most common form seems to have been that of a strong wooden chair attached to one end of a beam, which pivoted midway on a post planted in the ground at the edge of a pond or stream. The woman having been secured in the chair, the beam was worked up and down by a chain at the other end, and she was thus plunged into the water or "ducked." The practice of ducking originated towards the close of the fifteenth century, and very generally prevailed until the early part of the eighteenth, and in some places to a later date. At Leominster, England, a ducking-stool was in use as late as 1809.

**Duck River**, of Tennessee, rises in Coffee co., flows nearly westward through Middle Tennessee, and enters the Tennessee River in Humphries co. Length, about 250 miles.

**Duck-weed** (*Lemna*), a genus of endogenous plants placed by some botanists in the natural order Lemnaceæ, while others refer them to the order Araceæ. They are mostly floating plants, with unisexual flowers, without calyx or corolla, and with loose hanging roots. They are widely distributed over the world, and several species are found in the U. S., covering the surface of stagnant waters with their flat green fronds.

**Duclos** (CHARLES PINEAU), a witty French writer, born at Dinan Feb. 12, 1704. Having written several successful romances, he was admitted into the French Academy in 1747. He was appointed historiographer of France in 1753. Among his works are moral essays entitled "Considérations sur les Mœurs de ce Siècle" (1750) and "Secret Memoirs of the Reigns of Louis XIV. and Louis XV." Died Mar. 26, 1772.

**Ducrot** (AUGUSTE ALEXANDRE), born at Nevers Feb. 24, 1817, died in Paris Aug. 17, 1882. He was educated at Saint-Cyr, and was appointed lieutenant in the army Dec. 27, 1840, and general of division June 7, 1865. After the battle of Sedan he declined those favors which the French officers could obtain on their word of honor, and was incarcerated at Pont-à-Mousson. He escaped, and reached Paris. He commanded at Rueil, La Juchère, and Buzenval, and partook in the various sorties. After the conclusion of peace he wished to retire into private life, but was appointed commander-in-chief of the Eighth Army Corps, stationed at Bourges. In politics he opposed every scheme for the re-establishment of the empire. He wrote "La Journée de Sedan," "La Vérité sur l'Algérie," "Observations sur le système de la défense de la France," "Défense de Paris" (4 vols., Paris, 1875-78).

**Ductility** [Lat. *ductilitas*, from *ductilis*, "easy to be drawn"], a capability of being drawn out into a long and slender form. This term is applied almost exclusively to that property of certain metals which enables them to be elongated or drawn out into wire. The metals having the greatest ductility are gold, silver, platinum, and iron. A grain of gold may be drawn into 500 feet of wire, and a wire of platinum not exceeding a 30,000th of an inch in diameter has been obtained by placing a fine wire of platinum in the axis of a larger silver wire, then drawing the compound wire in the usual mode, and finally dissolving the silver by nitric acid. The ductility of glass (when melted or heated to a red heat) is almost unlimited. The ductility of many bodies is modified by temperature.

**Dudevant**, MADAME. See SAND, GEORGE.

**Dudley**, a parliamentary borough of England, is a part of Worcestershire, surrounded by the county of Stafford, 9 miles W. N. W. of Birmingham. It is well built, and is one of the chief seats of the iron-trade. Here are manufactures of glass, grates, fire-irons, nails, vices, chain-cables, etc. Near Dudley are the ruins of Dudley Castle, founded in 760 A. D. by Dudo, a Saxon prince. Mines of coal and iron and quarries of Silurian limestone are worked in the vicinity. Dudley returns one member to Parliament. Pop. of municipal borough in 1881, 46,233.



Duck-bill: *Ornithorhynchus*.

Diemen's Land and Australia. In its bill-like jaws, its spurs, its monotrematous character, its non-placental development, and its anatomy, it appears to be a connecting link between birds and mammals.

The duck-bill is the only animal of its genus. It is about fifteen inches long, with a brown fur. It has a sort of horny tooth near the base of each jaw or mandible, and the males have spurs on the hind legs. The female has no nipple, but the young (which are at first very slightly developed) draw the milk through a slit-like opening.

This animal inhabits ponds and quiet streams, where it swims about on the surface of the water with its head somewhat elevated, often diving for its food, which consists of insects and other small aquatic animals. It climbs trees with facility, and is sometimes seen in small parties on the limbs of trees near the water. It digs a burrow, often thirty feet long, in the river-bank, with one opening above and another below water. This burrow is projected in a serpentine course into the bank and ascends toward its termination, and at the end the nest—which is composed of dried grasses, leaves, weeds, etc. strewn over the floor—is built. (See ORNITHORHYNCHIDÆ.)

**Dudley** (BENJAMIN WINSLOW), M. D., LL.D., was born in Virginia in 1785. Receiving an imperfect preliminary education, he commenced the study of medicine in Lexington, Ky., and took his degree in the University of Pennsylvania in 1806. He went to Europe in 1810, and during his four years of absence studied with Sir Astley Cooper, Abernethy, Cline, Larrey, Dubois, Boyer, Marjolin, and others. In 1817, in conjunction with Blythe, Caldwell, Brown, Richardson, Drake, etc., he organized the medical department of the University of Transylvania, which was long the leading school of medicine in the West. In all its changes Dr. Dudley ever was emphatically its head; he occupied the professorships of anatomy and surgery, which required him to lecture nine times every week. He never had his equal W. of the mountains, and probably but one in America—viz. Valentine Mott. Few surgeons operated more cautiously, although Dr. Physick may have done so. None ever prepared his patients more thoroughly, none did more with the roller, prescribed simpler diet or fewer medicines than he. A distinguished English surgeon in London declared him to be "the lithotomist of the nineteenth century." It has been published that he cut a hundred times in succession for stone in the bladder, without a death or failure. The last report of his lithotomy cases—and they were all carefully selected—numbered 225, with an admission of some six deaths; unfortunately, however, the important particulars in regard to age, sex, when and where operated upon, condition of patient, etc., are generally omitted. Nevertheless, this report is a wonderful one. Dr. Dudley performed the lateral operation exclusively, and almost always with the gorget, an instrument now becoming obsolete. He was a small man, very active in his movements, strictly temperate, using cold bathing every morning, and is said never to have worn gloves or used an overcoat until injured by a fall on the ice in the streets of Lexington. He died Jan. 20, 1870. PAUL F. EVE.

**Dudley** (CHARLES EDWARD), a Senator, born in Staffordshire, England, May 23, 1780, emigrated to the U. S. in 1794. He was elected mayor of Albany in 1821, and a Senator of the U. S. for an unexpired term of four years in 1829. Died Jan. 23, 1841. The Dudley Observatory, at Albany, N. Y., was founded by his widow, who gave it \$70,000.

**Dudley** (HENRY BATE), English journalist and dramatist, born at Tenny-Compton 1745, died in London Feb. 1, 1824. He was educated at Cambridge and destined for the Church, but mostly devoted his time and energy to literature. In 1775 he founded the "Morning Post," and in 1780 the "Morning Herald," and both of these papers achieved a great and rapid success. Of his plays the most important are "Fletcher of Bacon" (1779), "The Woodman" (1791), "The Blackamoor Washed White," whose political innuendoes caused a complete uproar in the theatre (1776), "The Travellers in Switzerland" (1793), etc. He was an intimate friend of Garrick.

**Dudley** (JOSEPH) was born in Roxbury, Mass., July 23, 1647. He was appointed chief-justice of Massachusetts in 1686, chief-justice of New York in 1690, and was governor of his native province from 1702 to 1715. Died April 2, 1720.

**Dudley** (PAUL), F. R. S., a lawyer, a son of the preceding, was born Sept. 3, 1675. He was distinguished for eloquence and talents, became attorney-general of Massachusetts in 1702, and chief-justice in 1745; founded the Dudleyan Lecture at Harvard College. Died Jan. 25, 1751.

**Dudley** (THOMAS), born at Northampton, England, in 1576, served in Holland in Queen Elizabeth's army, and in 1630 came to Boston as deputy-governor of Massachusetts Bay under his son-in-law, Governor Bradstreet. He held the office twelve years. He was governor of the colony in 1634, '40, '45, and '50, and became major-general in 1644. Died July 31, 1653, at Roxbury, where he left an estate long held by his descendants.

**Dudley** (THOMAS U.). See APPENDIX.

**Du'el** [Lat. *duellum* (perhaps a contraction of *duorum bellum*, a "war of two"); Fr. *duel*; Ger. *Duell* and *Zweikampf*; It. and Port. *duello*; Sp. *duelo*] appears to have signified originally a trial by battle resorted to by two individuals, either for the purpose of determining the guilt or innocence of a person charged with a crime, or of deciding a disputed right. In more recent times it is used to denote a hostile meeting between two persons in consequence of an affront given by one to the other, and for the purpose of affording satisfaction to the injured party.

The practice of fighting duels as a means of deciding private differences seems to be of comparatively recent date. That it originated with the feudal system is sufficiently clear. We should not, however, confound two very different institutions—the appeal to arms as an alternative for the trial by ordeal, and the voluntary challenges

or defiance resorted to for the purpose of settling disputes supposed to involve the honor of gentlemen. This last custom was first elevated to the dignity of an established institution by Philip le Bel of France (1308).

In England, duelling does not appear to have prevailed until the latter part of the reign of Queen Elizabeth. At this period appeared the famous "Treatise of Honor" by Vincentio Saviolo, a fierce and punctilious Italian. He was a fencing-master by profession. His work, published in 1594—now little known—appears to have been adopted as a standard book of reference in cases of supposed insult. Saviolo resolves all quarrels into the *lie*—that is, he supposes the original insult to be followed by a regular series of replies and retorts, until one of the parties is reduced to give the *lie* direct; which, like the phrase "stupid youth" in some German universities, was immediately followed by the appeal to arms.

Henry II. of France issued an edict in 1547 prohibiting the public or judicial combat. This decree was caused by the death of his favorite La Chataigneraye from wounds received in the lists. The public duel survived longer in Italy. Its abolition in France was not followed by the good effects which the statesmen of those days probably anticipated from it. Private duels, conducted with a sanguinary spirit before unheard of, became very prevalent. Brantôme gives instances of duellists who prided themselves on advantages which they had taken of their opponents, and were not less esteemed in society for having done so; there were said to be regiments in the same service, the officers of which were bound to fight one another whenever they met. Lord Herbert of Cherbury mentions the honor in which the French ladies held the brave Balagny, a man with neither wit, figure, nor fortune, but whose merit consisted in the fact that he had killed eight or nine of his friends in single combat.

In the reign of Henry III. the custom of the seconds taking part in the quarrels of their principals seems first to have been established—a custom which did not cease till the beginning of the last century. When such practices were rife in all parts of France we can scarcely doubt the extraordinary assertions of writers of those times—that 120 gentlemen were killed in duels in a single province in six months; that in the reign of Henry IV. 4000 fell in two years; and that this mania cost France more gentle blood than thirty years of civil war. Henry IV. issued edicts against duelling; Louis XIII. proceeded against it with such severity that it is said wounded duellists were dragged from the field to the gibbet; but this extreme severity, as usual in such cases, appears to have had no good effect. In the minority of Louis XIV. the duke de Nemours, a prince of the blood, fell, with two of his seconds, in a quarrel with another grandee. Soon after this many noblemen and gentlemen of undoubted courage made a voluntary compact to abstain from duelling. This resolution was seconded by Louis XIV. when of age, in several edicts. It should be remembered to the honor of that monarch that he labored during his whole life to correct this abuse, and with considerable success. One of his expedients was the establishment of a court of chivalry, the members of which were the marshals of France, which was to decide on all questions in which a gentleman might conceive his honor to be involved. Killing in duels in France is now punishable as homicide, and a civil action lies on behalf of the friends of the man who has been slain.

The first attempt made in England to introduce legislative enactments for the suppression of duels is said to have taken place in 1713, when, after the famous duel of Duke Hamilton with Lord Mohun, a bill for that purpose was brought into the Commons, but lost on the third reading. A challenge to fight is now a high misdemeanor. In Scotland as late, it would appear, as the middle of the sixteenth century, licenses for duelling were granted by the Crown, and formed a source of revenue; killing in a duel without license was murder. The new codes of Bavaria and Prussia contain a number of provisions against duels, challenges, etc. In no country were duels more prevalent formerly than in Ireland. In France the period of the restored monarchy (1815–48) was one of those in which duels were most rife, not only among the military, but among civilians; but since 1848 they have greatly diminished. In Great Britain a heavy blow was aimed at duelling in the army by the article of war of 1844, rendering it an offence punishable by cashiering. For some years duels have been comparatively rare. (See "The Field of Honor," by THUMAN, 1884.)

In America the practice of fighting duels was formerly very common. But in more recent times duelling in any part of the U. S. is rarely heard of. It is not only made illegal by statute, but is forbidden in the army and navy by the Articles of War. REVISED BY J. THOMAS.

**Duen'na** [Sp. *duēna*], the chief lady-in-waiting on the queen of Spain. In a more general sense it is applied to a

woman holding a middle station between a governess and a companion, and appointed to take charge of young ladies.

**Du'er** (JOHN), LL.D., an able American jurist and legal writer, born at Albany, N. Y., Oct. 7, 1782, was a son of Col. William Duer. He practised law in New York City, whither he removed in 1820, and was elected a judge of the superior court of that city in 1849. Among his works is "The Law and Practice of Marine Insurance" (2 vols. 8vo, 1845-46). He succeeded Oakley as chief-justice of the superior court in 1857. Died Aug. 8, 1858.

**Duer** (WILLIAM ALEXANDER), a jurist, born in Dutchess co., N. Y., Sept. 8, 1780, was a brother of the preceding. His mother was a daughter of Lord Stirling. He was admitted to the bar in 1802, and became a partner of Edward Livingston in New Orleans, but returned to the city of New York about 1812. He was a judge of the supreme court of New York from 1822 to 1829. In the latter year he was chosen president of Columbia College. He was the author of a "Treatise on the Constitutional Jurisprudence of the U. S." (1856). Died May 30, 1858.

**Duet'** [It. *duetto* (from the Lat. *duo*, "two"); Fr. *duo*], a piece of music composed for two performers, either vocal or instrumental.

**Due West**, Abbeville, co., S. C. (see map of South Carolina, ref. 5-C, for location of county), is distinguished chiefly as a seat of learning. Erskine College and Erskine Theological Seminary, under the control of the Associate Reformed Presbyterians, are located here, as well as a female college. There are five public libraries in the town, which is near the line of the Columbia and Greenville R. R. Pop. in 1870, 400; in 1880, 449.

**Dufau** (PIERRE ARMAND), a French author, born at Bordeaux in 1795. He wrote several works on political economy and French history, and was an editor of several liberal journals of Paris, and is the author of several works on the education of the blind.

**Dufaure** (JULES ARMAND STANISLAS), a French orator and statesman, born at Saujon, in Charente-Inférieure, Dec. 4, 1798. He practised law at Bordeaux, and was elected to the Chamber of Deputies in 1834. He became an influential leader of the liberal party. After the formation of the republic in 1848 he was a moderate republican member of the Assembly, and was minister of the interior for about two months ending in December of that year. He filled the same office from June to Oct., 1849, and was driven from the public service by the *coup-d'état* of Dec., 1851, after which he gained great eminence at the bar. He was appointed minister of justice by Thiers in Feb., 1871. D. June 27, 1881.

**Dufay** (CHARLES FRANÇOIS DE CISTERNA), a French savant, born in Paris Sept. 14, 1698. He was the author of the theory of two kinds of electricity, vitreous and resinous. He wrote treatises on chemistry and other sciences. Died July 16, 1739.

**Duff** (ALEXANDER), D. D., LL.D., a Scottish Presbyterian missionary, born in Perthshire in 1806 or 1808. He was educated at St. Andrew's. He went to India in 1830, and labored there with great zeal and success for many years as a missionary. In 1839 he published a work "On India and the Missions." After the disruption of the Scottish Church in 1843 he was the chief agent of the mission which the Free Church maintains at Calcutta. He visited the U. S. in 1854, returned to India in 1855, and remained there until 1863. After his return to Scotland he became professor of evangelistic theology in the theological schools of the Free Church. D. Feb. 12, 1878.

**Duff'ferin**, EARLS OF (United Kingdom, 1871), Barons Dufferin and Clandeboye (Ireland, 1800), Viscounts Clandeboye (1871), Barons Clandeboye of Clandeboye (United Kingdom, 1850).—FREDERICK TEMPLE BLACKWOOD, LL.D., first earl, K. P., K. C. B., born in June, 1826, was under-secretary of state for India 1864-66, and for war 1866, succeeded his father in 1841, and was governor-general of Canada from 1872 to 1878. In 1879 he went to Constantinople as minister plenipotentiary, and exercised a great influence on Eastern affairs; in 1884 he became viceroy of India. He has written "Letters from High Latitudes," "Honorable Impulses," "Gushington," "Mr. Mill's Plan for the Pacification of Ireland," "Irish Emigration," etc.

**Duffield** (GEORGE), D. D., was born at Strasburg, Lancaster co., Pa., July 4, 1794, and was educated at the University of Pennsylvania. He was for many years a pastor of Presbyterian churches in Philadelphia, New York, and Detroit. He was an active leader of the "New School" movement. Died at Detroit, Mich., June 26, 1869.

**Dufour** (GUILLAUME HENRI), an able Swiss general, born at Constance Sept. 15, 1787. He entered the French army in 1809, and became a captain in the Swiss service about 1815. In 1847 he was chosen commander-in-chief

of the federal army raised to defend the integrity of the republic against the Roman Catholic Sonderbund. He quickly quelled the rebellion. In 1864 he was president of the Geneva convention. He published, besides others, a "Memoir upon Ancient and Mediæval Artillery" (1840) and "Permanent Fortification" (1850). D. July 14, 1875.

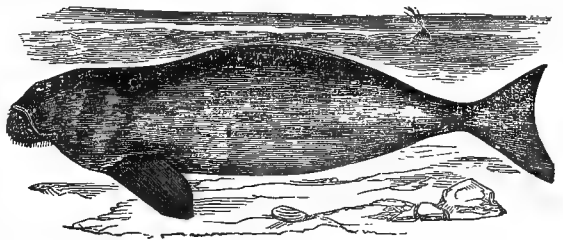
**Duganne** (AUGUSTINE JOSEPH HICKEY), an American poet and novelist, born in Boston in 1823. He published a volume of poems in 1856, and a prose work entitled a "Class-Book of Governments and Civil Society" (1859). Among his poems are "The Iron Harp" (1847) and "The Mission of Intellect" (1852). Died July 14, 1875.

**Dugas** (LOUIS ALEXANDER), M. D., LL.D., was born in Washington, Wilkes co., Ga., Jan. 3, 1806, received his medical education at the University of Maryland and in Europe, and was one of the original founders of the Medical College of Georgia (1832), in which he still is professor of surgery (1874). He has published many contributions in professional periodicals, was many years editor of the "Southern Medical and Surgical Journal" (Athens, Ga.), and is the author of a "New Principle of Diagnosis of Dislocations of the Shoulder-Joint" (1857).

**Dug'dale** (SIR WILLIAM), an English antiquary, born in Warwickshire Sept. 12, 1605. He was appointed blanchy-lion pursuivant-extraordinary in 1638, rouge-croix pursuivant-in-ordinary in 1640, became Chester herald in 1644, was a royalist in the civil war, and became Norroy king of arms in 1660, after the restoration of Charles II., and Garter king of arms in 1677. Dugdale and Dodsworth published an important work on English monasteries entitled "Monasticon Anglicanum" (3 vols., 1655-73). Among his other works are "Antiquities of Warwickshire" (1656), which is highly esteemed, and "Origines Juridicales" (1666). Died Feb. 10, 1686. (See "Life and Diary of Sir W. Dugdale," edited by HAMPER, 1827.)

**Dughet** (GASPARD), called CASPAR POUSSIN, a painter of French extraction, was born at Rome in 1613, and studied under his brother-in-law, Nicolas Poussin, whom he followed as a painter of the heroic landscape, excelling him in the grandeur of his distances, his development of the middle ground, rich foliage masses agitated by the wind, and the bold treatment of landscapes. His chief works are in Rome, where he died in 1675.

**Du'gong** [a word of Malay origin], a marine animal of the genus *Halicore*, belonging to the Sirenia. The du-



Dugong.

gong of the Indian seas is generally from eight to twelve feet long, though it is said to attain sometimes the length of twenty-five feet. The upper lip is thick and fleshy, and forms a kind of snout; the upper jaw bends downward almost at a right angle; the eyes are very small, with a nictitating membrane; the skin thick and smooth. In its internal structure it has considerable resemblance to the pachyderms, and it feeds chiefly on algae. It is also remarkable for the ventricles of the heart being entirely detached from each other. Its flesh is said to resemble beef, and is prized as food. The oil is recommended as a substitute for cod-liver oil. Various species occur in the Indian Ocean, the Red Sea, etc.

**Duguay-Trouin** (RENÉ), a celebrated French admiral, born at Saint Malo June 10, 1673. As captain of a privateer frigate he cruised about the high seas, and took many prizes from the English between 1690 and 1697. In the latter year he entered the royal marine with the rank of captain. He served with distinction in the war of the Spanish succession, which began in 1702. In 1707 he captured three English ships of war and about sixty transports of merchant vessels. Among his famous exploits was the capture of Rio Janeiro in 1711. He was raised to the rank of lieutenant-general in 1728. Died Sept. 27, 1736. (See his autobiographical "Memoirs," 1740, and English translation, 1742.)

**Du Guesclin** (BERTRAND), the greatest French general of his time, was born near Rennes about 1314. He fought against the English, who occupied many places in France, and he defeated the duke of Lancaster at Rennes

in 1366. In 1366 he commanded an army which fought for Henry de Trastamare against Peter the Cruel of Castile. He gained a victory over Peter, but he was defeated and taken prisoner by the English Black Prince in 1367. He paid a large ransom, and was soon released. Having been appointed constable of France in 1369, he defended the country against the English invaders, whom he expelled from nearly every province of France before 1375. Died July 13, 1380. (See FROISSART, "Chronicles;" JAMISON, "Life of Duguesclin," 1864.)

**Duhamel du Monceau** (HENRI LOUIS), an eminent French botanist and rural economist, born in Paris in 1700. Among his numerous useful works are a "Treatise on the Culture of Land" (1751), a treatise on the structure and physiology of plants entitled "De la Physique des Arbres" (1758), and "Elements of Agriculture" (1762). He was a member of the Academy of Sciences. Died Aug. 23, 1782.

**Duilius**, or **Duilius** (CAIUS), a Roman general who became consul in 260 B. C., during the first Punic war. He built ships of war after the model of one taken from the enemy, and was the first Roman who gained a naval victory over the Carthaginians, whom he defeated in the year 260 near the Lipari Islands.

**Duiliian Column**, the *Columna Rostrata* which was erected in the forum at Rome (as Quintilian states) to commemorate the naval victory of C. Duilius. (See **DUILIUS**.) Columns of this kind were called *rostrate*, from having the beaks of ships (*rostra*) projecting on each side. The restoration of the Duiliian column by Michael Angelo is now preserved in the Palazzo de' Conservatori on the Capitoline Hill, retaining in the pedestal a portion of the original inscription in archaic Latin. The inscription has been copied and printed, and may be found at the end of the fourth book of Duker's "Florus."

HENRY DRISLER.

**Duisburg**, a town of Rhenish Prussia, on the Ruhr and near the Rhine, 16 miles N. of Düsseldorf. It is an old town, and has a church founded in 1187. Here is a gymnasium, with a realschule and a female high school; and there are also manufactures of cotton and woollen fabrics, hosiery, porcelain, soap, etc. In the thirteenth century it was a city of the Hanseatic League. The railway which connects Cologne with Minden passes through this place, which has been declared a free port. Pop. in 1881, 41,242.

**Dujardin** (FÉLIX), a French naturalist, born at Tours in 1801. He wrote, besides other works, a "Natural History of Infusoria" (1841) and a "Manual of the Observer with the Microscope" (1843). Died in 1860.

**Dujardin**, or **De Jardyn** (KAREL), a skilful Dutch painter, born in Amsterdam about 1640, was a pupil of Berghem. He studied in Rome and painted pastoral landscapes. He made also a series of fifty etchings of rural subjects, which are much sought. During a second visit to Italy he died at Venice Nov. 20, 1678.

**Duke** [from the Lat. *dux* (gen. *ducis*), a "leader" or "general;" Fr. *duc*; It. *duca*; Sp. *duque*; Ger. *Herzog*], a title originally given in the Byzantine empire to military governors of provinces, and previous to the time of Theodosius regarded as inferior to that of count. Dukes in Germany became in course of time the chief princes of the empire. In France and Italy dukes form the second rank in the nobility, being next below princes; in England they are first. The title was introduced in the reign of Edward III., whose eldest son, the Black Prince, was made duke of Cornwall. In 1351, Henry Plantagenet, earl of Lancaster, became duke of Lancaster. The dignity thus created in these instances was not a dukedom by tenure; it has always remained a personal title only, hereditary according to the limitations of the patent. The Austrian archdukes and the Russian grand dukes are princes of the blood. The princes of the royal house of Saxony also have the title of duke. In Bavaria and Württemberg the side branches of the reigning family are called dukes in Bavaria and dukes of Württemberg. In Prussia the title was conferred in 1840 upon the Prince Hohenlohe Waldenburg Schillingsfürst (duke of Ratibor), and in 1861 upon Prince Hohenlohe Ochringen (duke of Ujest). Several reigning sovereigns of German states have the title of duke (Anhalt, Brunswick, Saxe-Coburg, Saxe-Meiningen, Saxe-Altenburg) or of grand duke (Baden, Hesse, Oldenburg, Saxe-Weimar, Mecklenburg-Schwerin, and Mecklenburg-Strelitz). Royal dukes in Great Britain are princes of the blood. British dukes have no territorial jurisdiction. The English dukes are next to the peers of the royal blood and the two archbishops of Canterbury and York, the first peers of the realm.

**Duke Centre**, on R. R. McKean co., Pa. (see map of Pennsylvania, ref. 2-D, for location of county). Pop. in 1880, 2068.

**Dulci'gno** [anc. *Olcinium*; Turk. *Olgoon*], a former town and seaport of European Turkey, lat. 41° 54' N., lon. 19° 12' E., on the Adriatic Sea, 14 miles W. S. W. of Scutari. It is the seat of a Catholic bishop, and has a trade in timber and oil, and was ceded to Montenegro in 1880. Pop. 7000.

**Dul'cimer** [Sp. *dulcemele*, from the Lat. *dulcis*, "sweet," and *melos*, "music"], the name of a musical instrument shaped like a triangle, and having brass wire strings, set in motion by rods of wood or iron. The form and nature of the instrument called by this name in the Bible are not known.

**Dül'ken**, a town in Germany, in the Rhine Province, 8 miles S. E. of Kempen. It has manufactures of cotton, silk, thread, ribbons, linens, and wire. Flax is extensively cultivated. Pop. 6540.

**Dulong** (PIERRE LOUIS), a French chemist and savant, born at Rouen Feb. 12, 1785. He discovered the chloride of nitrogen in 1812, and became an associate of Berzelius in chemical researches. In 1823 he was chosen a member of the Academy of Sciences. He wrote treatises on the theory of heat and on gases. Died at Paris July 19, 1838.

**Dulse**, the name given to many of the red-spored seaweeds. The *Rhodomenia palmata*, belonging to the Rhodomeniaceæ, grows on rocks on the coasts of Great Britain, the U. S., and other regions. It has sessile fronds of a dark-red or purple color, irregularly notched, and of a leathery texture. It is an important article of food in Iceland, where it is dried and stored in casks. It is abundant on all the British coasts, and is sometimes used as food, either raw or cooked. The *Schyzimenia edulis*, of the order Cryptonemiacæ, is also called dulse, and is used as food. This also occurs in the U. S. "Pepper dulse," of the genus *Laurentia* and order Laurentiaceæ, is eaten in Scotland. It grows on our Pacific coasts.

**Duluth'**, R. R. junction, a city, capital of St. Louis co., Minn. (see map of Minnesota, ref. 4-F, for location of county), is situated at the W. extremity of Lake Superior, 155 miles N. N. E. of St. Paul. It is one of the eastern termini of the Northern Pacific R. R., and the northern terminus of the St. Paul and Duluth R. R. It has several large grain elevators, a custom-house, a weather-signal office, and some of the largest private docks in the U. S. The harbor, entered by a ship-canal 250 feet wide, is landlocked, being formed by Minnesota and Rice's Points; the former is a scythe-shaped natural breakwater running out 7 miles into the lake. The harbor has been improved by the construction of several docks and piers, independent of the railroad company's works. The outer harbor is protected by a breakwater. Duluth has a blast-furnace, a large stove-factory, machine and car-building works, and other manufactures. In May, 1869, the site of the city was a forest—the old Duluth, at that time situated on Minnesota Point, consisted of a few cabins. The place is named after Capt. John Duluth, a French traveller, who visited this country and built a hut in 1760. Large quantities of wheat and flour are shipped from here. Pop. in 1869, 38; in 1870, 3131; in 1880, township, 160, village, 2645, city, 338, total, 3643.

**Dul'wich**, a suburb of London, England, in Surrey, 5 miles S. of London. It is pleasantly situated near Sydenham, and has numerous handsome villas and mansions. Here is Dulwich College, founded in 1619 by Edward Alleyne, a tragic actor, and a picture-gallery.

**Dumangas**, a town in Panay, one of the Philippine Islands, is near the sea. Rice abounds here. Pop. about 25,000.

**Dumas** (ALEXANDRE DAVY), a popular French novelist and dramatist, born at Villers-Cotterets (Aisne) July 24, 1803. He was not liberally educated. He went to Paris in 1823 to seek his fortune. In 1828 he produced "Henri III.," a drama, which was very successful. He was a writer of the romantic school, and was remarkable for literary fecundity. Even those of his novels which seem loosest and least substantial are distinguished by an abundance of fancy, a luxuriance of imagination, which can hardly fail to make a certain impression. He displayed much skill in the construction of plots. He understood the art of creating excitement in the minds of his readers, but this quality, to which his success is chiefly due, is also the principal argument against his books. Among his novels are "The Three Musketeers," with continuations (30 vols., 1844-45), and "The Count of Monte-Christo" (12 vols., 1845). It appears that a large part of the works published in his name were written by other men. A scandalous lawsuit divulged that he bought other people's manuscript and ably retouched it. His dramas have, indeed, a much greater literary value than his novels; "A Marriage under Louis XV." is still played with effect on all



European stages. Died at Puy, near Dieppe, Dec. 5, 1870.

**Dumas (ALEXANDRE)**, a novelist and comic writer, a son of the preceding, was born in Paris July 28, 1824. Abandoning the imaginative romance of his father, he applied himself to the study of society, and sought by verisimilitude and accurate delineation to make good his deficiency in dramatic construction. His works treat mostly of the relations between vice and morals. He saw that behind the complete abandonment to vice which characterizes certain portions of Parisian life the human heart is still beating its natural beat, smarting under all the misery to which vice is father. He saw that vice was often the natural and necessary consequence of the narrow and bigoted morals of society, and he made those truths heard. His first novels, "*La Dame aux Camélias*" (1848), "*Diane de Lys*" (1851), etc., were attended with great success, as also the plays which were founded on them. His best play is probably "*Le Demi-Monde*," first played at the Gymnase, but afterward incorporated with the repertoire of the Théâtre Français. His best known play is, perhaps, "*L'Etrangère*." Something of the most interesting he has written is his prefaces, original in dramatic respect, and not to be overlooked in moral respect. But there is something apboristic, obscure, and even self-contradictory, in his philosophy, just as there is something forced and patched up in his art. He makes the impression of an ambitious spirit looking out for a way toward sensation, rather than of a creative genius distributing its generous gifts. In 1872, in "*L'Homme-Femme*," a social tract, he attacked the French marriage system. In 1884 he became commander of Legion of Honor.

**Dumas (ALEXANDRE DAVY DE LA PAILLETIERE)**, a French general, born in St. Domingo Mar. 25, 1762, was the father of Alexandre Dumas (1803-70). His mother was a negress. He became a general of division, 1793, and defeated Austrian general Wurmser at Mantua, 1796; commanded the cavalry in Egypt in 1798. Died in 1807.

**Dumas (JEAN BAPTISTE)**, a French chemist and writer, born at Alais (Gard) July 14, 1800; became a resident of Paris, and married a daughter of the well-known chemist A. Brongniart. He acquired a European reputation by his discoveries in organic chemistry, isomerism, the law of substitutions, and other parts of chemical philosophy. In 1832 he was admitted into the Institute, and in 1834 he became professor of organic chemistry in the School of Medicine. His chief work is a "*Treatise on Chemistry Applied to the Arts*" (8 vols., 1828-45). He was minister of agriculture and commerce from Oct., 1849, to Jan., 1851, after which he became a senator. Died Apr. 11, 1884.

**Dumas (MATHIEU)**, COUNT, a French general, born at Montpeller Dec. 23, 1753. He fought for the U. S. in 1780-82, and was a moderate member of the Legislative Assembly in 1791. In the Reign of Terror he was condemned to death, but he escaped and went into exile. He became a general of division in 1805, and served at Ulm and Austerlitz. In 1812 he was intendant-general of the grand army in Russia. He wrote a narrative of the French campaigns from 1798 to 1807, entitled "*Précis des Evénements Militaires*" (19 vols., 1816-26), and "*Souvenirs*," an account of his career. Died Oct. 16, 1837.

**Dumbar'ton**, a county of Scotland, has an area of 297 square miles. It consists of two detached parts, one of them bounded on the E. by Loch Lomond, on the S. by the estuary of the Clyde, and on the W. by Loch Long; the other, much smaller, portion lying on both sides of the Forth and Clyde Canal. The surface is mountainous, and presents much picturesque scenery. Here are mines of coal and iron and quarries of limestone and slate. Capital, Dumbarton. Pop. in 1881, 75,333.

**Dumbarton**, a seaport of Scotland, the capital of the above county, is on the river Leven near its entrance into the Clyde, 13 miles N. W. of Glasgow. Steamboats ply regularly between this port and Glasgow. It has manufactures of glass, machinery, and ropes. Here, on a steep, rugged basaltic rock, rising to the height of 560 feet, stands the famous Dumbarton Castle, which has been a stronghold for many centuries. Pop. of parliamentary borough in 1881, 10,294.

**Dumb Cane** (*Dieffenbachia Seguina*), a West Indian shrub, so named from its acid juice causing the tongue to swell. It belongs to the order Araceæ. The root and the juice have medicinal properties, and are used in sugar-refining.

**Dumb'ness**, when associated with deafness, is usually the result of that deafness; the child being unable to hear, of course is unable to learn to talk; but there are at least two important varieties of dumbness which are the direct results of disease. The first of these is what physicians call

aphonia, a loss of voice which may be transient or permanent, functional or structural. Diseases of the larynx or of the nerves supplying it are frequent causes. A much more formidable disease or symptom is aphasia, which is a loss of language rather than of speech. It is a symptom of brain disease, the patient having the power to articulate, and even to think, but not to express his thoughts. (See DEAF AND DUMB, revised by E. M. GALLAUDET, LL.D.; also APHASIA and APHONIA.)

**Dum'dum**, a town of British India, in Bengal, 8 miles N. E. of Calcutta. Here are a cantonment and a cannon-foundry.

**Dumfries'**, a county in the S. of Scotland, is bounded on the S. by Solway Frith, on the E. by Cumberland, on the N. by Roxburgh, Selkirk, Peebles, and Lanark, and on the W. by Ayr and Kirkcudbright. Area, 1129 square miles. It is drained by the Annan, the Esk, and the Nith rivers. The surface is mountainous in the N. and undulating in the S. The valleys of the Annan, Esk, and Nith are fertile. The climate is, generally speaking, mild, with a mean temperature of 50° and a sufficient average rainfall. The soils are gravel, sandy loam, clay, or, along the rivers and their estuaries, rich alluvial deposits. The county is consequently essentially an agricultural one, and as such it takes a high rank. Large crops of oats, wheat, turnips, etc. are raised; also the cattle, and especially the sheep, enjoy a high reputation. Among the minerals of this county are coal, lead, silver, limestone, and new red sandstone. It is traversed by two railways extending to Edinburgh and Glasgow. The chief towns are Dumfries, Annan, Moffat, and Sanguhar. Pop. in 1881, 76,140.

**Dumfries**, a seaport of Scotland, the capital of the above county, is on the river Nith 9 miles from its entrance into Solway Frith, and 64 miles S. by W. from Edinburgh; lat. of Solway Frith light, 54° 48' N., lon. 3° 32' W. It is well built of red freestone, and is regarded as the capital of the south of Scotland. Two bridges across the river connect it with Maxwelltown. The high tides of Solway Frith bring vessels of sixty tons to the town, and larger vessels to the river quays near Dumfries. Here are manufactures of woollen cloths (tweeds), hosiery, hats, etc. Among the notable objects of the place is the tomb of Burns, who here officiated as exciseman. Pop. in 1881, 12,561.

**Dü'michen (JOHANNES)**, a German Egyptologist, born Oct. 15, 1833, studied at Berlin, and passed many years in archaeological research in the Valley of the Nile. He has written several treatises on Egyptian inscriptions.

**Dummer (DR. JEREMIAH)** was born at Boston, Mass., and graduated at Harvard in 1699, afterwards studying at Utrecht, where he obtained his doctor's degree. Unsuccessful as a preacher, he became the agent of Massachusetts in England (1710-21). He wrote with great ability in defence of colonial rights, and presented 800 volumes to Yale College. Died in England May 19, 1739.—His brother, Lieutenant-Governor WILLIAM DUMMER (1677-1761), founded Dummer Academy at Newbury, Mass. (opened in 1763).

**Dumont' (EBENEZER)**, an American general and lawyer, born at Vevay, Ind., Nov. 23, 1814. He became a brigadier-general of Union volunteers in Sept., 1861, and defeated the Confederates at Lebanon, Ky., in May, 1862. Having resigned his commission early in 1863, he was a Republican member of Congress for two terms (1863-67). Died April 16, 1871.

**Dumont (PIERRE ÉTIENNE LOUIS)**, a Swiss author, born at Geneva July 18, 1759. He was a Protestant minister, and emigrated in 1782 to St. Petersburg, where he preached eighteen months. In 1785 he removed to England, and became tutor to the sons of Lord Shelburne. He was intimate with Sir Samuel Romilly and Jeremy Bentham. He passed the years 1790 and 1791 mostly in Paris, where he associated with Mirabeau, whom he aided in composing his speeches and reports. Having returned to England in 1792, he edited and popularized Bentham's works on legislation—namely, "*Traité de Législation*" (1802) and "*Théories des Peines et Récompenses*" (1810). He died at Milan Sept. 29, 1829, leaving "*Souvenirs sur Mirabeau*" (1832). (See A. P. DE CANDOLLE, "*Notice sur la Vie et les Ecrits de M. Dumont*," 1829.)

**Dumont d'Urville (JULES SÉBASTIEN CÉSAR)**, a French navigator, born in Normandy May 23, 1790. He commanded an expedition sent in 1826 to obtain tidings of La Pérouse and to survey the coasts of New Zealand, New Guinea, etc. His discoveries were published in a work called "*Voyage of Discovery Around the World*" (22 vols., 1832-34). In 1837 he conducted an exploring expedition to the Antarctic regions. He discovered land, which he called Terre Adélie, in lat. 66° 30' S.; returned in 1840, and became a rear-admiral. Died May 8, 1842.

**Dumoulin** [Lat. *Molinus*], (CHARLES), an able French jurist, born in Paris in 1500. He was a Protestant, and was often persecuted for his religion. He wrote several legal works which were highly esteemed, and a book against the acts of the Council of Trent (published in 1564). Died in 1566.

**Dumouriez** (CHARLES FRANÇOIS), a French general, born at Cambrai Jan. 25, 1739. He served as an officer in the Seven Years' war, was quartermaster-general in Corsica in 1768, and was employed in a secret mission to Poland by the duke of Choiseul in 1770. Between 1776 and 1787 he was commandant at Cherbourg, where he planned and directed great naval works. In the Revolution he acted with the Girondists. He was appointed minister of foreign affairs in Mar., 1792, and acquired the confidence of the king. War having broken out between France and Austria, he resigned office in June, 1792, in order to take command of the army; invaded Flanders in Oct., 1792, and defeated the Austrians at Jemmapes in November, and conquered Belgium. According to Lamartine, he was at this period the virtual dictator of all parties. Instead of prosecuting the war with vigor, he plotted a counter-revolution, and negotiated secretly with the Austrians. The Convention, suspecting his design, sent four commissioners in April, 1793, to summon him to Paris. Dumouriez refused to obey the Convention, and when the commissioners ordered the soldiers to arrest him he sent them as prisoners to the Austrian camp. His army refused to support him in this defection, and he became a fugitive and exile. He died in England Mar. 14, 1823. (See "Mémoires de Dumouriez," by himself, 2 vols., 1794.)

**Dumpy Level**, a levelling instrument with a short telescope of large aperture, and compass-box beneath.

**Dun**, a Celtic or Gothic word signifying a "hill" or "height." It is the root of the names of many places (often modified into *Dum* or *Don*), as Dunkirk, Dumbarton, Donegal, etc.

**Duna Földvár**, a town of Hungary, in the county of Tolna, 28 miles N. of Tolna, on the Danube. Here is a Franciscan cloister and two match-factories. Pop. 12,720.

**Dunbar'**, a royal burgh and seaport of Scotland, in Haddingtonshire, is at the mouth of the Frith of Forth, 27 miles E. N. E. of Edinburgh; lat. 56° N., lon. 2° 29' W. The harbor will admit vessels of 300 tons. Dunbar is a fine old town, containing the remains of Dunbar Castle, which was the scene of many historical events. Dunbar has valuable herring-fisheries. Cromwell gained near this town a decisive victory over the royalists, Sept. 3, 1650. Pop. in 1881, 3649.

**Dunbar** (WILLIAM), an eminent Scottish poet, born at Salton about 1460. He was a Franciscan friar and itinerant preacher in his youth. He was employed by James IV. as clerk of embassy. Among his works are "The Thistle and the Rose" (1503), an allegory in honor of the marriage of James IV., and "The Merle and Nightingale," poems showing a rich fancy. He also wrote several poems of a religious character. Died about 1530.

**Duncan** (ADAM), VISCOUNT DUNCAN OF CAMPERDOWN, a British admiral, born at Dundee July 1, 1731. He entered the navy in 1746, and became a post-captain in 1761. In 1789 he obtained the rank of rear-admiral of the blue. With the rank of vice-admiral he was appointed commander of a fleet in the North Sea in 1795, and waged war against the Dutch. Many of his men mutinied and deserted in 1797, but finally returned to their duty. He defeated the Dutch near Camperdown in Oct., 1797, and was raised to the peerage for that service. Died Aug. 4, 1804.

**Duncan** (JAMES), an American officer, born in Sept., 1810, at Cornwall, N. Y., graduated at West Point 1834, and inspector-general U. S. A. Jan. 26, 1849, to which date he served in the artillery. He served chiefly at seaboard posts 1834-45; as assistant professor at the Military Academy 1855; in Florida war 1855-56, engaged at Camp Izard (wounded) and Olaklikaha; in removing Cherokees to the West 1838; in suppressing Canada border disturbances 1838-41; in the military occupation of Texas 1845-46; in the war with Mexico 1846-48, engaged at Palo Alto (brevet major), Resaca de la Palma (brevet lieutenant-colonel), Monterey (brevet colonel), Vera Cruz, Cerro Gordo, Amazoque, San Antonio, Churubusec, Molino del Rey, Chapultepec, and the city of Mexico; and on inspection duties 1849. Died July 3, 1849, at Mobile, Ala., aged thirty-six.

GEORGE W. CULLUM.

**Duncan** (JAMES HENRY), LL.D., born at Haverhill, Mass., Dec. 5, 1793, graduated at Phillips (Exeter) Academy and Harvard College 1812, admitted to Essex bar 1815, and entered upon the practice of law in Haverhill, Mass., where he resided till his death, Feb. 8, 1868. He was a member of the Massachusetts general court 1827-28, 1837-38, and

1857; member of governor's council 1839-40; from 1848 to 1852 member of Congress from the Essex district, Mass.; for many years chairman of the board of managers of the American Baptist Missionary Union, a trustee of Newton Theological Institution, and a fellow of Brown University. He was active and influential in all that concerned the welfare of his town, his Church, and the general interests of humanity.

**Duncan** (JOHN), born at Gilcomston, near Aberdeen, Scotland, 1796, died in Edinburgh Feb. 26, 1870. He graduated from the University of Aberdeen in 1814, studied theology in Edinburgh, and was licensed to preach in 1825. Having been converted in 1826 under the influence of Cæsar Malan, he settled in 1831 at Glasgow, but went in 1841 to Pesth as missionary among the Jews, and was in 1843 appointed professor of Hebrew and Oriental language in Edinburgh. (See DAVID BROWN, "Life of John Duncan," 1872, and "John Duncan in the Pulpit and at the Communion-Table," 1874; also WILLIAM KNIGHT, "Colloquia Peripatetica," 1870.)

**Duncan** (JOHNSON K.), a general, born in Pennsylvania in 1826, graduated at West Point in 1849. He entered the service of the Confederate States in 1861, and took command of Forts Jackson and St. Philip, on the Mississippi below New Orleans. After the fleet of Farragut had passed these forts Duncan surrendered them, April 29, 1862. Died in Jan., 1863.

**Duncan** (JOSEPH), an American legislator, born in Kentucky about 1790. He served in the war of 1812, after which he removed to Illinois. As a member of the senate of Illinois he originated a law establishing common schools. He was chosen a member of Congress in 1827, and governor of Illinois in 1834. Died Jan. 15, 1844.

**Duncan** (THOMAS), A. R. A., a Scottish painter, born in Perthshire in 1807. He painted portraits and historical and fancy subjects with success. He was elected an associate of the Royal Academy of London in 1843. His works are mostly illustrative of Scottish history, life, and character. Died in 1845.

**Duncan** (WILLIAM CECIL), D. D., was born in New York City Jan. 24, 1824, graduated at Columbia College in 1843, and studied at Hamilton Theological Seminary. He was ordained to the Baptist ministry in 1848. He was for some time editor of the "South-western Baptist Chronicle," and for three years professor of Greek and Latin in the University of Louisiana. During his pastorate over the Coliseum place Baptist church, New Orleans, he was compelled (1861) to leave the South for a considerable time. He was the author of several volumes of religious and denominational literature. Died May 1, 1864.

**Dun'cansby Head** (anc. *Berubium*), a promontory forming the N. E. extremity of Scotland and of Caithness, is 1½ miles E. of John o' Groat's House; lat. 58° 40' N., lon. 3° 8' W.

**Dun'ciad, The**, a keen poetical satire, written by Alexander Pope, and published complete in four books (1742). It is a fierce onslaught on his numerous detractors, who have thereby obtained an unenviable immortality.

**Dunck'er** (MAXIMILIAN WOLFGANG), a German historian, born in Berlin Oct. 5, 1811. He made his studies in his native city and at Bonn, but in the latter place becoming implicated in the democratic movements, he was arrested and condemned to six years' imprisonment, but was very soon pardoned. He became professor of history at Halle in 1842, a member of the German national assembly in 1848, professor at Tübingen in 1857, and received an appointment as keeper of the Prussian archives in 1861. Among his works are "Origines Germanicæ" (1840), a "History of Antiquity" (1852), his principal work, translated into English, "Die Krisis der Reformation" (Leipzig, 1846), "Zur Geschichte der deutschen Reichsversammlung" (1849), "H. von Gagern" (1850), "Vier Monate answärtiger Politik" (1850). On Jan. 1, 1875, he retired into private life, having accomplished the incorporation of the archives of Hesse, Nassau, and Hanover with those of Prussia.

**Dun'combe** (THOMAS SLINGSBY), an English radical, born in 1797, was elected to Parliament in 1826. He represented Finsbury from 1834 to 1861, advocated the vote by ballot, extension of suffrage, and other reforms. He was a witty, fluent, and popular speaker. He made in 1858 a motion which resulted in the relief of the Jews from political disabilities. Died Nov. 13, 1861.

**Dundalk'**, a seaport-town of Ireland, the capital of the county of Louth, is at the mouth of Castletown River and on Dundalk Bay, 50 miles N. of Dublin, with which it is connected by railway. It has a safe harbor, which admits vessels drawing sixteen feet of water. The chief articles of export are linen, timber, iron, dairy products,

and live-stock. Here are manufactures of soap, pins, leather, starch, etc. Edward Bruce took Dundalk in 1315, and held his court here until he was killed in 1318. Pop. in 1881, 11,337.

**Dundas**, a post-town of Wentworth co., Ont., Dominion of Canada, is at the W. end of Lake Ontario, and at the head of the Desjardins Canal, on the Great Western R. R., 7 miles W. of Hamilton. It has manufactures of machinery, axes, combs, woollens, castings, soap, etc. It has many fine buildings. Pop. in 1881, 3709.

**Dundas** (Sir JAMES WHITLEY DEANS), a British admiral, born Dec. 4, 1785. He commanded a fleet in the Black Sea in 1854, during the war against Russia. Died Oct. 3, 1862.

**Dundas' Strait**, Northern Australia, separates Melbourne Island from Coburg Peninsula, and is 18 miles wide.

**Dundee** [Lat. *Taodunum*], a royal burgh and seaport of Scotland, in the county of Forfar, is finely situated on the N. side of the wide estuary of the Tay, 10 miles from the sea and 50 miles by water N. N. E. of Edinburgh; lat. 56° 27' 36" N., lon. 2° 57' 45" W. The principal public edifices are the royal exchange, opened in 1856; the corn exchange; St. Paul's church, with a tower and spire 217 feet high; the infirmary and town-hall. Here is a remarkable tower 156 feet high, built in the twelfth century, to which three parochial churches under one roof have been annexed. Dundee has a theatre, a public library, and an asylum for the insane. It is the chief seat in Great Britain of the manufacture of coarse linen fabrics—namely, osnaburges, sheetings, ducks, dowlas, drills, and canvas. It has also manufactures of jute, confectionery, and machinery. The annual value of the flax, hemp, and jute manufactures of Dundee is about £3,000,000. Dundee has an excellent harbor, and extensive docks which cost £600,000. It is connected with Edinburgh by a railway, the passengers of which cross the Friths of Tay and Forth by large steamboats. Here are a number of shipbuilding yards. Pop. in 1881, 140,075.

**Dundee**, R. R. junction, Monroe co., Mich. (see map of Michigan, ref. 8-K, for location of county). It has paper and planing-mills. Pop. in 1880, 932.

**Dundee**, on R. R., Yates co., N. Y. (see map of New York, ref. 5-E, for location of county), about 12 miles from Watkins and 32 miles N. by W. from Elmira. It has an academy, furnaces, mills, etc. Pop. in 1870, 730; in 1880, 1025.

**Dundonald**, EARLS OF (1669), Barons Cochrane (Scotland, 1647).—THOMAS COCHRANE, tenth earl of Dundonald, born Dec. 14, 1775, died Oct. 30, 1860, succeeded his father in 1831, and is famous for his daring naval exploits in the service of England, Chili, Brazil, etc., and for the injustice done him by England.

**Dune** [from Ang.-Sax. *dun*, a "hill"], the name given to low mounds of movable sand found on the sea-coasts. They are formed by deposits of fine sand borne forward by the wind till it is obstructed by large stones or other obstacles, around which it accumulates. Dunes often cause great damage by their inroads, the department of Landes in France having been nearly overwhelmed by them.

**Dunedin**, a seaport-town of New Zealand, the capital of the province of Otago, is on the S. E. coast of the Middle Isle; lat. 45° 50' S., lon. 170° 36' E. It was founded in 1848, since when it has increased rapidly. It is the seat of an Anglican bishop. The chief export is wool. Pop. in 1881, 24,372.

**Dunfermline**, a handsome royal burgh of Scotland, in Fifeshire, is on a long ridge 3 miles from the Frith of Forth and 15 miles N. W. of Edinburgh. It derives its prosperity chiefly from manufactures of linen, cotton, worsted, iron, etc., and is said to be unrivalled by any British town in the manufacture of damask linen. Here are also several iron-foundries, collieries, dye-works, and bleaching-works. Dunfermline was a town as early as 1100 A. D. Malcolm Canmore founded here about 1080 a Benedictine abbey, of which some ruins are still visible. Here was also a regal palace of the Stuarts, now ruined. Robert Bruce was buried at Dunfermline. Pop. in 1881, 17,084.

**Dunfish**, in the U. S. a name given to codfish cured in such a manner as to give them a "dun" color. Fish for "dunning" are caught in February or in early spring. The fish are taken in deep water, are split and incompletely salted, then laid in a pile for two or three months in a dark place, and covered with salt hay, eel-grass, etc., and pressed by some weight. They are then uncovered and closely packed for several months, when they are ready for use. They acquire a peculiar flavor, which is greatly liked by many. The Isles of Shoals (Me. and N. H.) are a principal seat of this method of curing.

**Dungarvan**, a seaport and bathing-place of Ireland, in the county of Waterford, is on Dungarvan Bay, 40 miles E. N. E. of Cork. Its harbor admits only small vessels. It has three convents, and an old castle now used as a barrack. Pop. 7700.

**Dung Beetle**, a name given to many coleopterous insects of the family Scarabæidæ and of the genera *Copris*, *Phæneus*, *Aphodius*, *Geotrupes*, *Bolbocerus*, *Trox*, and others. Some of these insects enclose their eggs in pellets or globes of manure. There are many species in America, Europe, Asia, and Africa. The sacred scarabæus of the Egyptians was a true dung beetle, the *Ateuchus sacer* of the Old World.

**Dung'lison** (ROBLEY), M. D., LL.D., was born at Keswick, England, Jan. 4, 1798, received his medical education at London and Erlangen, was professor of medicine in the University of Virginia (1824-33), of therapeutics in the University of Maryland (1833-36), and of the institutes of medicine (1836-68) in the Jefferson Medical College, Philadelphia. He published about twenty volumes, among which are "Human Physiology" (1832), a "Medical Dictionary" (1833), "Therapeutics and Materia Medica" (1836). Died April 1, 1869.

**Duniway** (ABIGAIL SCOTT). See APPENDIX.

**Dunkeld**, a small town of Scotland, in Perthshire, is on the Tay, 15 miles N. N. W. of Perth. It is in a vale enclosed by mountains. A cathedral was built here in 1830, several centuries after the foundation of Dunkeld, which became the seat of a bishop in 1127. Here is the mansion of the duke of Athole, with the largest and finest park in Scotland, including twenty square miles of larch woods.

**Dunkers**, **Dunk'ards**, or **Tunk'ers** [from the Ger. *tunken*, to "dip"], a sect of German-American Baptists, called by themselves **Brethren**, said to have been founded at Schwarzenau in Westphalia by one Alexander Mack in 1708, and named from their manner of baptism by trine immersion of believers. Having been driven from Germany by persecution between 1719 and 1729, they settled in Pennsylvania, and subsequently in Ohio, Indiana, Maryland, Virginia, and several other States. Their doctrines are similar to those of the Mennonites, and in the simplicity of their dress and speech they somewhat resemble the Society of Friends. From the Dunkers as a sect must be distinguished the Seventh-Day Dunkers, commonly called GERMAN SEVENTH-DAY BAPTISTS.

**Dunkirk** [Fr. *Dunkerque*], a fortified seaport-town in the extreme northern part of France, is in the department of Nord, and on the Strait of Dover, about 40 miles N. W. of Lille and 46 miles E. of Dover; lat. 51° 3' N., lon. 2° 22' E. It is the northern terminus of the Railway du Nord. It is well built, with wide and well-paved streets, and is defended by a citadel and ramparts. The harbor is shallow, but the roadstead is large and safe. Dunkirk has several fine churches, a college, a theatre, a public library, and a town-hall; also manufactures of soap, starch, cordage, and leather, with metal foundries and shipbuilding yards. It became a free port in 1826, since which it has had an active trade in wines, liqueurs, etc. A church is said to have been built here in the seventh century among the sandhills or dunes, and hence its name, which signifies "church of the dunes." Dunkirk was taken by the English in 1658, but was sold to the French king by Charles II. in 1662. Pop. in 1881, 37,528.

**Dunkirk**, city, port of entry, and R. R. centre of Chautauqua co., N. Y. (see map of New York, ref. 6-B, for location of county), is on Lake Erie, 40 miles S. W. of Buffalo. It is the western terminus of the Erie R. R., which connects it with New York City, 459 miles distant. It has a good harbor and an advantageous position for trade. It has extensive locomotive-works, a foundry, a coal and grain elevator, and various mills and factories. The city is lighted by gas, and supplied with water from Lake Erie by the Holly system, and has an orphan asylum, an opera-house, a library and free reading-room, etc. Pop. in 1870, 5231; in 1880, 7248.

**Dunlap**, on R. R., Harrison co., Ia. (see map of Iowa, ref. 5-C, for location of county). Pop. in 1880, 1246.

**Dunlap**, capital of Sequatchie co., Tenn. (see map of Tennessee, ref. 7-G, for location of county), on the Sequatchie River, about 94 miles S. E. of Nashville. Pop. in 1880, 133.

**Dunlap** (WILLIAM), an American painter and writer, born at Perth Amboy, N. J., Feb. 19, 1766. Among his paintings are "Christ Rejected" (1821) and "Calvary" (1828). He wrote, besides other works, a "Life of Charles Brockden Brown" (1827), "History of the Rise and Progress of the Arts of Design in the U. S." (1834), and a "History of the American Theatre" (1833). Died Sept. 28, 1839.

**Dun-le-Roi**, a town of France, department of Cher. 16 miles S. E. of Bourges. It is an iron-mining district. Pop. in 1881, 4555.

**Dun'lin**, called also **Sea Snipe** and **Oxbird** (*Tringa variabilis*), is a species of sandpiper found in most parts of North America and Europe. It is eight inches long, of a black, rufous, and gray color on the back, and black and white beneath. Audubon calls it the red-backed sandpiper (*Tringa alpina*). They are nimble-limbed birds, always on the move, keeping close to the water's edge, running along the sands pecking eagerly at molluscs and worms.

**Dun'net Head**, a rocky peninsula of Scotland, 100 to 600 feet high, in Caithness, is the most northern point of Great Britain. Here is a lighthouse 340 feet above the sea.

**Duns Scot'us** (JOHN), surnamed THE SUTLE DOCTOR, a celebrated theologian and scholastic philosopher, was born about 1274. He is claimed as their countryman by the Scots, the English, and the Irish. He was of gentle blood, studied at Oxford, became a Franciscan friar, and in 1296 professor of theology at that place. In 1301 he removed to Paris, where he taught theology with great distinction. He wrote many works on theology and metaphysics, and was a realist in philosophy. He opposed the teachings of Thomas Aquinas, and tried to identify their consequences with Averroism, which denied individual immortality and the freedom of the will. He held that the faculties of the soul are not subjectively distinct from each other. In theology he favored the doctrine of the immaculate conception of the Virgin Mary. He was the founder of a school called Scotists, who maintained for several centuries a controversy with the Thomists (*i. e.* the disciples of Aquinas). He died at Cologne Nov. 8, 1308.

**Dun'stan**, SAINT, an English prelate, born at Glastonbury in 925 A. D. He was a man of extraordinary abilities, and gained renown by his ascetic piety. He acquired the favor of Edred, who began to reign in 946 A. D., and he took a prominent part in the government during his reign. He was banished by Edwy, but obtained the chief power under Edgar, who became king in 959, and appointed Dunstan archbishop of Canterbury. Dunstan promoted the papal supremacy, enriched and exalted the monks, and compelled the clergy to practise celibacy. He was deprived of power on the accession of Ethelred in 978. Died May 19, 988 A. D.

**Dun'ster** (HENRY), the first president of Harvard College, was born in Lancashire, England, and educated at Magdalen College, Cambridge. He came to New England in 1610, and entered upon his presidency Aug. 27th of that year. In 1654 he was compelled to resign, in consequence of having borne public testimony against the baptism of infants, for which offence he was afterwards tried by a jury and placed under bonds. Still later, he was again presented by the grand jury for neglect to have one of his children baptized. He was esteemed for learning and piety. He assisted in the preparation of the "New England Psalm-book" (1640). Died at Scituate, Mass., Feb. 27, 1659. (See "Life of Dunster," by J. CHAPLIN, D. D., 1872.)

**Dun'ton** (JOHN), an eccentric English writer and dissenter, born at Graffham May 4, 1659. He opened a bookstore in London about 1685, but failed in business. He wrote, besides other works, "The Athenian Mercury" (20 vols., 1690-96), the "Dublin Scuffle" (1699), and "The Life and Errors of John Dunton, with the Lives and Characters of a Thousand Persons," containing an account of a visit to Boston and Salem, and sketches of ministers and prominent citizens of New England in 1685 (1705; new ed. 1818). Died in 1733.

**Dunwoody** (SAMUEL), a minister of the Methodist Episcopal Church South, born in Pennsylvania Aug. 3, 1780. He was forty-eight years a minister in the South Carolina Conference, which extended into North Carolina and Georgia. He was a bold pioneer of Methodism, a powerful controversialist, an original thinker, and a successful preacher. He organized the first Methodist church in Savannah, Ga., in 1807. He died in South Carolina July 8, 1854. T. O. SUMMERS.

**Duodec'imals** [from the Lat. *duodecim*, "twelve"], called also **Cross-Multiplication**, is the name given to a method by which the area of a rectangular surface is calculated when the length and breadth are stated in feet, inches, and lines. It is principally used by artificers in finding the contents of their work. The operation is performed by substituting the duodecimal scale of notation for the decimal.

The **DUODECIMAL SCALE** is the scale of notation obtained by the division of unity into twelve equal parts. Computation in this manner has some advantages, as 12 may be divided into so many equal parts—viz. 2, 3, 4, and 6; but

the decimal scale, which coincides with our system of notation, is now universally preferred.

**Duodec'imo** [from the Lat. *duodecim*, "twelve"], a term signifying "twelfth," is applied to a book when every sheet being six times folded forms twelve leaves. It is usually abbreviated into 12mo.

**Duode'num** [from the Lat. *duodeni*, "twelve," because it is about twelve finger-breadths long in man], that part of the small intestine which is nearest the stomach. In man it is eight or ten inches in length. It is the widest, shortest, and most fixed part of the small intestine, having no mesentery. It is somewhat horseshoe-like in form, the convexity to the right. It receives the secretions of the liver and the pancreas. Its muscular fibres are more numerous than in the rest of the small intestine.

**Dupanloup** (FÉLIX ANTOINE PHILIBERT), a French bishop, born at Saint-Félix, in Savoy, Jan. 3, 1802. He studied in Paris, and was ordained a priest in 1825. In 1827 he became confessor to the count of Chambord, in 1828 catechist to the Orléans princes, and in 1830 almoner to Madame la Dauphine, but retired from all those positions after the Revolution, and was appointed superior of the diocesan seminary of Paris. He became bishop of Orléans in 1849, and was admitted into the French Academy in 1854. He belonged to the Gallican party, but submitted to the decisions of the council of the Vatican. He fought ardently for free education, and wrote, besides other works, a popular treatise on education (3 vols., 1855-57). Among his other writings, which are very numerous, the most noticeable are "Le Mariage chrétien" (1868, 4th ed. 1875), "Histoire de notre Seigneur Jesus Christ" (1869), etc. In 1871 he was elected a member of the National Assembly. He was nominated archbishop of Paris in 1871, but declined that office. D. at Paris Oct. 11, 1878.

**Duperré** (VICTOR GUY), BARON, a French admiral, born at La Rochelle Feb. 20, 1775. He gained the rank of vice-admiral in 1826, and commanded the fleet which aided the army to conquer Algiers in 1830, and was made admiral. Died Nov. 2, 1846.

**Duperrey** (LOUIS ISIDORE), a French navigator and hydrographer, born in Paris in 1786. He conducted an exploring expedition in 1822 to the islands of the Pacific. He surveyed the coasts of New Zealand and parts of Australia, returned in 1825, and published a "Voyage Round the World in the Corvette La Coquille" (1826-30).

**Dupetit-Thouars** (ABEL AUBERT), a French admiral, born Aug. 3, 1793, was the son of ABEL AUBERT DUPETIT-THOUARS, captain of the ship *Le Tonnant*, destroyed in the battle of Aboukir, and nephew of LOUIS MARIE AUBERT DUPETIT-THOUARS, botanist (born Nov. 11, 1758, died in 1831), who explored the botany of Africa, Madagascar, etc. He was appointed commander of the naval forces in the Pacific Ocean, and seized the island of Tahiti in 1842, but this act was disavowed by his government. He published a "Voyage Round the World" (10 vols., 1841-49). Died Mar. 17, 1864.

**Dupin** (ANDRÉ MARIE JEAN JACQUES), a French lawyer and statesman, born at Varzy, in Nièvre, Feb. 1, 1783. He gained distinction as the advocate of Marshal Ney, Béranger, and other persons tried for political offences. In 1826 he was elected a member of the Chamber of Deputies, in which he acted with the liberals. He promoted the revolution of 1830 and the accession of Louis Philippe. He was chosen president of the Chamber of Deputies eight times between 1832 and 1848, and was admitted into the French Academy in 1832. In Feb., 1848, he supported the count of Paris as the successor to Louis Philippe, but he recognized the republic which was then formed. He was a prominent member of the Constituent Assembly, and was president of the Legislative Assembly in 1849. In 1857 he was appointed procureur-général of France. He published, besides other works, "Mémoires et Plaidoyers" (20 vols., 1806-30). Died Nov. 10, 1865.

**Dupin** (FRANÇOIS PIERRE CHARLES), BARON, a French geometer, a brother of the preceding, was born at Varzy Oct. 6, 1784. He visited England in 1816, and published "Travels in Great Britain" (6 vols., 1820-24). He became professor of mechanics at the Conservatoire des Arts et Métiers in 1810. He wrote on geometry and mechanics, and did much to advance the useful arts and improve the condition of the laboring people. In the legislature his labors were extensive. He was an Orleanist. Died Jan. 18, 1873. He wrote a great number of treatises and pamphlets on the condition of the working classes.

**Duplèix** (JOSEPH), MARQUIS, a French governor, born about 1695. He amassed a fortune by commercial operations in India, and in 1742 was appointed governor of Pondicherry and all the French possessions in India. He formed the project of founding a European empire in that

country, and soon made himself master of the Carnatic, partly by fighting and partly by political intrigues. He was opposed by the English general Clive, who defeated the French in several battles. Dupleix was removed from the command in 1754, and returned to France, where he died in 1763.

**Du Plessis-Mornay** (PHILIPPE), born at Buh, Normandy, Nov. 5, 1549, died at La Forêt-sur-Sèvre, Nov. 11, 1623, one of the leaders of the French Protestants and an intimate friend of Henry IV., for whose cause he fought with sword and pen. After the conversion, however, of Henry IV. to Romanism the friendship cooled off. Several of his treatises have been translated into English: "Discours de la vie et de la mort" (London, 1576) and "Traité de l'Eglise" (London, 1576). One of his most famous treatises is "Le mystère d'iniquité," a violent attack on the papacy, written in the latter part of his life.

**Dupon'ceau** (PETER S.), LL.D., a French lawyer and scholar, born in the island of Rhé June 3, 1760. He emigrated to the U. S. in 1777, and served in the army as aide-de-camp to Baron Steuben. He practised law in Philadelphia with distinction, and was president of the American Philosophical Society. He wrote on philosophy and other subjects. In 1838 he published a work on Indian languages. Died April 1, 1844.

**Dupont** (HENRY). See APPENDIX.

**Dupont** (HENRY A.). See APPENDIX.

**Dupont** (PIERRE), a popular French song-writer, born at Lyons April 23, 1821. He composed the words and airs to his poems at the same time. Among his works are "The Two Angels," a poem (1842), "Song of Bread," and "Song of the Workers." Died at Lyons July 25, 1870.

**Du Pont** (SAMUEL FRANCIS), U. S. N., born of French descent Sept. 27, 1803, at Bergen Point, N. J., entered the navy as a midshipman Dec. 19, 1815, became a lieutenant in 1826, a commander in 1842, a captain in 1855, and a rear-admiral in 1862. To attempt to give, within the limits assigned in this volume to biography, even a brief outline of the services of one whose naval life of fifty years was but a record of constant and continuous devotion to the navy and the country, would indeed be vain. The writer must therefore restrict himself to saying that while in command of the Cyane on the W. coast of Mexico during our war with that republic, Du Pont added to a name already distinguished a reputation for ability, sound judgment, discreetness, and daring which all his after service tended greatly to strengthen; so that when the first act of the drama of the civil war opened with the fall of Fort Sumter, Du Pont stood prominently forward, by the side of Farragut and Foote, as one to whom might safely be entrusted the honor and welfare of his country in this her hour of need. As soon, therefore, as the government had decided "to seize and occupy one or more important points on our Southern coast," it confided to his care that part of the joint army and navy expedition organized for this purpose, upon which the success of the whole depended; and when he unfurled his flag from the masthead of the Wabash, the desk of the secretary of the navy was filled with applications from officers asking to serve under him; for all were anxious to follow whithersoever Du Pont might choose to lead. How well founded their confidence the result shows; for on the evening of the ninth day after sailing from Hampton Roads, Du Pont, with his fleet of fifteen vessels, was in possession of Port Royal Bay, one of the finest and largest harbors of the South, after a brilliant and successful engagement of four hours with two strong forts splendidly garrisoned and mounting forty-three guns, all but four of which were of heavy calibre. He now established a rigid blockade of the coast, pushed his vessels into almost every bay, inlet, and river of South Carolina, Georgia, and Florida, and took possession of several strong places which served as *points d'appui* for the army.

On the 7th of April, 1863, at 3 P. M., he engaged Fort Sumter with eight iron-clads, and, not having silenced the fort at 4.30 P. M., made signal then "to withdraw from action," intending to renew the engagement on the following morning; but, finding that many of his vessels were injured, and one, the Keokuk, sunk, he became convinced that to do so would be "to convert failure into disaster," and abandoned his design, expressing to the department his opinion that Charleston could not be taken "by a purely naval attack"—a judgment that the events of the next two years amply vindicated and sustained. In July, 1863, being relieved from the command of the South Atlantic fleet, he returned to his home, where he died on the 23d of June, 1865, sincerely regretted by the whole navy.

A thorough seaman, an accomplished officer, a Christian gentleman, he was beloved by all who came in contact with him, and best by those who knew him best. His mind,

like his stature, was above that of ordinary men, his person graceful and commanding, his countenance handsome, thoughtful, and interesting; and "in looking upon him," as Tacitus says of the wise and virtuous Agricola, "you would have been easily convinced that he was a good man, and you would have been willing to believe him a great one."

FOXHALL A. PARKER.

**Dupont de l'Étang** (PIERRE), a French general, born at Chabannais July 14, 1765. He served with distinction at Jena (1806) and Friedland (1807). Having obtained the command of an army in Spain, he was defeated at Baylen in June, 1808, by De Castaños, who took from him 18,000 prisoners. For this ill-success he was disgraced and imprisoned. Died Feb. 16, 1838.

**Dupont de l'Eure** (JACQUES CHARLES), a French judge and legislator, born in 1767. He was liberal in politics, and represented his native department (L'Eure) in the Chamber of Deputies (1817-48). He was chosen president of the provisional government in Feb., 1848. Died in 1855.

**Dupont de Nemours** (PIERRE SAMUEL), b. in Paris Dec. 14, 1739, became a member of the National Assembly in 1790, and in 1795 he was admitted into the Institute. He refused to take office under Napoleon, and emigrated to Delaware in 1815. He wrote several treatises on political economy and natural history, and "Philosophie de l'Univers" (1796). Died Aug. 6, 1817.

**Dupuis** (CHARLES FRANÇOIS), a French philosopher, born at Trie-le-Château (Oise) Oct. 16, 1742. He became professor of rhetoric in the College of Lisieux in 1766, and was a friend and pupil of Lalande the astronomer. His "Origine de tous les Cultes, ou la Religion Universelle" (12 vols., 1794), contained bold speculations on religion. Died Sept. 29, 1809.

**Dupuy** (MISS ELIZA ANN), b. of Huguenot parents in the city of Petersburg, Va., about 1814; graduated at Augusta, Ky., and cast her lot in Western and Southern society. Her earliest work was the historic character called "The Conspirator," in which Aaron Burr is the hero. It was followed by "The Huguenot Exiles," "Michael Rudolph," and the "Mysterious Guest" in historic fiction, and by "Emma Walton," "The Planter's Daughter," "The Gypsy's Warning," and others. Her works number some forty volumes, still receiving the public approbation. For many years she wrote serial novels for the "New York Ledger," since published in volumes. Died Jan., 1881.

C. G. FORSHEV.

**Dupuytren** (GUILLAUME), BARON, a French surgeon and anatomist, born Oct. 6, 1777, became professor of surgery in Paris in 1811. He was reputed the most skillful French surgeon of his time, made important discoveries in morbid anatomy, and invented several useful instruments. Died Feb. 8, 1835. (See CRUVEILHIER, "Vie de Dupuytren," 1841.)

**Duquesne, du-kain'**, a former borough of Allegheny co., Pa., on the right bank of the Allegheny River. It has been annexed to Allegheny City, of which it became the eighth ward.

**Duquesne** (ABRAHAM), MARQUIS, a famous French naval commander, born at Dieppe in 1610. He served with distinction against the Spaniards at Tarragona in 1641. In 1643 he defeated the Danes near Gothenburg, and compelled them to make peace. He defeated the Spanish and Dutch fleet under De Ruyter in the Mediterranean, near Catania, in April, 1676. Died at Paris Feb. 2, 1688. (See ANDRÉ RICHER, "Vie du Marquis Duquesne," 1783.)

**Duquoin**, R. R. junction, a city of Perry co., Ill. (see map of Illinois, ref. 10-E, for location of county), 76 miles N. of Cairo. It has one graded school, a park and public library, a foundry and machine-shops, salt-works, two flouring-mills, stove-factory, and twelve coal-mines. Pop. in 1880, 2807.

**Du'ra Ma'ter** [the Lat. for "hard" or "unyielding mother," so named because it is more unyielding than the "pia mater"], the outermost of the three meninges or membranes enveloping the brain and spinal cord in vertebrate animals. Within the skull it is so completely joined to the bones that it may be regarded as their endosteum. Its inner surface is covered with pavement epithelium, and perhaps by the parietal layer of the arachnoid membrane, but this is denied by Kölliker. The dura mater sends out sheaths for the nerves as they go through their foramina. It is usually studded, except in infancy, by numerous small whitish masses called the Pacchionian bodies, whose use is not understood. The tentorium and the falces (*falx cerebri* and *falx cerebelli*) are induplications of the dura mater sent into the cavity of the skull. Within the spinal canal the dura mater becomes a fibrous tube, separated from the vertebræ (which have an endosteum) by a loose areolar



fatty tissue and a plexus of veins. It is much larger than the spinal cord, the space between being filled by the other meninges and by the cerebro-spinal fluid.

**Dura'men** [from *duro*, to "harden"], a Latin word signifying a "hardening," is a term applied in botany to the hardened and matured central layers of exogenous trees, commonly called "heart-wood." It is more dense, compact, and durable than the alburnum or sap-wood, and its tubes are filled with the peculiar secretions of the tree, so that the sap no longer circulates freely through them. In many species it is of a darker color than the alburnum. The duramen is the most valuable part of the tree for timber and for the use of the cabinet-maker.

**Durance** [Lat. *Druentia*], a river in the S. E. part of France, rises among the Cottian Alps in the department of Hautes-Alpes. Its general direction is nearly south-westward. It flows through the department of Basses-Alpes, forms the south-western boundary of Vaucluse, and enters the Rhone 3 miles below Avignon. Its total length is nearly 200 miles. Marseilles is supplied with water from this river by an aqueduct 51 miles long.

**Durand**, former capital of Pepin co., Wis. (see map of Wisconsin, ref. 5-B, for location of county), is on R. R. and the Chippewa River, about 20 miles N. of Wabasha (Minn.). Pop. in 1880, 642.

**Durand** (ASHER BROWN), an eminent American painter and engraver, born at Jefferson, N. J., Aug. 21, 1796. He engraved several portraits for the "National Portrait Gallery," also Trumbull's "Declaration of Independence." After 1835 he devoted himself almost exclusively to painting, and gained brilliant fame as a landscape-painter. Among his paintings are "The Capture of Major André," "The Wrath of Peter Stuyvesant," "A Primeval Forest," "Franconia Mountains," and "The Rainbow." D. 1874.

**Durand** (GUILLAUME) de Saint-Pourçain, known as the "Most Resolute Doctor," a scholastic divine, born at St.-Pourçain, Auvergne, about 1280. He was a Dominican friar in his youth. In 1318 he became bishop of Puy, and bishop of Meaux in 1326. He died about 1332. He was a decided nominalist, and by his independent thinking is believed to have contributed to the rise of the Reformation. His best-known writings are commentaries on Peter Lombard, and a work on the canon law ("De Origine Jurisdictionum"). In his treatise "On the State of the Pious Dead" he attacked the opinions of Pope John XXII.

**Duran'do** (GRACOMO), an Italian general, born at Mondovì in 1807. He printed in 1847 a brochure in favor of Italian unity under a constitutional government, which had an extensive influence. He was minister of war at Turin in 1854-55, and became a senator in 1860. In 1862-63 he was minister of foreign affairs in the cabinet of Rattazzi.

**Duran'go**, a state of Mexico, bounded on the N. by Chihuahua, on the E. by Cohahuila, on the S. by Xalisco, and on the W. by Cinaloa. The surface is mostly mountainous. It belongs to the N. part of the table-land of Anahuac. Area, 42,645 square miles. Gold and silver are found here. Capital, Durango. Pop. in 1880, 190,846.

**Durango**, or **Guadiana**, a town of Mexico, capital of the above state, is about 150 miles N. W. of Zacatecas; lat. 24° 2' N., lon. 103° 34' W. It is nearly 7000 feet above the level of the sea. It is the seat of a bishop, and has a cathedral, a college, a mint, several convents, and a theatre; also manufactures of tobacco and iron. Pop. 27,000.

**Durango**, Col. See APPENDIX.

**Durant** (HENRY F.), the founder of Wellesley College, born at Lowell, Mass., in 1822, died in Boston Oct. 5, 1881. He graduated from Harvard University, studied law in his father's office, practised as a lawyer in Boston with great success, until he in 1863 suddenly became a lay evangelist. In 1875 he founded WELLESLEY COLLEGE (which see), for the higher education of women, at a cost of one million dollars, besides an annual support of half a hundred thousand dollars.

**Duran'te** (FRANCESCO), an Italian composer, born Mar. 15, 1684, studied music at Naples under Gaetano Greco and under Scarlatti, and in 1742 became director of the conservatory of Sta. Maria di Loreto at Naples. His compositions consist solely of church music, and are marked by loftiness and purity of style. Died Aug. 13, 1755.

**Dura'zzo** [Turkish *Drasch*; anc. *Epidamnus*, afterwards *Dyrrhachium*], a fortified maritime town of European Turkey, in Albania, is on the Adriatic; lat. 41° 18' N., lon. 19° 28' E. It is the seat of a Roman Catholic archbishop. It has a safe harbor and an active trade. Grain, tobacco, and olive oil are exported from it. The ancient *Epidamnus* was a populous city. The expulsion of its aristocracy in 436 B. C. was the origin of the Peloponnesian war. The Romans changed the name to Dyr-

rhachium (which see). It was captured by the Norman chief Robert Guiscard in 1082, and by the Venetians in 1205. Pop. about 8000.

**Dur'bin** (JOHN PRICE), D. D., an American Methodist preacher, born in Bourbon co., Ky., in 1800, was educated at Miami University and Cincinnati College, and entered the ministry in 1819. He became president of Dickinson College in Pennsylvania in 1834. Having visited Europe and the Levant, he published "Observations in Europe, principally in France and Great Britain" (2 vols., 1844), and "Observations in Egypt, Palestine, etc." (2 vols., 1845). For many years he was missionary-secretary of the Methodist Episcopal Church, and displayed great eloquence and administrative ability in its affairs. He resigned the presidency of Dickinson College in 1845. He contributed largely to periodicals, etc. D. Oct. 19, 1876.

**Dü'ren**, or **Mark Düren** (anc. *Marcodurum*), a town of Rhenish Prussia, on the river Roer and on the Cologne and Aix-la-Chapelle Railway, 18 miles E. of Aix-la-Chapelle. It has a Catholic gymnasium, a high-school, a female high-school, an asylum for the blind, several fine churches, and manufactures of woollen cloth, carpets, cotton goods, etc. It was besieged and taken by Charles V. in 1543. Charlemagne held diets here in 775 and 779 A. D. Pop. in 1881, 17,368.

**Dü'r'er** (ALBRECHT), a celebrated German painter and engraver, born at Nuremberg in 1471. The day of his birth is uncertain, owing to the way in which it is inserted in his father's diary, but it was probably May 21st. He was a pupil of Michael Wohlgemuth, with whom he studied and worked three years (1486-89). He afterwards passed four years in travel, visiting various parts of Germany, and returned to Nuremberg in 1494. In the same year he married Agnes Frey, with whom he is said to have lived unhappily, though there is no good authority for the widespread belief. He visited Venice in 1505, and while there painted a picture for the Tedeschi, or guild of German merchants, which was probably "The Feast of the Rose Garlands," now in the monastery of Strahow at Prague. This was his first picture of importance. In 1520 he went to the Netherlands, accompanied by his wife; and during his journey, the object of which is not known, he kept a minute diary, which was first published in Von Murr's "Journal zur Kunstgeschichte" (1775-88). This curious and interesting record of early travel has been several times translated into English. Dürer returned home in 1521, and continued to live in his native town until his death, April 6, 1528. Dürer's works consist of paintings in oil and engravings on wood and copper. He has also left a number of etchings; and over 500 of his drawings in pen and ink, water-color, chalk, charcoal, India-ink, and with the silver point, exist in public and private collections. These drawings and sketches are remarkable for their precision, delicacy, and firmness of touch, and for the power of observation and patient study they reveal in the master. The finest collections are in the British Museum, the Albertina Gallery at Vienna, and the Uffizi at Florence. His most celebrated paintings are "The Four Apostles," originally presented by him to the city of Nuremberg, but now in Munich; his own portrait in the Pinakothek at Munich, painted in 1500, and another—an earlier one—in the Uffizi Gallery at Florence, and an "Adoration of the Magi," a most beautiful picture, well worthy of the place it occupies in the tribune. His best wood-cuts are the four series "The Apocalypse," "The Great Passion," "The Little Passion," and "The Life of the Virgin," but there are many fine single cuts. Dürer is not believed to have engraved all the wood-cuts that bear his monogram, but only to have made the designs. Perhaps the works by which Dürer is most widely known are his engravings on copper. Of these the most famous are the "Adam and Eve," the "Melancholia," the "Knight, Death, and the Devil," the "Saint Eustache," "Saint Jerome in his Study," and "The Great Fortune." These are all large, but many among the smaller engravings are equal miracles of execution. Dürer was much beloved by the emperor Maximilian I. and by many of the most distinguished men of his time—by Luther, by Melanchthon, by Erasmus, as well as by lesser men, such as Camerarius and Pirkheimer. When in Venice he received much kindness from Bellini, and Raphael and he exchanged specimens of their work. Dürer has left us valuable portraits of Melanchthon, Erasmus, Pirkheimer, and many other notables of his time. He was the author of several treatises—"The Art of Fortification," "Instruction in the Art of Mensuration with the Rule and Compass," with one on "The Proportions of the Human Body," published after his death. A work on the "Proportions of the Horse" is now lost, as is also one on "The Art of Fencing," with perhaps some others whose names are not known. The most important works on Dürer

are J. HELLER, "Das Leben und die Werke A. Dürers," 1827-31; only the second volume of this valuable work ever appeared; his "Life" by THAUSING (Leipzig, 1876), and by Mrs. CHARLES HEATON (London, 1869), with the "Albert Dürer ses Dessins," by CHARLES ÉPHRUSI (Paris, 1882). (See also a photo-lithographic imitation of his "Little Passion," in thirty-seven sheets, published by J. W. Bouton in 1868, and copies of his copper-plates by J. R. Osgood, Boston, in 1872.) CLARENCE COOK.

**Du'ress** [Lat. *duritia*, "hardship"], in law, is either of the person or of goods. 1. *Of the Person*.—This is exercised in two modes, either by threats or by imprisonment. Duress by threats (*per minas*), according to the older authorities, occurred where a person entered into a contract or performed some other act through fear of loss of life or limbs, or grievous bodily harm. It was even an excuse for some crimes, but not for those of the graver class, such as the killing of an innocent person. The modern cases do not take quite so technical a view of the subject, and the tendency is to make the presence of duress turn on positive inquiry whether the threat was of a kind calculated to overcome the will of a person of ordinary firmness and prudence. In equity jurisprudence the word is used in a broader sense than in the courts of common law, and includes cases where a party is in extreme necessity and distress; and duress may be exercised not only towards the person who makes a contract, but in certain cases towards one standing in confidential relations with him. Thus, a threat to prosecute criminally a son, whereby a father is induced to execute a deed in order to save him from arrest, is sufficient duress in equity to furnish a basis to set the conveyance aside. A contract executed under duress is not void, but only voidable at the election of the injured party. Duress of imprisonment can only be affirmed of the case of unlawful restraint.

2. *Duress of Goods*.—This phrase refers to a case where a person having goods illegally detained pays money to obtain their release. If such payment is made under protest, the money may be recovered back, as being paid under compulsion. An instance is an exaction of unauthorized duties upon goods by the collector of a port. The mode of making the protest in this special case is regulated in the U. S. by act of Congress.

The question has been raised whether the doctrine of duress can be applied in international law to relieve a nation from the obligations of a treaty of peace. The answer must in general be in the negative, as the terms of peace, however humiliating, are the chances of war to which the parties have appealed. T. W. DWIGHT.

**Duret** (FRANCISQUE JOSEPH), a French sculptor, born Oct. 19, 1804, studied with his father, with Bosio, and at Rome. His works, among them "Fisher-boy Dancing" (1833), "Vintager" (1839), and statues of Molière and Chateaubriand, are noble compositions of great spirit and correctness. Died in May, 1865.

**Dur'fee** (JOSEPH), LL.D., an American jurist, born at Tiverton, R. I., Sept. 20, 1790, graduated at Brown University in 1813, became a member of Congress in 1820, and chief justice of Rhode Island in 1835. He wrote, besides other works, "What Cheer?" a poem on the adventures of Roger Williams (1832). His life and writings were published by his son (1849). Died July 26, 1847.

**D'Ur'fey** (THOMAS), an English dramatist, born at Exeter, gained the favor of Charles II. He wrote successful comedies, popular songs, and odes. Died in 1723.

**Durgā, or Dourga**, a Sanscrit word signifying "difficult of access," and forming one of the many names of PĀRVATĪ (which see).

**Dur'ham**, a county in the N. part of England, is bounded on the N. by the river Tyne, on the E. by the German Ocean, and on the S. by the river Tees. Area, 973 square miles. The surface is hilly, but the greater part of the land is arable. The rocks which underlie it are new red sandstone, carboniferous limestone, and magnesian limestone. Among its mineral resources are coal, iron, lead, and marble. The collieries of Durham are the most extensive and valuable in England. Durham produces a celebrated breed of short-horned cattle. The chief towns are Durham, Sunderland, Darlington, South Shields, and Gateshead. Durham is one of the three counties palatine of England. Pop. in 1881, 867,258.

**Durham** [Sax. *Dunholme*, from *dun*, a "hill," and *holme*, a "river"], an episcopal city of England, the capital of the above county, is on the river Wear, 14 miles S. of Newcastle. It is built around a steep rocky hill, the top of which is occupied by a castle and cathedral. It is connected by railways with Newcastle and other towns. It sends two members to Parliament. Here is a castle founded by William the Conqueror about 1072. The magnificent cathedral

of Durham was founded in 1093, and is a Norman structure 507 feet long by 200 wide, with a central tower 214 feet high. The grand Norman church which Bishop Carileph built, and which is distinguished by its strength, the exquisite proportions in all its divisions, and the elaborate execution, still forms the main part of the whole construction. Many additions, however, have been made in the course of time; as, for instance, the galilee or western chapel, from the Transition period, built by Bishop Pudsey between 1153 and 1195, the eastern transept, or the so-called Nine Altars, containing the remains of St. Cuthbert, etc. The city itself originated, indeed, from the cathedral. Though there was a small Roman camp at Maiden Castle Hill, close by, Durham itself dates only from the end of the tenth century. It was the removal of the see of Lindisfarne to this place which first started the city, and the removal was caused by the building of the church. This cathedral contains the tombs of Saints Cuthbert and Bede. The see of Durham was long the richest bishopric in England. The city is also the seat of a university, which was opened in 1833. Pop. in 1881, 14,932.

**Durham**, on R. R., cap. of Durham co., N. C. (see map of North Carolina, ref. 2-G, for location of county), 25 m. N. W. of Raleigh, has manufactures of tobacco. The surrender of Gen. J. E. Johnston, April 25, 1865, took place near by. Pop. in 1880, 2041.

**Durham**, EARLS OF, and Viscounts Lambton (1833), Barons Durham (United Kingdom, 1828).—GEORGE FREDERICK D'ARCY LAMBTON, second earl, born Sept. 5, 1828, succeeded his father in 1840.

**Durham** (JOHN GEORGE LAMBTON), EARL OF, an English statesman, born in the county of Durham April 12, 1792. He was elected to Parliament by the Whigs in 1813, and was an advanced liberal. He was created Baron Durham in 1828, became lord privy seal in the cabinet of Earl Grey in Nov., 1830, and was one of the four persons who prepared the Reform bill of 1831, which he supported in the House of Lords. In 1833 he resigned the office of lord privy seal and received the title of earl. He was sent as ambassador to Russia in 1835, and was appointed governor-general of Canada in 1838, but returned suddenly in Dec., 1839. Died July 28, 1840.

**Durham Breed of Cattle**. See SHORT HORNS.

**Du'rian, or Durion** (*Durio Zibethinus*), a tree of the order Sterculiaceæ, a native of the Malay peninsula, cultivated by the Malays for its delicious fruit, which forms a great part of their food. It is a lofty tree, with simple leaves and large clusters of pale yellow flowers. The fruit is globular or oval, about ten inches in diameter, and has a hard, thick, prickly rind enclosing a creamy pulp and about ten seeds, which are eaten roasted. It combines the most delicious flavor with a very offensive odor, and brings a higher price than any other fruit.

**Durivage** (FRANCIS ALEXANDER), was born in Boston, Mass., in 1814. He published a "Cyclopædia of History," "Stray Subjects," and other works, including popular tales, poems, and plays. D. Feb. 1, 1881.

**Dur'kee** (CHARLES), a politician, was born at Royalton, Vt., Dec. 5, 1807, removed to Wisconsin Territory in 1830, was a Free-Soil member of Congress (1849-55), U. S. Senator (1855-61), and governor of Utah (1865-70). Died Jan. 14, 1870.

**Durk'heim**, a town of Bavaria, on the Isenach, 20 miles N. of Landau. It has a castle, a hospital, and manufactures of paper and glass. It is surrounded by beautiful scenery, and is a resort of invalids. It has an active trade in wine. The neighboring salt-springs of Philippsall not only supply the bathing-establishment, but annually produce about 8000 hundredweight of salt. The city originated as a dependency of the Benedictine abbey of Limburg, came afterward into the possession of the counts of Leiningen, and had its share of the military vicissitudes of the Palatinate. Pop. in 1880, 6089.

**Dur'lach**, a town of Germany, in Baden, on the river Pfalz, and on a railway, 3 miles E. of Carlsruhe. It is at the base of the Thurmberg, a hill the top of which is occupied by a ruined castle. It manufactures tobacco, beer, vinegar, and chicory. Before the foundation of Carlsruhe, in 1715, it was the residence of the margraves of Baden and a prosperous place, though it was several times devastated by the French. Pop. in 1880, 7474.

**Duroc** (GÉRARD CHRISTOPHE MICHEL), duke of Friuli, a French general and diplomatist, born at Pont-à-Mousson Oct. 25, 1772. Destined for a military career, he early entered the military school of his native city, from which he was graduated in 1792 as sous-lieutenant of artillery. He became in 1796 aide-de-camp to Bonaparte, whom he accompanied to Egypt in 1798. During

the consulate and empire he was sent on diplomatic missions to Berlin, Vienna, and other courts. He was a favorite officer of Napoleon, who made him general of division, governor of the Tuileries, duke of Friuli, and who received the news of his death with the greatest emotion. He was shot in the battle of Wurtzen, near Mackersdorf, May 23, 1813.

**Duruy** (VICTOR), a French historian, born in Paris Sept. 11, 1811. He published many popular and excellent historical and geographical works, some of which were designed for schools. He was minister of public instruction from June, 1863, to July, 1869, and made important changes in the educational system of France.

**Duryea** (JOSEPH T.), D. D. See APPENDIX.

**Dusky Bay**, of New Zealand, is a large inlet on the S. W. coast of the Middle Island. It affords good anchorage. Lat. 45° 40' S., lon. 166° 20' E.

**Düsseldorf**, a town of Rhenish Prussia, the former capital of the duchy of Berg, is finely situated on the right bank of the Rhine, at the mouth of the river Düssel, 17 miles N. N. W. of Cologne; lat. 51° 13' N., lon. 6° 45' E. It is connected by railways with Cologne, Elberfeld, and other towns. The Rhine is here crossed by a bridge of boats. Düsseldorf is mostly built of brick, and has wide and regular streets. It contains an old electoral palace, a gymnasium, a realschule, a town-hall, a public library, a theatre, an observatory, and several fine churches. Here are manufactures of woollen and cotton fabrics, jewelry, hats, leather, carpets, etc. Its prosperity is derived partly from trade and the navigation of the Rhine. Here is a fine public garden called the Hofgarten, and a celebrated academy of art. This town became a free port in 1829. It has increased rapidly in recent times. Pop. in 1880, 95,459.

**Düsseldorf School of Painting.** The Düsseldorf Academy, founded in 1767 by Prince Charles Theodore, led a languishing life until, under the patronage of Frederick William III., Cornelius was appointed director, which position he continued to fill until his removal to Munich in 1826. A man of such ability and force naturally quickened the growth of art, and the academy soon became the centre of a new life. On the departure of Cornelius, William von Schadow was made director, and his great skill as a teacher, added to his proficiency in his art, increased the reputation of the academy as a school, and drew to it more and more of the rising, undeveloped talent of Young Germany. The names that make this period in the history of German art, in the eyes of Germans at least, a modern Renaissance—Koch, Overbeck, Veit, Schnorr, Von Schwind—are most widely known by the frescoes with which they adorned so many palaces, villas, churches, and public buildings in Rome, Munich, and Berlin; but the artists of the Düsseldorf School have spread the name of their Alma Mater far and wide by means of their easel-pictures. Their chief influence outside of Germany has been in America, where many of their best works have been exhibited and sold, and whither several artists, mostly of American birth, have brought the doctrines they learned at Düsseldorf, either in the academy or in the studios of German artists residing there, and have gained much influence and a widespread reputation at home and abroad by putting them in practice. In 1853 an exhibition of Düsseldorf pictures, belonging to Mr. Boker, was opened in the city of New York, and long continued one of the principal attractions of the town. It made Americans familiar with the names of Lessing, Hübner, Karl Sohn, Hildebrand, Steinbrück, Andreas Achenbach, Hasenclever, and Preyer; and as the specimens of their work contained in this gallery were of the best, there came nearer to being a real enthusiasm on the subject of art awakened in our Eastern States than was ever before, or than has since, been possible. A group of Americans, Eastman Johnson, George H. Hall, W. Whittredge, were somewhat influenced by their studies at Düsseldorf, but fortunately for his country other and larger influences saved the first of these from being spoiled by the teachings of the academy, and preserved to us one of the best of our painters. But we were not so fortunate in the cases of Leutze and Bierstadt, two artists of considerable native ability, who were fatally overmastered by the Düsseldorf Academy, and whose influence in this country has set art back for fifty years. While it would not be fair to compare their works with those of the more famous members of the school in Europe, it cannot be denied that their pictures were the direct outcome of the system taught at Düsseldorf, though it must be admitted that the system was unfortunate in its representatives—men of small culture, and working in a community where art was necessarily little understood.

The school at Düsseldorf was early divided into two parties—the Catholic and the Protestant, the former seeking to restore the ancient exclusive devotion of art, as in

the Old Cologne School, to religious, chiefly Roman Catholic, subjects; the other, of which Lessing was the acknowledged head, refusing to be shut up in such narrow limits, and painting all subjects—landscape, genre, historical, and religious—having, however, a strong leaning to the Protestant side. The harm the Düsseldorf School has done is not perhaps greater than has been done by the schools of Berlin and Munich: it seems greater to an American, because we have suffered so much from it. It inculcates the fatal doctrines that art can be taught, and that its ministry is that of a preacher of doctrines or a narrator of anecdotes, religious, historical, domestic. It confounds art with science, and dissects where it ought to create. But in their own narrow, pedantic field here were men of sense, talent, learning, industry—everything but genius; the men of genius in Germany, as everywhere, have grown up and worked outside of all schools—and they have had the reward that always awaits the commonplace and the practical. They have been extremely popular, they have stimulated a great number of kindred minds, and they have more than supplied the demand for works of art that everybody can understand. CLARENCE COOK.

**Dussieux** (LOUIS ÉTIENNE), celebrated French historian and geographer, born at Lyons April 5, 1815, obtained the prizes of the Academy in 1839 and 1840, and was appointed professor of history and geography in the school of Saint Cyr 1842. He published, "*L'art considéré comme symbole de l'état social*" (1838), "*Essai historique sur l'invasion des Hongrois en Europe et spécialement en France*" (1839), "*Recherches sur l'histoire de la peinture sur émail*" (1840), "*Géographie historique de la France ou Histoire de la formation du territoire français*" (1843, in thirty-three charts), "*Cours de géographie physique et politique*" (1846-48, with maps and notes), "*Les Artistes Français à l'étranger*" (1852; third edition in 1875), "*Force et faiblesse de la Russie au point de vue militaire*" (1854), "*Histoire de France racontée par les contemporains*" (1860-62; 4 vols.), "*Cours classiques de géographie*" (1859-65; 6 vols.).

**Duston** (HANNAH). See APPENDIX.

**Dutch Flat**, a mountain-village of Placer co., Cal. (see map of California, ref. 3-B, for location of county), on the Central Pacific R. R., 67 miles from Sacramento. It has productive hydraulic gold-mines. Pop. in 1880, 939.

**Dutch Gap Canal**, a cut through the narrow isthmus of a peninsula known as Farrar's Island, in the James River, about 5 miles below Richmond, Va., designed to afford the national vessels a nearer approach to the Confederate works, to avoid the great obstructions which had been placed in the curve of the river, and to outflank the heavy Howlett House batteries. It was executed under Major P. S. Michie, by order of Gen. B. F. Butler. The work was undertaken Aug. 15, 1864, and finished Jan. 1, 1865; but a large part of the bulkhead of clay which was blown out by powder on that occasion fell back, so as to obstruct navigation for the time. It was of no service to either side during the war, but has since shortened the navigation of the river to Richmond some seven miles.

**Dutch Gold**, an alloy of copper and zinc, closely resembling common brass, but having rather less zinc in its composition than brass generally has. It is used for beating into thin plates, resembling gold-leaf in appearance when new, and used for ornamentation instead of gold-leaf. It tarnishes readily, and may be tested by the application of strong nitric acid, which will not injure gold-leaf, but which readily dissolves the imitation.

**Dutch Guiana.** See GUIANA.

**Dutch Language and Literature.** The Dutch is the language spoken by the inhabitants of the Netherlands. It is so closely allied to the Flemish that in their earlier forms, at least, the two may be considered as one and the same tongue. The Dutch belongs to the Aryan (otherwise called the Indo-European) family of languages, and to the Teutonic subdivision of that great family. The study of the Dutch language is of especial interest to the student of English, as well as to the general philologist, as presenting one of the most important links that connect our tongue with the German, and also as bearing a very close relationship to the Lowland Scotch.

The Dutch alphabet consists of the same letters as our own. The vowels *a, e, i, o, u* are essentially the same in sound as in French; but *u*, followed by a consonant in the same syllable, is pronounced nearly like short *u* in English. *Y* (now mostly replaced by *y*) has the sound of the long *i* (*î*) in English. A long vowel sound before a consonant in the same syllable is usually indicated by doubling the vowel, as *laat* ("late"), *been* ("bone"), *zoon* ("son"), *duur* ("duration"). *ae* is equivalent to long *a*; it is now replaced in spelling by *aa*. *Ei* or *ey* sounds like long *i* in Eng-

lish; *eu* is like *eu* in French; *ie* like our *ee*. *Ij*, as already intimated, is pronounced like our long *i*. *Oe* sounds like our *oo*; *ui* or *uy* like *oi*. The consonants *b, c, f, h, k, l, m, n, p, r, s, t, x*, and *z* are essentially the same in sound as in English. *D* at the beginning or in the middle of a word is pronounced like the English *d*, but at the end of a word sounds like *t*; *g* has nearly the sound of the German *ch* in *ach*; *v* at the beginning of a word has a sound intermediate between our *f* and *v*; *w* sounds almost as in English; *ch* is pronounced like *ch* in German; *sch*, however, has not, as in German, the sound of our *sh*, but preserves that of the guttural *ch*, with the pure sound of *s*, being pronounced somewhat like *sk*.

The Dutch nearly resembles the German in the inflections of the nouns and verbs, and in the construction of the sentences, as well as in many of its words, as may be seen from the following examples:

SINGULAR.	
Dutch.	(German.)
Nominative, <i>de koning</i>	( <i>der König</i> ), the king.
Genitive, <i>des konings</i> *	( <i>des Königes</i> or <i>Königs</i> ), of the king.
Dative, <i>den koning</i>	( <i>dem Könige</i> ), to the king.
Accusative, <i>den koning</i>	( <i>den König</i> ), the king.
PLURAL.	
Nom. <i>de koningen</i>	( <i>die Könige</i> ), the kings.
Gen. <i>der koningen</i> *	( <i>der Könige</i> ), of the kings.
Dat. <i>den koningen</i>	( <i>den Königen</i> ), to the kings.
Acc. <i>de koningen</i>	( <i>die Könige</i> ), the kings.

The following is an example of the article with an adjective and substantive:

SINGULAR.	
Dutch.	(German.)
Nom. <i>de goede vriend</i>	( <i>der gute Freund</i> ), the good friend.
Gen. <i>des goeden vriends</i> *	( <i>des guten Freundes</i> ), of the good friend.
Dat. <i>den goeden vriend</i>	( <i>dem guten Freunde</i> ), to the good friend.
Acc. <i>den goeden vriend</i>	( <i>den guten Freund</i> ), the good friend.
PLURAL.	
Nom. <i>de goede vrienden</i>	( <i>die guten Freunde</i> ), the good friends.
Gen. <i>der goede vrienden</i> *	( <i>der guten Freunde</i> ), of the good friends.
Dat. <i>den goeden vrienden</i>	( <i>den guten Freunden</i> ), to the good friends.
Acc. <i>de goede vrienden</i>	( <i>die guten Freunde</i> ), the good friends.

The plural of the nouns is generally formed by adding *en* or *n* to the singular, as *een boom* (masc.), "a tree," *boomen*, "trees;" *eene kerk* (fem.), "a church," *kerken*, "churches;" *een hofd* (neut.), "a head," *hofden*, "heads;" *bede*, "a prayer," *beden*, "prayers." Kind, "a child," is an exception; it takes the addition of *eren* to form the plural, like our word child, which originally made the plural in the same way, *child-eren*, afterwards contracted into *children*. Many nouns change the final consonant of the singular into another of the same class, as *dief*, "thief," *dieven*, "thieves;" *huis*, "house," *huizen*, "houses," etc.: often a double vowel in the singular is changed to a single one in the plural, as *maan*, "moon," *manen*, "moons;" *zoon*, "son," *zonen*, "sons," etc.; not unfrequently both vowels and consonants are changed, as *baas*, "master," *bazen*, "masters;" *graaf*, "count," *graven*, "counts," etc. Nouns ending in *r, l, en*, and *em* frequently form the plural by simply adding *s*, as *broeder*, "brother," *broeders*, "brothers" (also formed by adding *en*, as *broederen*); *moeder*, "mother," *moeders*, "mothers;" *appel*, "apple," *appels*, "apples;" *bessens*, "broom" or "besom," *bessens*, "brooms;" *kindeken*, "a little child," *kindeken*, "little children."

The Dutch numerals are as follow:

1. een.	18. achttien.
2. twee.	19. negentien.
3. drij.	20. twintig.
4. vier.	21. een en twintig.
5. vijf.	22. twee en twintig.
6. zes.	23. drij en twintig, and so on.
7. zeven.	30. dertig.
8. acht.	40. veertig.
9. negen.	50. vijftig.
10. tien.	60. zestig.
11. elf.	70. zeventig.
12. twaalf.	80. tachtig.
13. dertien.	90. negentig.
14. veertien.	100. honderd.
15. vijftien.	200. twee honderd
16. zestien.	1,000. duizend.
17. zeventien.	1,000,000. miljoen.

#### ORDINAL NUMBERS.

de eerste, the first.	de dertiende, the thirteenth.
de tweede, the second.	de veertiende, the fourteenth.
de derde, the third.	de twintigste, the twentieth.
de vierde, the fourth.	de een en twintigste, the twenty-first.
de vijfde, the fifth.	de dertigste, the thirtieth.
de zesde, the sixth.	de veertigste, the fortieth.
de zevende, the seventh.	de vijftigste, the fiftieth.
de achtste, the eighth.	de zestigste, the sixtieth.
de negende, the ninth.	de zeventigste, the seventieth.
de tiende, the tenth.	de tachtigste, the eightieth.
de elfde, the eleventh.	de negentigste, the ninetieth.
de twaalfde, the twelfth.	de honderdste, the one hundredth.

\* It is proper to observe that instead of the forms *des konings*, *der koningen*, *des goeden vriends*, we may also use *van den koning*, *van de koningen*, *van den goeden vriend*, etc.

The principal Dutch pronouns are declined as follows:

SINGULAR.		PLURAL.	
(German.)		(German.)	
Nom. <i>ik</i>	( <i>ich</i> ),	<i>wij</i>	( <i>wir</i> ), we.
Gen. <i>mijner</i>	( <i>meiner</i> ),	<i>onzer</i>	( <i>unser</i> or <i>onser</i> ), our.
Dat. <i>mi</i>	( <i>mir</i> ),	<i>ons</i>	( <i>uns</i> ), to us.
Acc. <i>mi</i>	( <i>mir</i> ),	<i>ons</i>	( <i>uns</i> ), us.

PLURAL.*		(German.)	
Nom. <i>gij</i> (or <i>gijlieden</i> )	( <i>ihr</i> ), ye, you.		
Gen. <i>van u</i> (or <i>uwer</i> )	( <i>uer</i> ), your.		
Dat. <i>u</i> (or <i>ulieden</i> )	( <i>euch</i> ), to you.		
Acc. <i>u</i> (or <i>ulieden</i> )	( <i>euch</i> ), you.		

SINGULAR.		(German.)	
Nom. <i>hij</i>	( <i>er</i> ), he.		
Gen. <i>van hem</i> , or <i>zijns</i>	( <i>seiner</i> ), his, or of him.		
Dat. <i>hem</i>	( <i>ihm</i> ), to him.		
Acc. <i>hem</i>	( <i>ihm</i> ), him.		

PLURAL.		(German.)	
Nom. <i>zij</i>	( <i>sie</i> ), they.		
Gen. <i>hunner</i> (or <i>van hen</i> )	( <i>ihrer</i> ), them.		
Dat. <i>hun</i> (or <i>aan hen</i> )	( <i>ihnen</i> ), to them.		
Acc. <i>hen</i> (or <i>ze</i> )	( <i>sie</i> ), them.		

SINGULAR.		PLURAL.	
(German.)		(German.)	
Nom. <i>zij</i>	( <i>sie</i> ), she.	<i>zij</i>	( <i>sie</i> ).
Gen. <i>harer</i>	( <i>ihrer</i> ), her or hers.	<i>harer</i>	( <i>ihrer</i> ).
Dat. <i>haar</i>	( <i>ihr</i> ), to her.	<i>haar</i>	( <i>ihnen</i> ).
Acc. <i>haar</i> and <i>ze</i> ( <i>sie</i> ), her.		<i>haar</i> and <i>ze</i> ( <i>sie</i> ).	

Het, "it," has no inflections, the cases being formed by prefixing prepositions, as *van het*, "of it," *aan het*, "to hit," etc. The plural is like the plural of *zij*, except that it does not take *ze* in the accusative. *Zich* (like the German *sich*, to which it corresponds exactly in pronunciation as well as signification) signifies "himself," "herself," "itself," "themselves;" it is only found in the oblique cases, never in the nominative.

The Dutch pronominal adjectives are—

SINGULAR.		
Masculine.	Feminine.	Neuter.
Nom. <i>de mijne</i> ,	<i>de mijne</i> ,	<i>het mijne</i> , mine.
Gen. <i>des mijnen</i> ,	<i>der mijne</i> ,	<i>des mijnen</i> , of mine.
Dat. <i>den mijnen</i> ,	<i>der mijne</i> ,	<i>den mijnen</i> , to mine.
Acc. <i>den mijnen</i> ,	<i>de mijne</i> ,	<i>het mijne</i> , mine.
PLURAL.		
Masculine.	Feminine.	Neuter.
Nom. <i>de mijnen</i> ,	<i>de mijnen</i> ,	<i>de mijnen</i> .
Gen. <i>der mijnen</i> ,	<i>der mijnen</i> ,	<i>der mijnen</i> .
Dat. <i>den mijnen</i> ,	<i>der mijnen</i> ,	<i>den mijnen</i> .
Acc. <i>de mijnen</i> ,	<i>de mijnen</i> ,	<i>de mijnen</i> .

*De onze*, "ours," *de uwe*, "yours," *de zijne*, "his," *de hare*, "hers," etc., are declined in a similar manner.

The demonstrative adjectives (otherwise called demonstrative pronouns) are *dese* (masc. and fem.), and *dit* (neut.), "this;" in the plural *dese* ("these") for all three genders: and *gene* (masc. and fem.) and *geen* (neut.), "that." The latter is often compounded with the definite article, as *degene* (masc. and fem.), *hetgene* (neut.), "that;" *degene*, "those," forming the plural for all three genders; and with *die*, *dat*, as *diegene* (masc. and fem.), *datgene* (neut.), "that;" plural, for the three genders, *diegene*, "those."

The relatives are—

SINGULAR.		
Masculine.	Feminine.	Neuter.
Nom. <i>die</i> , who;	<i>die</i> , who;	<i>dat</i> , which.
Gen. <i>diens</i> , whose;	<i>dier</i> , whose;	<i>diens</i> , of which.
Dat. <i>dien</i> , to whom;	<i>dier</i> , to whom;	<i>dien</i> , to which.
Acc. <i>dien</i> , whom;	<i>dier</i> , whom;	<i>dat</i> , which.
PLURAL.		
Nom. <i>die</i> ,	<i>die</i> ,	<i>die</i> .
Gen. <i>dier</i> ,	<i>dier</i> ,	<i>dier</i> .
Dat. <i>dien</i> ,	<i>dier</i> ,	<i>dien</i> .
Acc. <i>die</i> ,	<i>die</i> ,	<i>die</i> .

*Welke* (masc. and fem.), "who," and *welk* (neut.), "which," are also used as relatives, especially in elevated discourse.

The interrogative *wie* (masc. and fem.), "who," and *wat* (neut.), "what," are declined like *die*, *dat*, as given above.

The following are the principal tenses, etc. of the verb *zijn*, to "be:"

#### INDICATIVE MOOD.

Present Tense.	
Dutch.	(German.)
<i>ik ben</i>	( <i>ich bin</i> ), I am.
<i>gij zijt</i>	( <i>ihr seid</i> ), you are (or thou art).
<i>hij is</i>	( <i>er ist</i> ), he is.
<i>wij zijn</i>	( <i>wir sind</i> ), we are.
<i>gij (or gijlieden) zijt</i>	( <i>ihr seyd</i> ), you are.
<i>zij zijn</i>	( <i>sie sind</i> ), they are.

\* The Dutch may be said to have, properly speaking, no second person singular; but *gij* is always used, even in Scripture, for the singular as well as the plural.

† Cognate with the German *jener*, *jene*, etc., which in a similar manner is compounded with the article, as *derjenige*, *dasjenige*, etc.

<i>ik was</i>	<i>Imperfect.</i>
<i>gij waart</i>	( <i>ich war</i> ), I was, etc.
<i>wij waren</i>	( <i>ihr wart</i> ).
<i>gij waart</i>	( <i>er war</i> ).
<i>zij waren</i>	( <i>wir waren</i> ).
	( <i>ihr wart</i> ).
	( <i>sie waren</i> ).

<i>ik ben geweest</i>	<i>Perfect.</i>
<i>gij zijt geweest</i>	( <i>ich bin gewesen</i> ), I have been, etc.
<i>hij is geweest</i>	( <i>ihr seid gewesen</i> ).
	( <i>er ist gewesen</i> ), etc.

In the future the Dutch use the auxiliary *zal*, *zult*, *zal*, *zullen*, *zult*, *zullen*, as *ik zal zijn* ("I shall be"), *gij zult zijn*, etc. (the Germans use *werde*, *wirst*, *wird*, *werden*, etc.).

*Zoude* ("should"), *zoudet*, *zoude*, *zouden*, *zoudet*, *zouden*, is used to form the conditional (instead of which the Germans use *würde*, etc.).

## PARTICIPLES.

Present, <i>zynde</i>	(German.)
Past, <i>gewest</i>	( <i>seynd</i> ).
	( <i>gewesen</i> ).

The regular active verb *hooren*, to "hear," is conjugated as follows:

Indicative Present.	Imperfect.	Perfect.
<i>ik hoor</i> , I hear.	<i>ik hoorde</i> .	<i>ik heb gehoord</i> , I have heard, etc.
<i>gij hoort</i> , you hear.	<i>gij hoordet</i> .	<i>gij hebt gehoord</i> .
<i>hij hoort</i> , he hears.	<i>hij hoorde</i> .	<i>hij heeft gehoord</i> .
<i>wij hooren</i> , we hear.	<i>wij hoorden</i> .	<i>wij hebben gehoord</i> .
<i>gij hoort</i> , you hear.	<i>gij hoordet</i> .	<i>gij hebt gehoord</i> .
<i>zij hooren</i> , they hear.	<i>zij hoorden</i> .	<i>zij hebben gehoord</i> .

Pluperfect.	Future.	Conditional.
<i>ik had gehoord</i> .	<i>ik zal hooren</i> .	<i>ik zoude hooren</i> .
<i>gij hadt gehoord</i> .		
<i>hij had gehoord</i> .		
<i>wij hadden gehoord</i> .		
<i>gij hadt gehoord</i> .		
<i>zij hadden gehoord</i> .		

## IMPERATIVE MOOD.

<i>hoor</i> , hear thou.
<i>laet hem</i> (or <i>hij</i> ) <i>hooren</i> , let him hear.
<i>laet ons</i> (or <i>laten wij</i> ) <i>hooren</i> , let us hear.
<i>hooret</i> , hear ye.
<i>laet hen</i> (or <i>laten zij</i> ) <i>hooren</i> , let them hear.

The subjunctive mood is omitted here, as presenting nothing especially remarkable.

The present participle is *hoorende*, "hearing;" the future, *zullende hooren*, "going to hear," literally, equivalent to "shall to hear," or, as the Greek neatly expresses it, μέλλων ακούειν.

The passive voice of verbs is formed with the auxiliary *worden* (imperfect, *werd* or *wierd*), to "be" or "become," thus:

Indicative Present.	(German.)
<i>ik word gehoord</i>	( <i>ich werde gehört</i> ), I am heard,
<i>gij wordt gehoord</i>	( <i>du wirst gehört</i> ) [etc.
<i>hij wordt gehoord</i>	( <i>er wird gehört</i> ).
<i>wij worden gehoord</i>	( <i>wir werden gehört</i> ).
<i>gij wordt gehoord</i>	( <i>ihr werdet gehört</i> ).
<i>zij worden gehoord</i>	( <i>sie werden gehört</i> ).
Imperfect.	
<i>ik werd</i> (or <i>wierd</i> ) <i>gehoord</i>	( <i>ich wurde</i> (or <i>ward</i> ) <i>gehört</i> ), I was
<i>gij werd</i> (or <i>wierd</i> ) <i>gehoord</i>	( <i>du wurdest gehört</i> ). [heard, etc.
<i>hij werd</i> (or <i>wierd</i> ) <i>gehoord</i>	( <i>er wurde gehört</i> ).
<i>wij werden</i> (or <i>wierden</i> ) <i>gehoord</i>	( <i>wir wurden gehört</i> ).
<i>gij werd</i> (or <i>wierd</i> ) <i>gehoord</i>	( <i>ihr werdet gehört</i> ).
<i>zij werden</i> (or <i>wierden</i> ) <i>gehoord</i>	( <i>sie wurden gehört</i> ).
Perfect.	
<i>ik ben gehoord worden</i>	( <i>ich bin gehört worden</i> ), I have been
	heard, etc.
Pluperfect.	
<i>ik was gehoord worden</i>	( <i>ich war gehört worden</i> ), I had been
	heard, etc.
First Future.	
<i>ik zal gehoord worden</i>	( <i>ich werde gehört werden</i> ), I shall be
	heard, etc.
Second Future.	
<i>ik zal gehoord worden zijn</i>	( <i>ich werde gehört worden seyn</i> ), I shall
	have been heard, etc.

**Essential Resemblance between Dutch and German Words.**  
—This resemblance is often much greater in reality than appears to the eye. Thus, the Dutch *zijn* and the German *seyn* (to "be"), so different in appearance, have not only the same meaning, but precisely the same pronunciation. The same is also true of several other parts of the above-named verb; for example, in the subjunctive mood the Dutch *zij, zijt, and zijn*, and the German *sey, seyde, and seyn* (for *seyen*), are pronounced exactly alike. So *buigen* and *beugen* (to "bend"), *lesen* and *lezen* (to "read"), *meel* and *Mehl* ("meal"), *meer* and *mehr* ("more"), *mijn* and *mein* ("my" or "mine"), *nemen* and *nehmen* (to "take"), *prijzen* and *preisen* (to "praise"), *zijn* and *sein* ("his"), *bloed* and *Blut* ("blood"), *bloem* and *Blum* (for *Blume*, "flower"), *broeder* and *Bruder* ("brother"), *hoed* and *Hut* ("hat"), *hoef* and *Huf* ("hoof"), *hoen* and *Huhn* ("fowl", "hen"), *koe* and *Kuh* ("cow"), *moed* and *Muth* ("spirit", "courage"), *moes* and *Mus* ("pap", "sausage"), *roem* and *Ruhm* ("fame", "glory"), *brood* and *Bröd* ("bread"), *hoon* and *Hohn* ("insult"), *nood* and *Noth* ("need", "necessity"),

*rood* and *roth* ("red"), *stroo* and *Stroh* ("straw"), *troon* and *Thron* ("throne"), *troost* and *Tröst* ("comfort"), *zaat* and *Saat* ("seed"), *zacht* and *sacht* ("soft", "gentle"), *zand* and *Sand* ("sand"), *zeer* and *sehr* ("very"), *zegen* and *Segen* ("blessing"), *zijde* and *Seide* ("silk"), *zin* and *Sinn* ("sense"), *zo* and *so* ("thus", "also", "as"), *zoon* and *Sohn* ("son"), etc.

A great multitude of instances might be cited in which the meaning is the same, and the pronunciation nearly the same, or the difference, at most, is between letters of the same class, as *d* and *t*, *b* and *v*, *p* and *f*, or *v* and *f*, *ch* and *k*, etc.; as *blijven* and *bleiben* (to "remain"), *doen* and *thun* (to "do"), *dood* and *Töd* ("death"), *dood* and *tödt* ("dead"), *dragen* and *tragen* (to "bear"), and the past tense of the same, *droeg* and *trug* ("bore"), *rijden* and *reiten* (to "ride"), *roepen* and *rufen* (to "call"), *strijden* and *streiten* (to "fight", to "strive"), *treiden* and *treten* (to "tread"), *vallen* and *fallen* (to "fall"), *vechten* and *fechten* (to "fight"), *vinden* and *finden* (to "find"), *voor* and *vör* ("before"), *vraag* and *Frag* (for *Frage*, a "question"), *werpen* and *werfen* (to "throw"), *wijken* and *weichen* (to "retire", to "yield"), *wijzen* and *weisen* (to "show"), *zoeken* and *suchen* (to "seek"), *zwijgen* and *schweigen* (to "be silent"), etc.

There are, in regard to certain letters, changes that very frequently if not invariably take place when a word passes, so to speak, from the German to the Dutch. The following changes take place in diphthongs and vowels: (1.) The German *au* usually becomes *o* or *oo* in Dutch; for example, *auf* ("on", "up") is changed to *op* (for the change of *f* to *p*, and that of other consonants, see below); *Baum* ("tree") to *boom*; *Haufe* ("heap") to *hoop*; *Haupt* ("head") to *hoofd*; *kaufen* (to "buy") to *koopen*; *Lauf* (a "running") and *laufen* (to "run") to *loop* and *loopen*; *Raub* ("prey", "plunder"), *Rauber* (a "robber") and *Rauben* (to "rob") to *roof*, *roover*, and *rooven*; *Rauch* ("smoke") and *rauchen* (to "smoke") to *rook* and *rooken*; *Saum* (a "hem", "seam") to *zoom*; *taub* ("deaf") to *toof*; *tauf* or *taufe* ("dipping", "baptism") to *doop*; *Traum* ("dream") to *droom*. (2.) The German *au* also not unfrequently becomes *ui* in Dutch, as *aus* ("out"), *uit*; *Bauch* ("belly"), *buik*; *braun* ("brown"), *bruin*; *Bräut* ("bride"), *bruid*; *Daum* ("thumb"), *dwm*; *faul* ("foul"), *vuil*; *Faust* ("fist"), *vuist*; *Haus* ("house"), *huis*; *Laus* ("louse"), *luis*; *Maus* ("mouse"), *muis*; *Raum* ("space", "room"), *ruim*; *rauschen* (to "rush", to "roar"), *ruischen*; *sauber* ("clean", "pure"), *zuiver*; *saufen* (to "drink", to "tipple"), *zuipen*; *Staub* ("dust"), *stuif*; *Strauch* ("shrub"), *struik*; *Strauß* ("ostrich"), *struis*; *Taube* ("dove", "pigeon"), *duif*; *Traube* ("grape"), *druij*; *Zaum* ("hedge" or "fence"), *tuin*. (3.) *Ei* in German frequently becomes *ee* in Dutch, as *allein* ("alone"), *alleen*; *Bein* ("leg", "bone"), *been*; *Eich* (an "oak"), *eek*; *ein* ("one"), *een*; *kein* ("no", as an adjective), *geen*; *Stein* (a "stone"), *steen*, etc. (4.) But *ei*, as well as *ey*, is often changed to *ij*, as *preisen* (to "praise") to *prijzen*; *sein* ("his") and *seyn* (to "be") to *zijn*, etc., etc. (5.) *Eu* and its equivalent *äu*, commonly become *ui*, having essentially the same sound, as *beugen* (to "bend"), *buigen*; *Beule* (a "boil"), *buil*; *keusch* ("chaste"), *kuisch*; *säugen* (to "suckle"), *zuigen*; *säumen* (to "delay"), *zuimen*; *Zeug* ("stuff", "materials", "tools"), *tuig*, etc., etc. (6.) *Oe* or *ö* in German often becomes *oo* in Dutch, as *böse*, *boos* ("bad", "evil"); *blöße*, *bloot* ("bashful"); *hören*, *hooren* (to "hear"); *schön*, *schoon* ("beautiful"); *schönheit*, *schoonheid* ("beauty"), etc. (7.) *Ue* or *ü* in German often becomes *u* in Dutch, the latter being the natural equivalent of the former; as *Brücke*, *brug* ("bridge"); *büchen*, *bukken* (to "stoop", to "bow"); *Bürger*, *burger* ("citizen"); *dünken*, *dunken* (to "seem"). The German *mich dünkt*, and Dutch *mij dunkt*, explains the origin of our phrase *methinks* (i. e. "it seems to me").

In the first paragraph treating of the resemblance between Dutch and German, the reader will see numerous examples of the correspondence of the German long *o* with the Dutch *oo* (as *Sohn* and *zoon*, etc.), and the German *u* with the Dutch *oe* (as *gut* and *goed*, etc.), precisely the same sound being represented by the corresponding words. The German *u*, however, often becomes *o* in Dutch, as *Bund*, *bond* (a "covenant"); *Bundel*, *bonde* ("bundle"); *bunt*, *bont* ("variegated"); *Grund*, *grond* ("bottom", "ground"); *Hund*, *hond* ("dog"); *Krumm*, *krom* ("crooked"), etc., etc.

Of the consonants (1), *f* in German commonly becomes *p* in Dutch,\* as may be seen in the following verbs: *helfen* (to "help"), *helfen*; *hoffen* (to "hope"), *hopen*; *reifen* (to "ripen"), *rijpen*; *rufen* (to "call"), *roepen*; *werfen* (to "throw"), *werpen*. In like manner from the German *Dorf* ("village"), *Harfe* ("harp"), *reif* ("ripe"), *Schiff*

\*In a few instances the reverse occurs; that is, the sound of *p* in German is changed to *f* in Dutch; as *Haupt*, *hoofd* ("head"); *Dieb* (pronounced as if written *diep*), *dief* ("thief"); *Raub* (pronounced as if written *raup*), *roof* ("plunder"), etc.



("ship"), *Waffe* ("weapon"), etc., we have in Dutch, *dorp*, *harp*, *rijp*, *schip*, *wapen*, etc. (2.) *B* is usually changed to *v*, as shown in the following examples: *bleiben*, *blijven* (to "remain"); *schreiben*, *schrijven* (to "write"); *sterben*, *sterven* (to "die"). (3.) *S* initial or medial in German becomes *z* in Dutch; for example, *seyn*, *zijn* (to "be"); *lesen*, *lezen* (to "read"); etc. (4.) The German *s* terminal generally becomes *t* in Dutch, as *blöse*, *bloot* ("mere," "naked"); *Füss*, *voet* ("foot"); *gröss*, *groot* ("great"); *Maas*, *maat* ("measure"); *Schloß*, *slot* ("lock," "castle"). To which may be added *es*, *het* ("it"); *das*, *dat* ("that"); *was*, *wat* ("what"). (5.) *Z* initial is usually changed to *t*, as *Zahl*, *tal* ("number"); *zählen*, *tellen* (to "tell"); *bezahlen*, *betalen* (to "pay"); *Zaum*, *toom* ("bridle"); *Zeichen*, *teeken* ("sign," "token"); *Zeit*, *tijd* ("time"); *Ziegel*, *tegél* (a "tile"); *Zimmer*, *timmer* (a "room," also "timber"); *Zinn*, *tinne* ("pinnae"); *Zins*, *tins* ("rent"); *zu*, *toe* ("to"); *zwei*, *twee* ("two"); *Zweifel*, *twiifel* ("doubt"); *Zweig*, *twijg* (a "branch" or "twig"); *zwölf*, *twaalv* ("twelve"); *Zunge*, *tong* ("tongue"); *zwanzig*, *twintig* ("twenty"); *Zwiet*, *twiet* ("strife," "discord"). (6.) *Ch* in German is often changed to *k* in Dutch, as *Büch*, *boek* ("book"); *fluchen*, *vloeken* (to "curse"), and *Fluch*, *vloek* (a "curse"); *suchen*, *zoeken* (to "seek"), etc.; but this is very far from being always the case. The most numerous class of exceptions consists of words beginning with *sch*—e. g. German *Schaf*, Dutch *schaap* ("sheep"); German *Schiff*, Dutch *schip* ("ship"), etc.

It will be observed from the foregoing examples that almost invariably where the Dutch consonant differs from the German it corresponds to the English whenever there is any English word at all resembling either; compare, for example, the German *Zeit*, the Dutch *tijd*, and the Old English *tide*, in the sense of "time"; German *Zeichen*, Dutch *teeken*, English *token*, etc.

It has seemed proper to explain somewhat fully the principles of such changes from the one tongue to the other as would be likely to escape the notice of those who should make only a cursory examination of the two languages. But it has not been deemed necessary to dwell at length upon the more obvious correspondences between them. It may not, however, be without interest to present some examples of such correspondences: *Band*, *band* (a "band"); *Berg*, *berg* ("mountain"); *bersten*, *bersten* (to "burst"); *bergen*, *bergen* (to "conceal"); *Bescheid*, *bescheid* ("information"); *bescheiden*, *bescheiden* ("modest," "discreet"); *bescheiden*, *bescheiden* (to "appoint"); *Brand*, *brand* (a "burning"); *branden*, *branden* (to "rage"); *Hand*, *hand* ("hand"); *Handel*, *handel* ("trade"); *hangen*, *hangen* (to "hang"); *Helm*, *helm* ("helmet" or "helmet"); *Hemd*, *hemd* ("shirt"); *Kind*, *kind* ("child"); *klein*, *klein* ("small"); *krank*, *krank* ("sick"); *Kunst*, *kunst* ("art"); *Land*, *land* ("land"); *lang*, *lang* ("long"); *Last*, *last* (a "burden"); *leder*, *leder* ("leather"); *Licht*, *licht* ("light"); *lichten*, *lichten* (to "lighten," to "illuminate"); *Linde*, *linde* (a "linden tree"); *List*, *list* ("cunning," "craft"); *listig*, *listig* ("crafty," "cunning"); *Lust*, *lust* ("pleasure"); *Markt*, *markt* ("market"); *Maat*, *maat* ("measure"); *merk*, *merk* ("mark"); *merken*, *merken* (to "mark"); *Minne*, *minne* ("love"); *Morgen*, *morgen* ("morning"); *Nacht*, *nacht* ("night"); *Nagel*, *nagel* (a "nail"); *nimmer*, *nimmer* ("never"); *Rad*, *rad* (a "wheel"); *Rand*, *rand* ("margin," "border"); *Rede*, *rede* ("speech"); *Regen*, *regen* ("rain"); *rein*, *rein* ("clear," "pure"); *Rente*, *rente* ("rent"); *Spiegel*, *spiegel* (a "mirror"); *Vogel*, *vogel* ("bird," "fowl"); *Wacht*, *wacht* ("watch"); *Wagen*, *wagen* ("wagon," "carriage"); *wegen*, *wegen* (to "weigh"); *Werk*, *werk* ("work"); *Winter*, *winter* ("winter").

The character of Dutch literature may be said to correspond, to a great extent, to the national character, which has been formed in a constant conflict with the most formidable and most unconquerable of all the elements. "The Dutch have taken their possessions from the dominion of the deep; and the exercise of the perpetual thought, care, and industry necessary first to raise and then to keep up such mighty embankments as defend them from their constant assailing, the raging sea, has educated a people adventurous, brave, and cautious." (*Bosworth's Anglo-Saxon Dictionary*, p. xcii.) The spirit of industry and energy thus acquired may be said to pervade their literature, which is characterized rather by solid strength than by a versatile fancy or soaring imagination. Much of the Dutch poetry, however, is not without the charm of unaffected simplicity and great expressiveness of language. In fact, the distinguishing characteristics of the Dutch language may be said to be directness of expression and descriptive energy. In simplicity and directness indeed it bears a near resemblance to the English, over which its greater fulness of inflections gives it some decided advantages, especially on the score of variety and flexibility. In another respect, also,

it is on some accounts superior to our tongue. We allude to the facilities it possesses for forming compound words. Many technical terms which the English borrow from the Latin or Greek are formed by the Dutch from their own indigenous roots. In this respect the Dutch even surpasses the German. Thus, for astronomy they have *sterrekunde* ("star-knowledge"), a word which explains itself without the necessity of having recourse to a Greek etymology. Such Dutch terms are usually much more euphonic than their literal English equivalents, because they generally employ connecting vowels, thus rendering the sound much softer, instead of running the terminal and initial consonants together, as is continually done in English in the formation of compound words; thus, we say *endless*, but the Dutch say *eindeloos*; the same may be seen in the above-cited *sterrekunde*, and in numerous other compound words.

It may be proper to remark here that the Dutch having been pre-eminently a commercial and maritime nation long before England could boast of being the mistress of the sea, from them have been derived many of our nautical terms and phrases, such as *boom*, literally, "tree or beam;" *skipper* (Dutch *schipper*, the *ch* being hard), literally, a "shipper;" *schooner*, etc.

Some of the oldest extant specimens of the Dutch language are supposed to date as far back as the ninth century. They bear a near resemblance to the Low German. All the earlier specimens, indeed, of the Teutonic dialects prove, by the remarkable affinities which they bear to each other, that they originated from a common source. We have already spoken of the essential identity of the Dutch and Flemish, the difference between these two languages being scarcely more than a difference of pronunciation and orthography. The celebrated poem called "Reinaert de Vos" ("Reynard the Fox"), the first part of which was written originally in the old Flemish dialect about 1150, affords one of the finest of the early specimens of the Flemish or Dutch language. From it was made a free translation into Low Saxon, "Reineke Vos," under which form it became widely known and very popular.

Jacob van Maerlant is regarded as the father of Dutch poetry. He was born at Damme, in Flanders, in 1235, and died in 1300. He made various translations into Dutch poetry, of which the following may suffice as a specimen:

"Diese bloemen hebben wi besocht,  
En ute Latine in Dietche brocht,  
Ute Aristotiles boeken."

Translated literally:

"These flowers (beauties) have we sought,  
And out of Latin into Dutch brought,  
From Aristotle's books."

Perhaps his most celebrated work is his "Spiegel Historiae" ("Historic Mirror"). The "Rijmkronik" ("Chronicle" in verse) of Melis Stoke was written about 1290. The following is an interesting sample of that early rhyme:

"Dese pine ende dit ghepens  
send ic u Heer Grave Florens  
Dat ghi moget sien ende horen  
Wanen dat ghi sijt geboren,  
Ende bi wat redenen ghi in bant  
Hebbet Zeeland ende Holland;  
Ende bi wat redenen dat ghi soect  
Vrieslant dat u so sere vloect."

Literally translated:

"These labors (pains) and these thoughts  
send I to you, Sir Count Florens,  
that you may see and hear (learn)  
whence [it is] that you are born  
(descended), and by what right  
(reasons) you have Zeeland and  
Holland in hand (in your possession),  
and by what right you seek  
Friesland, that curses you so sorely."

Jan van Heelu, the contemporary of Stoke, also wrote chronicles in verse ("Rijmkronik"), which display considerable poetic spirit.

The culture and development of what may be strictly termed Dutch literature, as distinguished from the Flemish, may be said to date from the establishment at Amsterdam (about 1570) of a sort of literary academy called *Rederijkamer* ("Chamber of Rhetoric"), under the auspices of Coornhert, Spiegel, and Vischer. Somewhat later appeared Peter Kornelius Hooft, whom Vondel calls, playing upon his name (signifying "head"), "Dat doorluchtig Hooft der Hollandsche poeten"—"That illustrious head of the Dutch poets." The merits of Hooft are so great that he has been styled the creator of Dutch literature. He imparted a sweetness and harmony to the poetry of his native language unknown before his time, and not surpassed by any later author. He also excelled as a writer of history. Jacob Cats (1577–1660), or Father Cats, as his countrymen in their affection delighted to call him, was emphatically the poet of the people, and his productions are still admired and loved by all classes. Joost van den Vondel (1587–

1679) is one of the greatest names in Dutch literature. He excelled in satirical and lyric poetry, and also in tragedy. About the end of the seventeenth century there was a decline in Dutch poetry, caused in part by the influence of the French school of criticism, but a new poetical era commenced in the latter half of the next century, introduced by J. Bellamy (about 1770), whose ballad of "Rosje" is regarded as the most beautiful in the language. In touching simplicity it reminds us of some of the finest of the Scottish ballads. Bilderdijk (1756-1831) was not only one of the greatest of Dutch poets, but was distinguished in almost every department of literature. Tollens (1780-1856) is perhaps the most popular of recent Dutch poets. Among his most celebrated productions are "De Overwintering op Nova Zembla" ("The Wintering on Nova Zembla"), a narrative poem giving an account of the famous expedition of Barentz (1594-96), and his splendid war-lyric entitled "Wapenkreet" ("Call to Arms").

In classical learning the Dutch have taken a high place among the nations of Europe. Among the most distinguished of their scholars are Erasmus, Lipsius, Daniel and Nicholas Heinsius, Grotius, Gronovius, Vossius (Gerard de Vos), Hemsterhuis, etc. In science they have had Huygens, Leewenhoeck, Ruysch, and Swammerdam. In theology they can boast of Arminius, besides many others. In philosophy there is perhaps no greater name in modern times than Spinoza; and in medicine few, if any, more illustrious than those of Boerhaave and Van der Kolk.

J. THOMAS.

**Dutch Liquid**, or **Eth'ene Chlo'ride**, received its first name because it was first discovered by Dutch chemists in 1795. It is a combination of ethene (olefiant gas,  $C_2H_4$ ) with chlorine, and its formula is  $C_2H_4Cl_2$ . It is a thin, inflammable, colorless liquid of an agreeable fragrance and pleasant taste, somewhat resembling chloroform. Like chloroform, it has great anæsthetic powers when its vapor is inhaled, but the medical profession are not satisfied of its safety. Modifications of this compound (such as  $C_2H_3Cl$ ,  $C_2H_3Cl_3$ , and  $C_2H_2Cl_2$ ) are also sometimes called Dutch liquids, and the whole are known as the "Dutch liquid series."

**Dutch Reformed Church.** See REFORMED CHURCH OF AMERICA.

**Dutens** (JOSEPH MICHEL), a French political economist, born at Tours Oct. 15, 1765. He published "The Philosophy of Political Economy" (2 vols., 1835) and other works. Died Aug. 6, 1848.—His uncle, LOUIS DUTENS, F. R. S., born at Tours Oct. 15, 1765, removed to England, where he obtained from the duke of Northumberland the lucrative living of Elsdon, acting at three different times as English chargé d'affaires at Turin. He wrote a treatise ("Discoveries of the Ancients," 1769), maintaining the antiquity of many discoveries, numismatical treatises, and "Mémoires d'un Voyageur qui se repose" (Paris, 1806). Died May 23, 1812.

**Duties** [from *due*, i. e. "something owed;" Fr. *douane*], in their general sense, are those things which a man is, by any natural, moral, or legal obligation, bound to do or to refrain from doing. The word is also used commercially, and then, in its most enlarged sense, is nearly equivalent to taxes, embracing all impositions or charges levied on persons or things; but in its more restricted sense it is often used as equivalent to customs or imposts, being those taxes which are payable upon goods and merchandise imported or exported. (See the Constitution of the U. S., Art. I., s. 8, n. 1, and Art. I., s. 10, n. 2.) The import duty is held to be a personal debt, chargeable upon the importer, as well as a lien on the goods themselves.

As used in the U. S., the term duties does not include the taxes on property, real or personal, nor the poll-tax; nor, in its popular sense, does it include the excise. In the U. S. there is no duty on exportation, nor is any State allowed to collect duties or imposts.

**Dutrochet** (RENÉ JOACHIM HENRI), M. D., a French physiologist, born in Poitou Nov. 14, 1776. He graduated as M. D. in 1806, and devoted his time chiefly to the study of natural history and physiology. He published "Researches in Endosmosis and Exosmosis" (1828), and "Mémoires pour servir à l'Histoire anatomique et physiologique des Végétaux et Animaux" (1837). Died Feb. 4, 1847.

**Dut'ton** (ARTHUR H.), an American officer, born at Wallingford, Conn., in 1839, graduated at West Point, and was appointed brevet second lieutenant in the corps of engineers June 24, 1861; promoted to be first lieutenant of engineers Mar., 1863, and captain Oct., 1863. During the civil war he served on staff and engineer duty from July, 1861, to July, 1862, being assistant engineer on the defences of Washington and in the Florida expedition with Gen. H. G. Wright. He was appointed

Sept., 1862, colonel of the Twenty-first Connecticut Volunteers, which regiment he led at Antietam and Fredericksburg; commanded a brigade in the Ninth army corps at Newport News and about Suffolk, Va., Feb. to Aug., 1863; was chief of staff to Major-General Peck, in command of the district of North Carolina; during the operations of the Army of the James at Bermuda Hundred, Va., 1864, he commanded his regiment, distinguishing himself at the battle of Drury's Bluff, May 10; and while reconnoitering the Confederate works May 26 was mortally wounded. Died at Baltimore, Md., June 5, 1864. Brevet major Dec., 1862, lieutenant-colonel May, 1863, colonel and brigadier-general May, 1864, for gallant and meritorious services.

**Dutton** (HENRY), LL.D., a jurist, was born at Plymouth, Conn., Feb. 12, 1790, and graduated at Yale in 1818, was professor of law in Yale (1847-55), became governor of Connecticut in 1854, and was a judge of the superior court and court of errors (1861-66). He prepared several digests, compilations of State statutes, etc., by which he made himself well deserved of juridical literature. Died April 26, 1869.

**Duum'viri**, or **Duo'viri** [Lat., the plural of *duumvir*, from *duo*, "two," and *vir* (plu. *viri*), a "man" (i. e. the "two men")], the title of various magistrates of ancient Rome and her colonies. Two men jointly held the office, whence the name. The *duumviri*, "*juri dicundo*" ("for pronouncing judgment"), were chief magistrates in municipal towns. Naval *duumviri* were occasionally appointed to equip fleets. *Duumviri* "*perduellionis*" were appointed to try cases of treason (*perduellio*) and parricide. Quinquennial *duumviri* were the censors of municipal towns, and were chosen every five years, hence called *quinquennales* (from *quinque*, *annus*), but the duties of the office occupied only one year. The position was one of great dignity. Sacred *duumviri* were sometimes appointed to erect temples. There were also *duumviri* for performing other minor duties.

**Duval** (ALEXANDRE), born April 6, 1767, served in the American Revolution on a French vessel, was then engineer, architect, and, after 1792, devoted himself to dramatic composition. He succeeded in mingling comic traits with serious action, and many of his pieces have kept the stage. Died Jan. 10, 1842.—His brother, MAURY DUVAL, born Jan. 28, 1760, acquired note by treatises upon antiquities. Died Nov. 12, 1838.

**Duvaucel** (ALFRED), a French naturalist, born in Paris in 1792, was a stepson and pupil of the celebrated Cuvier. He passed nearly six years in the exploration of the natural history of India, to which he went in 1818. He died near Madras in Aug., 1824.

**Duvergier de Hauranne** (PROSPER), born at Rouen Aug. 3, 1798, died in Paris May 22, 1881. After finishing his studies he visited England, and became in 1824 contributor to the "Globe" together with Guizot and Rémusat. Elected a deputy from Saucerre, he supported with all his might the policy of resistance which Casimir Perier represented, and the cabinet of Molé he attacked in the chamber and in the press. His "Des principes du gouvernement représentatif" was published in 1838. The policy of Thiers he adopted with great sympathy, and finally broke altogether with Guizot. Elected a member of the Constitutional Assembly of 1848, he took his seat among the royalist minority. After the *coup d'état* he was imprisoned for a short time, and then banished, but was soon after allowed to return to France. During the Second Empire he devoted himself to literature; his "Histoire du gouvernement parlementaire en France" appeared 1857-73 (10 vols.). At the general senatorial election of 1876 he entered the senate, having declared himself in favor of a conservative republic; but his influence seemed to have decreased. He continued, however, to contribute to the "Revue des deux Mondes." In 1870 he became a member of the Academy.

**Duvernoy** (GEORGES LOUIS), M. D., a French zoologist and anatomist, born at Montbéliard Aug. 6, 1777. He edited Cuvier's "Lectures on Comparative Anatomy" (1805) at his request. He succeeded Cuvier in 1837 as professor in the College of France, and became in 1850 professor of comparative anatomy. Among his important works is "Lectures on Organic Bodies" (1842). Died Mar. 1, 1855.

**Duveyrer** (HENRI), a French traveller, born Feb. 28, 1840, was the son of Charles Duveyrer, a political and dramatic writer, and nephew of Anne Joseph Duveyrer, who, under the pseudonym of Mélesville, wrote a great number of theatrical pieces in collaboration with Scribe and others. He was of an adventurous turn of mind, and after finishing his studies he went to England to procure the support necessary to a tour of exploration through

Africa. He first visited Algeria, and made some explorations of the northern parts of Sahara; and, having acquired the friendship of the chief of the Tuariks, he finally succeeded in penetrating to the very centre of Soodan. After his return, in 1867, the Société de Géographie de Paris gave him its great gold medal and made him one of its perpetual secretaries. He has published "Exploration du Sahara" and "Les Touaregs du Nord" (1864, with thirty-one maps), and "Livingstone et ses explorations dans la région des lacs de l'Afrique orientale" (1873). Together with Maunoir he undertook to continue the publication of the "Année géographique," by VIVIEN DE SAINT MARTIN.

**Duyc'kinck** (EVERT AUGUSTUS), an American editor and essayist, born in the city of New York Nov. 23, 1816, and graduated at Columbia College in 1835. He was the founder and editor of the "Literary World." With the aid of his brother George he published a "Cyclopædia of American Literature" (2 vols., 1856), which is highly esteemed. Among his works is a "History of the War for the Union" (3 vols., 1861-65). D. Aug. 13, 1878.

**Duycinck** (GEORGE LOXE), a brother of the preceding, was born in New York Oct. 17, 1823, graduated at the University of New York in 1843. He was joint-author of the "Cyclopædia of American Literature" (1856), and published several biographies, among which was a "Life of George Herbert" (1858). Died Mar. 30, 1863.

**Dwara'ca, or Dwarka**, a maritime town of India, in Guzerat, is on the Arabian Sea a few miles S. of the Gulf of Cutch, 95 miles N. W. of Joonaghur. Here is a temple of Krishna, which is annually visited by multitudes of pilgrims. The great temple is an ancient sculptured stone structure, with a massy gate and a long flight of steps. In front is a sacred stream.

**Dwarf** [Ang.-Sax. *deorg*; Ger. *Zwerg*; Swedish and Dutch, *dwerg*], the name given to any animal or plant greatly below the usual size of its kind, particularly a human being of small dimensions. In ancient times dwarfs were kept by persons of rank for their amusement, and the Roman ladies employed them as domestics. In Europe the passion for dwarfs reached its height under the reigns of Francis I. and Henry II. of France. Among the most celebrated dwarfs were the following: Philetus of Cos, a philosopher and poet, who lived about 330-285 B. C.; Geoffrey Hudson, born in 1619, who was three feet nine inches high; Joseph Borowlawski, born in 1739, who attained the height of thirty-nine inches, and was remarkable for acute intellect; and Nicolas Ferry or Bébé (thirty-three inches high), who was a favorite of Stanislas, king of Poland. In recent times Tom Thumb (Charles S. Stratton), born at Bridgeport, Conn., in 1837, died 1884, was the most celebrated, and his performances as an actor were received with applause both in Europe and America.

The dwarfs of Scandinavian mythology are represented as deformed and crafty elves, distinguished for their skill in magic and the working of metals.

**Dwarfed Trees** may be produced in three different ways—by grafting on dwarf slow-growing stocks, as, for example, the pear on the quince; by planting in small pots filled with poor soil, by which the plant is starved and stunted; and by causing a portion of the extremity of a branch to produce roots, and then cutting it off and planting it in a pot with poor soil. The last is the Chinese method, and is thus performed: The extremity of a branch two or three feet long in a fruit- or flower-bearing state is selected, and a ring of bark is taken off at the point where it is desired that roots should be produced. The part thus denuded of bark is covered with a ball of clay, kept moist with the frequent application of water. After the roots have grown out the branch is cut off, planted in a pot of poor soil, and sparingly supplied with water. The dwarf tree will remain nearly of the same size for years. The pear tree especially is often dwarfed, because in this condition it will produce fruit while still very young. Some varieties of pear may remain unfruitful for many years unless dwarfed, while the dwarfed trees, as a general rule, are pretty sure to abound in flowers and fruit. Esthetically, however, they are an eyesore—except, of course, to the Chinese.

**Dwight**, R. R. junction, Livingston co., Ill. (see map of Illinois, ref. 4-F, for location of county), 72 miles S. W. of Chicago. Pop. in 1870, 1044; in 1880, 1295.

**Dwight** (BENJAMIN WOODBRIDGE), PH. D., born at New Haven, Conn., April 5, 1816, and graduated at Hamilton College, N. Y., in 1835, was principal and proprietor of a high school for boys in Brooklyn and New York City for many years. He is the author of "The Higher Christian Education," "Modern Philology, First and Second Series," "The History of the Strong Family," 2 vols., and also of "The History of the Dwight Family in America,"

2 vols., "Woman's Higher Culture," and "The True Doctrine of Divine Providence." He resides at Clinton, Oneida co., N. Y., where he is engaged in literary labor.

**Dwight** (EDMUND), a merchant, born at Springfield, Mass., Nov. 28, 1780. He graduated at Yale in 1799. He was a member of business firms which established cotton-mills at Chicopee and Holyoke. He gave \$10,000 to support normal schools in Massachusetts. Died April 1, 1849.

**Dwight** (FRANCIS), born at Springfield, Mass., Mar. 14, 1808, graduated at Harvard College in 1827, and at the Law School in 1830, travelled extensively in Europe, and afterwards practised law for a few years (1834-38), but in 1838 turned the whole force of his strong nature towards the promotion of common-school education in our country, and established at Albany, N. Y., in 1840, "The District School Journal," under State patronage. Here he had full scope for his fine, highly-cultured faculties of mind and his glowing zeal in behalf of the most improved style of popular education. His name stands, for honor, by the side of that of Horace Mann in the thoughts of those who know how the present superior style of public instruction has been reached in those parts of the land where it is highest in its form. He died in the fulness of his influence for good, Dec. 15, 1845.

**Dwight** (REV. HARRISON GRAY OTIS), D. D., born at Conway, Mass., Nov. 22, 1803, graduated at Hamilton College, N. Y., in 1825, and became a missionary of the A. B. C. F. M. in 1830 to the Armenians, making Constantinople the centre of his field of operations. He was abundant in his labors with tongue and pen, and is one of the most noted of all American missionaries hitherto for his great skill and success in his work. He published in America and England several volumes at different times, as "Researches of Smith and Dwight in Armenia," "Memoir of Mrs. Elizabeth B. Dwight," "Christianity Revived in the East," "A Complete Catalogue of Literature in Armenia," etc. He composed also several books and tracts in the native languages of the East. He was killed suddenly, when on a brief visit to his native land, by an accident on the Troy and Bennington R. R., Jan. 25, 1862.

**Dwight** (JOHN) graduated at Oxford University, England, in 1682, was secretary to three successive bishops of Chester, England (Walton, Ferne, and Hall). He established in 1684, at Fulham, "a manufactory of white gorges, marbled porcelain ware, statues, and vessels never before made in England, and also of China and Persian wares, and the Cologne and Hessian wares." He invented moulds and models and processes of his own, and manufactured the only porcelain that was made in England in his day. His inventive talents are described in leading English works on pottery and porcelain ware as having been of the very highest order. The great potteries at Fulham, Chelsea, etc. are ascribed to him as their real founder.

**Dwight** (JOHN SULLIVAN), a musical critic, born in Boston May 13, 1813, graduated at Harvard in 1832. He studied divinity, entered the Unitarian ministry, and preached about six years. In 1842 he joined the Brook Farm enterprise at West Roxbury, Mass., where he remained until the institution was broken up. In 1852 he established "Dwight's Musical Journal," an excellent periodical, of which he is still the editor. Mr. Dwight has also published many admirable reviews, lectures, etc. The song "God Save the State," written by Rev. C. T. Brooks in 1835, was altered by J. S. Dwight in 1844.

**Dwight** (JOSEPH), BRIGADIER-GENERAL, born at Hatfield, Mass., Oct. 16, 1703, graduated at Harvard University in 1722, was judge of the court of common pleas of Hampshire co., Mass., and afterwards of Berkshire county, and judge of probate. He was eminent both as a judge and a soldier. He commanded the Massachusetts artillery at the reduction of Louisburg in 1745 with distinction, and led a brigade at Lake Champlain in the second French war in 1756. He was also for eleven years member of the general council of Massachusetts. Died in 1765.

**Dwight** (REV. NATHANIEL), M. D., brother to Dr. Timothy Dwight of Yale College, born Jan. 31, 1770, at Northampton, Mass., prepared and published the first school geography ever issued in this country. It was in the form of questions and answers, and was extensively used. He was also the author of "The Great Question Answered," and of "A Compendious History of the Signers of the Declaration of Independence." He resided chiefly at Wethersfield, Conn. Died June 11, 1831, at Oswego, N. Y.

**Dwight** (SAMUEL), M. D., of Fulham, England, graduated at Oxford University (son of John Dwight of Fulham, the great inventor and first manufacturer of porcelain ware in England), was the author of three different medical works—viz. "De Vomitione" (London, 1722), "De Hydropibus" (1725), and "De Febribus" (1731).

**Dwight** (SERENO EDWARDS), D. D., an American divine, born at Greenfield Hill, Conn., May 18, 1786, was a son of Timothy Dwight, noticed below. He graduated at Yale in 1803, and practised law with success (1810-16). He was afterwards pastor of Park street church, Boston (1817-26), and was president of Hamilton College (1833-35). He wrote, besides other works, "The Hebrew Wife" and a "Life of Jonathan Edwards," and edited the works of the same author (10 vols. 8vo). Died Nov. 30, 1850.

**Dwight** (THEODORE), an able journalist, an uncle of the preceding, was born at Northampton, Mass., Dec. 15, 1764. He was a member of Congress (1806-07). He practised law with distinction, and was a leader of the Federalist party. He was secretary of the Hartford Convention in 1814. His mother was a daughter of Jonathan Edwards. In 1817 he founded the "New York Daily Advertiser," which he edited until 1835. He published "The Life and Character of Thomas Jefferson" and "The History of the Hartford Convention." He was a brilliant political writer. Died July 12, 1846.

**Dwight** (THEODORE), an author, a son of the preceding, was born at Hartford, Conn., Mar. 3, 1796, and graduated at Yale in 1814. He wrote, besides other works, a "Tour of Italy" (1824), a "History of Connecticut" (1841), a "Life of Garibaldi" (1859), "A School Dictionary of Roots and Derivatives," "The Northern Traveller," "The Tour of New England," "The Father's Book," "First Lessons in Modern Greek," "The Roman Republic of 1849," and "The Kansas War." Died Oct. 16, 1866.

**Dwight** (THEODORE WILLIAM), LL.D., an American jurist, professor, and editor, born July 18, 1822, at Catskill, N. Y., graduated at Hamilton College, N. Y., in 1840, and studied his profession at Yale Law School, under the late distinguished Judge Hitchcock. In 1846 he was elected Maynard professor of law in Hamilton College, and there established a law school. In 1858 he was chosen professor of municipal law in Columbia College, N. Y. His inaugural address was published. He was soon made warden of the law school, a department of the college organized under his direction, and now (1874) numbering 425 students, drawn from all parts of the U. S. He received the degree of doctor of laws from Rutgers College, N. J. (1859), and from Columbia College (1860). He published an "Argument in Rose Will and Charity Cases" (1863), and other arguments in leading law cases. In association with Dr. E. C. Wines he published "Prisons and Reformatories in the U. S." He edited "Maine's Ancient Law." As associate editor of the "American Law Register" he has written articles which have been separately published, as "Trial by Impeachment," etc. He was elected non-resident professor of constitutional law in Cornell University, N. Y. (1868), and lecturer in Amherst College, Mass., on the same subject (1869). He was a member of the New York constitutional convention of 1867, and early in 1873 was vice-president of the New York board of State commissioners of public charities, president of the New York prison association, and an active member of the well-known "committee of seventy" of the city of New York. In Jan., 1874, he was appointed by Governor Dix of New York a judge of the commission of appeals, a court sharing the duties of the court of appeals.

**Dwight** (TIMOTHY), D. D., LL.D., an eminent American divine and scholar, born at Northampton, Mass., on the 14th of May, 1752. His mother was Mary, daughter of Jonathan Edwards. He graduated at Yale College in 1769, after which he was a tutor in that institution for six years. In 1777 he married Mary Woolsey. Between 1778 and 1782 he was a chaplain in the army, or lived with his mother at Northampton; in 1783 he became minister of a church at Greenfield, Conn., where also he was principal of a flourishing academy. In 1795 he was elected president of Yale College, in which he also became professor of theology at the same time. He was an able preacher, and was eminently qualified as an instructor of young men. He continued to be president of Yale College until his death. His chief works are "The Conquest of Canaan," an epic poem (1785), "Theology Explained and Defended in a Series of 173 Sermons" (5 vols., 1818), often reprinted, and "Travels in New England and New York" (4 vols., 1821). Died at New Haven Jan. 11, 1817. (See W. B. SPRAGUE, "Life of T. Dwight," in SPARKS'S "American Biography," vol. iv., second series; also SPRAGUE'S "Annals of the American Pulpit," vol. ii., pp. 152-165.)

**Dwight** (WILDER), an American officer, born in Springfield, Mass., in 1833, graduated at Harvard College in 1853, entered the army as major of the Second Massachusetts regiment of volunteers, and served in the Shenandoah campaign under Gen. Banks, displaying great bravery during the famous retreat. He was engaged at the battle of Antietam Sept. 17, 1862, where he was mortally wounded, but survived till the 19th, when he expired in hospital at Boones-

ville. At the time of his death he was lieutenant-colonel of his regiment.

G. C. SIMMONS.

**Dwight** (WILLIAM BUCK), b. at Constantinople May 22, 1833, came to the U. S. in 1849; graduated from Yale College 1854; from Union Theological Seminary, New York City, 1857; from Yale scientific school 1859; 1859-65 principal and proprietor of Englewood Female Institute, Englewood, N. J.; 1865-67 occupied in mining and geological examinations in Virginia and Missouri; 1867-70 principal of the Officers' Family School at the U. S. Military Academy, West Point, N. Y.; 1870-78 associate principal and instructor in natural sciences in the State Normal School at New Britain, Conn.; 1878 appointed professor of zoology in the Martha's Vineyard summer institute, Massachusetts; in the same year also appointed professor of natural history and curator of the museum in Vassar College, Poughkeepsie, N. Y.; in the spring of 1879 began a series of original explorations in the little-known limestones of the Wappinger Valley, Dutchess co., N. Y., which he has carried on till the present time (1885). The results, which it is proposed to issue in the form of a bulletin well illustrated, have as yet been only partially published, chiefly in papers in the following journals: *Proceedings of the American Association for the Advancement of Science* (1882), *American Journal of Science* (May, 1879; Jan., 1880; June, 1880; April, 1884).

**Dwight** (REV. WILLIAM THEODORE), D. D., son of President Timothy Dwight of Yale College, Conn., born June 15, 1795, at Greenfield Hill, Conn., graduated at Yale in 1813, practised law in Philadelphia for ten years (1821-31), when he entered the ministry, and was settled as a Congregational clergyman at Portland, Me., where he remained for thirty-two years (1832-64), when he resigned his pastorate on account of poor health. His ministry was one of great success, and his influence as a thinker, preacher, superior platform-speaker, and presiding officer in ecclesiastical councils and conventions was very great, not only throughout his adopted State, but also throughout the Congregational denomination at large. He was several times invited and urged to accept of other positions of honor and influence, and was solicited in vain by three different theological seminaries to take the chair of doctrinal theology in them. He excelled alike in the art of fine rhetorical composition and of easy and effective extempore speaking. His personal appearance was—like that of his father and of his brother, Dr. Sereno E. Dwight—fine and commanding. He died at Andover, Mass., Oct. 22, 1865.

**Dwi'na**, or **Duna** (anc. *Turynthus*), a river of Russia, rises in the government of Tver, near the source of the Volga. It forms the boundary between Livonia and Courland, and enters the Gulf of Riga 7 miles below the town of Riga. Length, about 600 miles.

**Dwina**, or **Northern Dwina**, a large river of Russia, is formed by the confluence of the Sookhona and Vithegda, in the government of Vologda. It flows nearly N. W. through Archangel, and enters the White Sea 20 miles below. Its length is estimated at 450 miles.

**Dyaks**, the aborigines of Borneo, occupy mostly the interior of the island. (See BORNEO.)

**Dyck, van** (ANTHONY). See VANDYKE.

**Dyeing** [Lat. *tinctura*; Fr. *teinture*; Ger. *Färben* or *Färbekunst*], the art of coloring yarn or cloth, has been practised from the most remote antiquity. The fibres and fabrics usually dyed are either cotton, linen, silk, or wool. (See TEXTILE FABRICS.) The coloring-matters employed are either the natural products of animals or plants, or are the results of chemical processes. (See DYE-STUFFS.) Thorough cleansing of the fibres is an almost indispensable preliminary to dyeing. Resinous and oily matters must be removed to give the dye liquors free access to the fabrics, and natural coloring-matters must be destroyed in order to secure the brightest and clearest tints of the dyes. Cotton is successively boiled with lime, soda-ash, and rosin; it is then soured with dilute sulphuric acid, and finally treated with hypochlorite of lime (bleaching-powder). Linen is subjected to repeated treatment with water, alkalies, acids, and hypochlorite of lime, alternating with exposure on the grass to air and sunlight. Silk is boiled in a solution of fine soap to remove the gelatinous, resinous, and fatty matters which make up a large proportion of its weight. Wool is thoroughly cleansed by washing in weak soap or soda-lye, putrid urine, or weak ammonia. (For the details of these operations see BLEACHING.)

The dyeing is usually effected while the fibres are in the yarn, although the woven cloth is dyed in some cases. The special operations of dyeing vary with the fabric and the coloring-matters employed. Some colors combine with the fibres very readily as soon as they are immersed in their solutions; such colors have been called *substantive*. Silk and wool take colors much more readily than cotton and

linen; many dyes are therefore substantive for these animal fibres. Nearly all the aniline colors belong to this class. With such colors the operations of dyeing are very simple. They consist in the mere immersion of the yarn or cloth in cold or hot solutions of the dye, with sufficient handling to secure the even distribution of the color. Agents are often added to fix or set the color, such as acids, alkalies, tin salt, alum, etc. A few colors are substantive for cotton and linen, as the safflower pink.

For dyes which will not unite directly with the fibres, called *adjective*, the aid of *mordants* is necessary. Mordants are bodies which possess an affinity for the colors, and which can be fixed in an insoluble condition on or within the fibres. Some are metallic oxides or salts, as alumina, oxide of iron, oxide of tin, tannate of tin, soap, etc.; others, as albumen, gluten, caseine, tannin, acids, etc., are of a different character. The mode of applying the mordant depends on the fabric, as well as on the character of the mordant itself. Silk and wool, when immersed in a solution of alum, take up a considerable quantity of the salt without decomposing it. The acetates of alumina and iron are easily decomposed, with the liberation of a portion of the acetic acid and the formation of an insoluble basic acetate. By boiling cotton in their solutions the fibres become thoroughly impregnated with the insoluble compounds, and when the yarn is transferred to the solution of the dye-stuff, the color unites with the mordant, forming insoluble colored bodies in or upon the fibres which are called *LAKES* (which see). The goods thus become permanently dyed. The same decomposition of the aluminous or ferrous salt occurs if the goods are simply immersed and then hung up in the air. Chloride of tin is decomposed by boiling its dilute solution, with the liberation of hydrochloric acid and the formation of insoluble oxide of tin. Sometimes the insoluble oxide or salt is produced by first immersing the goods in a soluble salt, and then passing them through a second solution of another agent. Exposing fabrics to an iron salt, and then to an alkaline lye, fixes oxide of iron. A lead salt and an alkaline lye fix oxide of lead. Stannate of soda, followed by a solution of nutgalls, sumach, etc., fixes tannate of tin in the fibres.

In some cases the mordant is mixed with the color, and both are applied simultaneously, to be subsequently fixed. Thus, aniline colors are mixed with albumen, applied to the cloth, and fixed by steaming, which coagulates the albumen, rendering it insoluble. Mixtures of the acetates of alumina and iron, of the chloride of tin, etc. with colors, are also fixed by steaming. This method of fixing colors is extensively practised in *CALICO-PRINTING* (which see), as it renders it possible to produce patterns by applying the colors to certain portions of the cloth, or by applying different colors to different portions. Mordants often affect the natural tints of the dyes, thus enabling the dyer to produce a variety of shades with the same dye. Oxide of iron is most remarkable in this respect; it changes the red color of madder, logwood, Brazil-wood, etc. to shades of purple, lilac, chocolate, and even black, according to the proportions in which it is employed. The most durable blacks are obtained with oxide of iron, combined with logwood, sumach, catechu, etc. The oxide of tin tends to brighten the shades, while alumina fixes them in their natural tints. This is a very important circumstance in calico-printing, as it enables the dyer to produce several colors on the same cloth by one operation of dyeing; the mordants, acetate of alumina, acetate of iron, and mixtures of the two salts in varying proportions, being printed on the cloth. The oxides are rendered insoluble by hanging the cloth in the air (*aging*), and by washing in alkaline solutions of silicate, arseniate, or phosphate of soda (*dunging*). On passing the mordanted cloth through a mixture of madder-root, Brazil-wood, etc. in warm water, patterns in pink, red, purple, lilac, chocolate, and black are produced. Metallic pigments are often produced in the yarn or cloth by the successive application of the agents necessary for their production. Thus, when cloth mordanted with oxide of iron is passed into an acidulated solution of ferrocyanide of potassium, an insoluble Prussian blue is at once produced. Goods impregnated with oxide of lead by immersion in acetate of lead become bright yellow in a solution of bichromate of potash, owing to the formation in the fibres of insoluble chromate of lead. By subsequently boiling with lime-water the yellow is changed to orange basic chromate. Pigments are also fixed upon the cloth by albumen; this is especially the case in the application of the chromates of lead, ultramarine, and Guignet's green in calico-printing. Indigo blue is produced in cotton by immersion in a solution of colorless reduced indigo (the indigo vat) and exposure to the air, when the indigo blue is regenerated by oxidation in an insoluble form. The following are a few of the principal methods of dyeing; more detailed statements are given under the different dyestuffs:

## REDS.

*On Cotton.*—(1) Mordant with sumach, then with red spirits (a solution of 2 oz. of tin in 3 oz. hydrochloric acid, 1 oz. nitric acid, and 1 oz. water); then dye in a mixture of Lima-wood and fustic. (2) The most beautiful red on cotton, Turkey red, is produced by boiling the cloth in a mixture of oil and a little carbonate of soda. It is then dried, freed from the excess of oil by pearlash, passed through a bath of nutgalls and alum; then through hot water holding chalk in suspension. It is then ready to be dyed in a boiling bath of madder. It is then washed, and the treatment with galls and alum, chalk and madder repeated. It is then cleared or brightened by boiling in soap and pearlash, then in soap and protochloride of tin; finally, it is immersed in a bath of sour bran. (3) Aniline reds and pinks on cotton mordanted in nutgalls or sumach, followed by perchloride of tin.

*On Wool.*—(4) Mordant with alum and bichromate of potash, and dye with peach and Lima-wood, with alum. (5) *Scarlet*. Cochineal, with cream of tartar, sumach, and fustic. (6) *Crimson*. Cochineal, with cream of tartar and protochloride of tin. (7) *Pink*. Cochineal, tartar, alum, and red spirits. (8) Aniline shades are fixed on wool without mordants.

*On Silk.*—(9) Peach-wood and fustic, followed by red spirits, with annatto for scarlets, cochineal and safflower for finer tints. (10) *Pink*. Safflower, with sulphuric acid and cream of tartar. (11) Beautiful tints have been obtained from lac-dye. (12) Anilines are applied to silk in a warm bath, slightly acidulated with acetic, tartaric, or sulphuric acid.

## BLUES.

*On Cotton.*—(13) Prussian blue produced by an iron mordant, followed by ferrocyanide of potassium. (14) Indigo vat, a solution of reduced indigo. (15) *Aniline blues*. Mordant with soap, then sumach, the protochloride of tin; dye in warm bath.

*On Wool.*—(16) Prussian blue, as for cotton. (17) Indigo extract, with argol and alum. (18) Aniline blue, with starch, sulphuric acid, and gum-arabic.

*On Silk.*—(19) Prussian blue, as for cotton. (20) Indigo extract and alum. (21) Anilines, with soap and sulphuric acid.

## YELLOW AND ORANGES.

*On Cotton.*—(22) Chromate of lead, produced by bath of acetate of lead, followed by bichromate of potassa, deepened by the addition of annatto. (23) The chrome yellow is deepened to orange by boiling in lime-water. (24) Mordant in acetate of alumina and dye in yellow weed (weld). (25) Mordant in weak protochloride of tin; dye in quercitron bark, fix with protochloride of tin. (26) *Coraline orange*. Mordant with stannate of soda, then with sumach.

*On Wool.*—(27) Mordant in tartar and alum; dye in mixture of quercitron, sumach, fustic, and red spirits. (28) Weld, with alum and tartar. (29) *Pieric acid*. (30) Aniline yellow. (31) Naphthaline yellow. (32) *Orange*. Sumach, with cochineal, fustic, tartar, and red spirits. (33) Aniline orange.

*On Silk.*—(34) *Yellow to orange*. Annatto, with alum and white soap. (35) Weld, with alum and tartar. (36) *Pieric acid*. (37) Aniline yellow or orange. (38) Naphthaline yellow.

## GREENS.

*On Cotton.*—(39) Dye blue, then yellow with fustic or quercitron bark. (40) Aniline green, on cotton mordanted with sumach; brighten the tint with pieric acid.

*On Wool.*—(41) Dye yellow with fustic and alum, then blue with indigo. (42) For olive, use fustic with logwood, madder and peach-wood; following with coppers. (43) Aniline green. (44) *Pieric acid* and indigo carmine.

*On Silk.*—(45) Fustic, with sulphate of indigo and alum, using logwood and coppers to darken shades. (46) Lakao, or Chinese green, gives beautiful shades. (47) Aniline green, with sulphuric acid or cream of tartar. (48) *Pieric acid* and indigo carmine.

## PURPLES, VIOLETS, AND LILACS.

*On Cotton.*—(49) Mordant with red spirits, and dye with logwood, to which a little red spirits and acetate of alumina have been added. (50) Dye light blue, then redden in logwood with alum. (51) Mordant in sumach, then in red spirits, and dye in logwood. (52) *Safflower lavender*. Dye light blue, then cover with safflower pink. (53) Dye madder on a mordant of alumina and oxide of iron. (54) *Aniline colors*. Mordant with perchloride of tin or with sumach, followed by perchloride of tin or tartar emetic; fix with gelatine or albumen.

*On Wool.*—(55) Cudbear, logwood, barwood, camwood, or peach-wood, with alum. (56) Murexide, fixed by corrosive sublimate, acetate of soda, and acetic acid. (57) Anilines.



*On Silk.*—(58) Archil or cudbear. (59) Murexide, as for wool. (60) Anilines.

#### BLACKS.

*On Cotton.*—(61) Sumach, followed by copperas, then by logwood, then by weak copperas; the color is improved by adding fustic and replacing the second copperas bath by acetate of iron. (62) For blue-black precede 61 by the indigo vat. (63) Aniline black is not available for dyeing, although the best black for many styles of calico-printing.

*On Wool.*—(64) Camwood, followed by copperas, then logwood, finally copperas. (65) Mordant in bichromate of potassa, with alum and fustic; hang in the air; dye in logwood, barwood, and fustic; finish in copperas.

*On Silk.*—(66) Copperas and logwood, repeated; the addition of nitrate of iron and fustic improves. (67) For blue-black, dye in Prussian blue and follow with 66.

#### DRABS.

*On Cotton.*—(68) Sumach, followed by weak copperas, then fustic, Lima-wood, and logwood; raised with alum.

*On Wool.*—(69) Madder, peach-wood, logwood, fustic, with alum and copperas.

*On Silk.*—(70) Sumach, fustic, and logwood, with copperas.

#### BROWNS.

*On Cotton.*—(71) Dye yellow, then with Lima and logwood, and fix with alum. (72) *Catechu brown.* Boil in catechu, pass through hot bichromate of potassa, wash in hot water containing a little soap. (73) *Chocolate or French brown.* Dye in spirit yellow, 25, then in logwood, and raise with acetate of alumina.

*On Wool.*—(74) Pass through a bath of fustic, madder, peach, and logwood; then through dilute copperas. (75) Bath of bichromate of potassa, argol, and alum; then of madder, peach, and logwood. (76) Aniline brown.

*On Silk.*—(77) First orange, with annatto, then pass through copperas, then bath of fustic, logwood, archil, and alum; modify with fustic for yellowish, peach for reddish, logwood for bluish brown. (78) Aniline brown.

(For special works on dyeing, see article on CALICO-PRINTING.)

C. F. CHANDLER.

**Dyer** (ALEXANDER B.), an American officer, born in 1817 in Virginia, graduated at West Point in 1837, and Sept. 12, 1864, chief of ordnance with the rank of brigadier-general. He served in the artillery at Fortress Monroe, Va., and in the Florida war 1837-38, and in the ordnance at various arsenals 1838-46; as chief of ordnance of the army invading New Mexico 1846-48, engaged at Canada, Taos (brevet first lieutenant), and Santa Cruz de Rosales, Mexico (brevet captain); on ordnance duty and in command of various arsenals 1848-61; and member of ordnance board 1859. He served in the civil war in command of Springfield Armory 1861-64, largely extending the manufacture of small-arms; as member of ordnance board 1860-63; and as chief of ordnance and in charge of ordnance bureau at Washington, D. C., after 1864. Brevet major-general Mar. 13, 1865. Died at Washington, D. C., May 20, 1874.

GEORGE W. CULLUM.

**Dyer** (ELIPHALET), born at Windham, Conn., Sept. 28, 1721, died there May 13, 1807. He graduated from Yale College in 1740, and commenced to practise law in 1745. During the French war (1755) he commanded a Connecticut regiment, and in 1762 he was elected a member of council. In 1763 he went to England as agent for the Susquehanna Company, and he was a delegate to the Stamp Act Congress in 1765. He was a member of Congress during the war.

**Dyer** (Rev. GEORGE), an English antiquary and scholar, born in London Mar. 16, 1755. He was educated at Cambridge, became a Baptist minister, and preached for some years at Oxford, from which he removed to London in 1792. He edited Valpy's Classics, and wrote, besides other works, a "History of the University of Cambridge" (2 vols., 1814). Died Mar. 2, 1841.

**Dyer** (Rev. JOHN), an English poet, born in Carmarthenshire in 1700. He was originally a painter, and studied art in Italy. He published in 1728 a poem entitled "Grongar Hill." Having taken holy orders, he obtained the livings of Calthorpe, Coningsby, and Bedford. Among his works are the "Ruins of Rome" (1740), and "The Fleece," a didactic poem (1754). Died July 24, 1758.

**Dyer, or Dyre** (Mrs. MARY), a member of the Society of Friends who suffered death for her religion. She was hanged on Boston Common, a willing martyr, June 1, 1660. (See HILDBRETH, "History of the U. S.," vol. i.)

**Dyer** (N. MAYO), U. S. N., born Feb. 19, 1839, in Massachusetts, appointed a master's mate in the volunteer navy May 2, 1862, became an acting ensign in 1863, an acting master in 1864, and an acting lieutenant in 1865. He re-

ceived a commission as lieutenant-commander in the regular navy Dec. 18, 1868. On the night of May 18, 1862, Master's Mate Dyer, in charge of the second cutter of the steamer R. R. Cuyler, off Mobile, boarded a blockade-runner which had accidentally grounded within 200 yards of Fort Morgan, and captured her officers and crew. Then, observing that a gunboat was coming towards him, Dyer set fire to the vessel, which, being filled with cotton, was soon destroyed, and made his way in safety with his prisoners to the Cuyler. He served on board the Metacomet at the battle of Mobile Bay, Aug. 5, 1864, and is thus honorably mentioned by his commanding officer, Lieutenant-Commander James E. Jowett, in his official report to Rear-Admiral Farragut of the part taken by the Metacomet in the action: "For the efficient handling of the vessel I am much indebted to Acting Master N. M. Dyer, who had permission to go North on leave, but volunteered to remain to assist in the attack upon the forts." He became commander Apr. 23, 1883; was lighthouse inspector 10th dist. Oct. 1, 1883-84.

FOXHALL A. PARKER.

**Dyer** (Rev. SIDNEY), a Baptist minister and author, was born at White Creek, Washington co., N. Y., in 1814. He became a soldier of the U. S. army in 1831, and remained in the service nearly ten years. In 1842, after laborious study, he was ordained, and afterwards was a missionary to the Choctaws. In 1852 he became pastor of a church in Indianapolis, and in 1859 one of the secretaries of the Baptist Publication Society in Philadelphia. He has published "Voices of Nature," "Songs and Ballads," "Great Wonders in Little Things," and other works.

**Dyers' Broom**, called also **Woodwaxen**, **Dyers' Green-Weed**, and **Whin**, a low shrub with yellow flowers and simple leaves. It is the *Genista tinctoria*, a European leguminous plant now thoroughly naturalized in New England. It is said to be the *genêt*, the bush which gave its name to the Plantagenet family. It was introduced into this country for garden cultivation, for its tops were formerly used to make a yellow dye for domestic purposes. It is used in Russia as a preventive to hydrophobia, but it appears to be simply a hydragogue cathartic of no great value.

**Dyersburg**, capital of Dyer co., Tenn. (see map of Tennessee, ref. 6-B, for location of county), on R. R. and Forked Deer River, about 160 miles W. of Nashville. Pop. in 1870, 683; in 1880, 1010.

**Dyersville**, on R. R., Dubuque co., Ia. (see map of Iowa, ref. 4-K, for location of county). It has a flour-mill and breweries. Pop. in 1880, 975.

**Dyers' Weed** or **Weld**, also called **Wood** and **Rocket**, the *Reseda luteola*, a European herb of the order Resedaceæ, naturalized about New York. It considerably resembles its congener, the mignonette. It is extensively cultivated in Holland and France, and to some extent in England, and is a valuable yellow dyestuff. Its quality is much improved by cultivation. It was formerly used in medicine as a sedative, diaphoretic, and diuretic.

**Dyestuffs.** The bodies used to impart color to textile fibres and fabrics are either derived from the animal or vegetable kingdom, or are prepared artificially, either from mineral or vegetable products. Many colors exist already formed in plants; others are produced from colorless bodies by oxidation or other processes. Lakes are compounds of coloring-matters with metallic oxides, such as alumina, the oxides of tin, lead, antimony, and barium. They are generally prepared from cochineal, madder, weld, Brazil-wood, coralline, aniline colors, etc. (See LAKES.) The following are some of the most important dyestuffs:

I. **ANIMAL DYES.**—*Cochineal*, the female insect of the species *Coccus cacti*, is by far the most important. Its coloring principle is carminic acid. It produces scarlets and crimsons of great brilliancy on silk and wool. Carmine is nearly pure carminic acid. *Kermes*, *kermes grains*, *alkermes* is the insect *Coccus ilicis*, one of the most ancient dyes for red shades on silk. *Lac* is the *Coccus lacce*, a similar insect. The *Tyrian purple* was obtained from mollusks: it is no longer used. *Galls* are excrescences produced on the leaves and leaf-stalks of the oak by punctures of the gall-wasp, made for the purpose of depositing her eggs. Their characteristic constituent is tannic acid, which produces drabs and blacks with iron salts. They also serve as a mordant for some aniline colors, and are the basis of most writing inks. *Sepia* is the fluid of cuttle-fish; it is not used as a dye, but as a water-color by artists. *Murexide* is a purple compound produced by the action of nitric acid and ammonia on uric acid from guano; it is no longer used.

II. **VEGETABLE DYES.**—These are extremely numerous, although only a few are in general use. They are derived from different parts of plants: (1) From roots the most important is *madder* (*Rubia tinctorum*), which contains two

principles, alizarine and purpurine. These bodies produce on cotton the most permanent reds, purples, and chocolates, which makes them specially applicable for calico-printing. Madder appears in commerce in the form of ground root; flowers of madder, the ground root washed and fermented; garancine, the ground root boiled with sulphuric acid and washed; and extract, a tolerably pure alizarine. Recently the alizarine has been manufactured artificially from the anthracene of coal-tar, and there is reason to believe that the artificial product will almost entirely supersede the natural root. *Munjeet* is the Indian madder. *Alkanet* is the *Anchusa tinctoria*, formerly used for lilac, lavender, and purple on silk. Its colors were always fugitive. *Barberry* produces a yellow of little importance. *Turmeric*, or Indian saffron, produces a fugitive yellow. It is now chiefly used for yellow lacquers, as a test for alkalis, for mixing with curry-powder and with mustard. *Soorangee* is a yellow much used in India. (2) Among the more important woods are *logwood*, containing hæmatoxylin, extensively used for reds, purples, violets, blues, and blacks; *Brazil-wood*, comprising several species of *Cesalpinia*, found in Central and South America and in Japan, known as "Lima," "Pernambuco," "Santa Martha," "Peach," "Nicaragua," "Sapan" or "Japan," etc. It yields a coloring-matter known as brazilin, which produces rich reds. *Sandal-wood* from Ceylon, and *cam* and *bar wood* from Africa, contain santalin, which gives reds, violets, and scarlets. *Fustic*, or "yellow wood," is the *Morus tinctoria* from the West Indies. *Fustic*, "young fustic," or "Hungarian yellow wood," is the *Rhus Cotinus*. (3) The only bark of special importance is the *quercitron*, which produces a rich yellow, and greens when combined with blue. *Lo-kao*, or *Chinese green*, is a green lake prepared by the Chinese from the bark of a species of *Rhamnus*, or buckthorn. (4) Leaves of the *Rhus Cotinus* are known as *sumach*; they produce a yellow, but are generally used, on account of the tannic acid they contain, either as a mordant or to produce blacks, etc. with iron salts. *Chica*, which gives an orange on cotton, consists of the leaves of *Bignonia Chica*. (5) *Flowers*. The petals of *Carthamus tinctorius* constitute "safflower." They contain a useless yellow coloring-matter, soluble in water, and a beautiful pink (*carthamin*), soluble in alkalis, which is used for red on silk and cotton. This is the material used for dyeing *red tape* and for preparing *red saucers*. *Saffron*, a beautiful yellow dye, consists of the stigmas of *Crocus sativus*. (6) *Fruit*. "Persian," "French," "Turkey," etc. berries are derived from several species of *Rhamnus*. They contain a beautiful yellow dye (*chrysothamnine*) and olive-yellow (*zanthorhamnine*). They are used in calico-printing, for paper pulp, and for lakes. *Annatto* or *annatto* is an extract of the seed-pellicles of *Bixa Orellana*. It is used for yellows, oranges, and with reds for scarlet. It is also employed for coloring butter and cheese. *Divi-divi* is the pod of the *Cesalpinia Coriaria*. It contains tannic acid. *Catechu*, *terra japonica*, and *gambir* are the extracts prepared from the fruit, wood, twigs, and unripe pods of several plants growing in India. Their active principle, as well as that of *divi-divi*, is tannic acid. They are used as mordants, with iron salts for drabs and blacks, and in tanning skins. (7) *Entire plants*. *Indigo* from various species of the *Indigofera*, and *woad* from the *Isatis tinctoria*, contain a glucoside (*indican*) which by fermentation yields indigo blue (*indigotine*). This color has long been used as one of the most permanent blue dyes. Several preparations are employed by the dyer: (a) solution of colorless or reduced indigo, with which the cloth or yarn is impregnated, and from which the insoluble blue indigotine is precipitated on exposure to the air; (b) in solution in sulphuric acid as sulpho-purpuric acid, purple blue, or as sulpho-indigotic acid, deep blue; (c) as carmine of indigo, the soda compounds of the above-mentioned acids. It is used for cotton, silk, and wool, and in calico-printing. *Lichens*. A variety of lichens yield, by a kind of fermentation, a series of products known as *archil* or *oreille*, *eudbear* or *persin*, and *litmus*. The weeds (from the Canaries, the Pyrenees, etc.) are pulverized and moistened with urine, when certain acids they contain are changed to the coloring-matter *orcin*. *Archil* appears in commerce as a purple paste, *eudbear* as a red powder, *litmus* as a blue lake. Before the introduction of the aniline colors the most beautiful purples for silk were obtained from *archil*. *Weld*, the *Reseda Luteola*, contains lutioline, which yields a rich but fugitive yellow.

III. ARTIFICIAL OR CHEMICAL COLORS.—(1) Pigments are insoluble metallic compounds, either produced in the yarn or cloth by successively applying the necessary reagents, or attached mechanically to the surface by albumen or other adhesive substances. *Prussian blue* is a ferrocyanide of iron; *chrome yellow* and *orange* are chromates of lead; *Schweinfurt green* is the aceto-arsenite of copper; *Guignet's green* is a hydrated oxide of chromium; ultra-

*marine* is a compound of alumina, silica, soda, and sulphur. (2) *Coal-tar colors*. Within the past few years a revolution has taken place in silk and wool dyeing, and even cotton-dyeing and calico-printing have been very considerably involved. An entirely new class of dyestuffs has been created by modern chemistry, all of which are derived from the refuse tar produced in gas-works from bituminous coal. These colors belong to four distinct series: (a) The aniline series, including the red rosaniline salts, the purple, violet, and blue substitution products derived from them, the greens, yellows, browns, black, and pinks, all of which are described under ANILINE COLORS (which see). (b) The phenol or carbolic acid series, including picric acid (yellow), phenicene, coralline (red and orange), and azuline or phenyl blue. (See PHENOL COLORS.) (c) The naphthalene series; Martin's yellow, dinitronaphthol yellow, Magdala red, and violet and blue substitution products derived from it. (See NAPHTHALENE COLORS.) (d) Anthracene series, of which artificial alizarine and anthrapurpurine are the representatives. (See ANTHRACENE, ALIZARINE, and Madder.)

All the important animal and vegetable dyestuffs above mentioned are described more fully under their respective titles. (For fuller information consult the works on dyeing mentioned in the article CALICO-PRINTING.)

C. F. CHANDLER.

**Dying Declaration**, in law, is a statement made by a person in the prospect of impending death with regard to the method of his death. In most countries such statements cannot be received in civil cases as evidence, and in criminal cases only when the manner of death of the deceased is the subject of the charge. They must be made with full knowledge of approaching death, must relate to facts only, must be complete and unqualified, and must be freely made. They are further subject to the ordinary rules of evidence. The theory is, that the knowledge of the approach of death creates an obligation at least equal to that of a judicial oath.

**Dyke, or Dike** [from the Dutch *dijk*, a "dike" or "wall;" Fr. *digue*], a term applied by geologists to the molten material filling a wide fissure or rent in rocks, such as often occurs in volcanic formations. This molten matter on cooling was solidified, so as to form a wall separating the edges of the disjointed strata. Such walls of intruded matter occur in stratified rocks of all ages, are usually nearly vertical, and are supposed to have been caused by volcanic eruptions. A dyke differs from a *fault* in not involving a shifting of the opposite sides of the fissure. The material with which the fissure is filled is often crystalline and porphyritic. In many cases the dyke is composed of lava, greenstone, or trap. Trap-dykes often project above the surface of the ground in consequence of the abrasion or denudation of the softer rock which was contiguous, and they form prominent objects in the landscape.

**Dyke**, a rampart against the encroachments of the sea. (See DIKE, revised by GEN. J. G. BARNARD, U. S. Army.)

**Dy'mond** (JONATHAN), an English moralist and writer, born at Exeter in 1796, was a member of the Society of Friends and a linen-draper. He wrote an able work entitled an "Inquiry into the Accordancy of War with the Principles of Christianity" (1823), and "Essays on the Principles of Morality, and on the Private and Political Rights and Obligations of Mankind" (1829), which are highly esteemed and have often been reprinted. Died May 6, 1828.

**Dynam'eter** [from the Gr. *δύναμις*, "power," and *μέτρον*, a "measure"] is an instrument for determining the magnifying power of a telescope. This power is the ratio of the solar focal distance of the object-glass to the focal distance of the eye-piece, considered as a single lens; and this ratio being the same as the ratio of the effective diameter of the object-glass of the telescope to the diameter of the image of the same formed at the solar focus and seen through the eye-piece, the object of the instrument is to measure the exact diameter of this image, which can be either projected on mother-of-pearl or measured by optical means. Ramsden proposed for this purpose the double-image dynameter, or micrometer, which is formed by dividing the eye-lens of a positive eye-piece into two equal parts, and mounting them so that the divided edges are made to slide along each other by means of a fine screw apparatus. Each semi-lens gives a separate image; and the distance of the two centres, measured by the revolutions of the screw when the borders of the two images are brought into contact, gives the distance of the centres of the images or the diameter of one of them.

**Dynam'ics**. The term *dynamics*, in its literal signification, as well as in its more modern acceptation, relates to or designates the science which has for its object the in-

vestigation of the laws and principles which govern the action of forces. The science of dynamics may be divided into various branches, each embracing the principles applicable to some special conditions of the action of forces or of the bodies acted on, such as the subject of *statics*, or the equilibrium of forces; the subject of *kinetics*, the action of forces in connection with the motions and changes which they produce; and the special applications of both these subjects to bodies in the *solid* and *fluid* states.

The abstract idea of force is derived from our knowledge and experience in regard to the forces of nature—gravitation, inertia, friction, molecular force, muscular force, etc. These forces are so far similar and identical in their effects as to admit of a common measure, and of being subjected to the same laws and principles. In general they arise from the action of one body on another, in such a manner that this action is distributed among all the particles or is exerted through a surface. But it is nearly always possible to assume a single force acting through a definite point and in a particular direction, which shall be equivalent, in its effects, to such combined or distributed forces. The force of gravity, for instance, is an attractive influence exerted between two bodies, which can only be supposed to be exerted by the separate particles or molecules of each, and yet a single force equivalent to the sum of the attraction of all the particles of a body, and acting through its centre of gravity, is usually assumed to represent this attraction. A force may thus be regarded as an influence or action which requires three elements for its determination—its *line of action*, its *point of application*, and its *magnitude*.

This abstract idea is applicable to all forces, and furnishes the starting-point or basis of the system of principles which constitutes the science of force. These principles depend also on certain axioms of physical science derived from a consideration of the nature of forces and their effects; and also upon certain geometrical laws involving the relation between the magnitudes of forces and motions, and their equivalent components. To compare the magnitudes of forces a standard unit or measure must be adopted which is applicable to all forces under all ordinary conditions. As all standards of measure are arbitrary, such a unit of measure may be found in the effects which a given force will produce under conditions which permit of the effect being measured by some other known standard of measure.

To explain the standard or unit of force adopted in dynamical science, it will be necessary to explain just what is understood by the mass of a body. If we suppose (*for the purpose of this explanation only*) that the ultimate particles or molecules of all substances are the same, and that we may designate by the term *density* the degree of proximity of the particles of any body to each other, then the number of particles in a given volume may be taken to denote the mass of the body; *i. e.* this number would represent the *quantity of matter in the body*. This quantity of matter or mass has important properties as regards force. First, the action of the force of gravity upon the body is directly proportional to the mass; and this mass possesses a peculiar power of resistance to any force which acts to change its condition in respect to motion. It is inert as regards any power in itself to change, but a force of resistance is developed with the action of an impressed force. The truth of this principle is so well established that the following relation between an impressed force, the mass of a body free to move without resistance (other than its inertia), and the velocity which is produced in a unit of time, has the force of a scientific axiom. This relation may be stated as follows: *The velocity produced in a body free to move without resistance in a unit of time will be directly proportional to the intensity or amount of the impressed force, and inversely proportional to the mass of the body.* In algebraic symbols, if  $v$  be the velocity,  $F$  the force, and  $M$  the mass, the relation will be expressed by the equation

$$v = \frac{F}{M}.$$

From this is determined the value of the force

$F = Mv$ . If the mass  $M$  be that of a given volume of some substance assumed as a standard, the unit of force may be assumed to be that force which will produce a given velocity—the unit of velocity, for instance—in a unit of time. This is an *absolute unit of force*, and serves as a universal measure. Another measure adopted is more specific, but not an invariable standard. It is, however, that in most common use, and is perhaps the most universally understood as the standard of measure for forces. If the force  $F$ , instead of being any force, be taken as the force of gravitation, the total attraction of the earth at a given place on the mass  $M$  will be what is commonly called the weight of the body; representing this by  $W$ , we shall have  $W = Mv$ . If the same standard mass be chosen as before, the weight of this mass may be taken as the unit

of force. Such a unit has been generally adopted for different national standards. For English measures the mass  $M$  is that of a piece of platinum carefully preserved, the weight of which is called 1, or one pound. This weight will differ for different latitudes, because the force of attraction of the earth varies with the latitude, and hence this measure is not absolute in its character, but it is convenient for use, and is universally employed. If any mass be allowed to fall under the influence of gravity, the velocity generated in one second may be determined experimentally, and the equation  $W = Mv$  will give the relation between the weight, mass, and velocity under these circumstances. In the latitude of London this velocity is 32.2

feet, approximately; so that  $\frac{W}{32.2} = M$ . The mass of a

body is thus found by dividing the weight by 32.2. The unit of force, for British measures, may therefore be said to be *one pound avoirdupois*, and the mass of a body may be found by dividing the weight by the number 32.2; these quantities representing British measures referred to the latitude of London. The corresponding French unit of force is 1 kilogramme, equivalent to about 2.2 British units.

A force being fully represented by its *magnitude*, *direction*, and *point of application*, the first problems in order in the action of impressed force, relate to the laws of equilibrium, or the rules for finding the resultant of any number of forces acting on a body. If the lines of direction of the forces all pass through the same point, the resultant may be found by the application of the geometrical theorem called the parallelogram of forces. If two forces act upon one point, and portions of their lines of direction be taken to represent the magnitude of the forces, their resultant, or a single force equivalent to the action of the two, will be represented by the diagonal of the parallelogram constructed on the lines of the other two. By counting the forces which act on a point two and two, and repeating the process, a single resultant for all may be found. Or, to determine graphically the resultant, from the extremity of the line representing one of the forces draw a line parallel to the direction of any other force, of a length representing the magnitude of this force; then from the extremity of this last line draw another, parallel to and equivalent to another force, and so on; the final resultant will be a line drawn from the extremity of the last line to the origin, or point of application; if this line is zero, then the forces are in equilibrium. If the forces do not all act on one point in the body, the conditions of equilibrium require that the action of the forces shall be such that they not only produce no motion of the body in a straight line, but there must be no unbalanced effort to turn the body about any line as an axis.

The *moment of a force* in reference to an axis is the product of the intensity of the force into the perpendicular distance of its line of action from that axis.

Several special cases may be considered as leading to the most general case of the equilibrium of any number of forces acting upon a rigid body in any direction.

1st. To find the resultant of two parallel forces acting in the same direction, divide any line across their common direction into parts inversely proportional to the magnitudes of the forces; the point of application of the resultant may thus be found, and its magnitude will be equal to the sum of the magnitudes of the two forces. A third force equal and opposed to this resultant will produce equilibrium.

2d. The resultant of any number of parallel forces acting in one plane and in the same direction may be found by first finding the resultant of two, then the resultant of this with a third, and so on.

3d. For any number of parallel forces not in one plane, the conditions of equilibrium require that the algebraic sum of the forces shall be equal to zero, and the algebraic sum of the moments of the forces in reference to any two rectangular axes in the plane; that is, the combined action of the forces must produce neither a motion of translation nor of rotation. The resultant of such a system, if there be a resultant, may be a single force, or two forces forming what is called a couple.

4th. Two equal parallel and contrary forces not acting on the same point produce a couple which has no single resultant.

5th. When a system of forces act in various directions and on various points of a rigid body, if their axes be assumed at right angles to each other, each of the forces may be replaced by three component forces in the direction of these axes. The components of each force being found by multiplying the magnitude of the force by the cosine of the angle which its line of action makes with the direction of the component (a process which depends on the theorem of the parallelogram of forces), then the conditions of equi-

librium of the system are that the algebraic sums of the components in the directions of the three axes shall be zero, and also the algebraic sums of the moments of the forces in reference to these axes must be zero.

The application of these principles to find the centres of gravity of various lines, surfaces, and solids is made by supposing the body to be divided into small elementary portions, and these portions to be acted on by the parallel forces of gravity acting on each. In a corresponding manner the centre of pressure of fluids resting upon surfaces may be found.

The various cases of equilibrium when no other forces act on a body than the force of gravity, and the pressure between the body and fixed supports, constitute a large class of problems which occur in the applications of dynamics to engineering; the stresses and strains which are produced in the pieces of a structure being the principal objects for calculation. In the action of forces where motion is produced, the elements of time, space, and velocity enter into the discussion, as well as the mass of the body acted on.

The three fundamental axioms or truths on which the science of dynamics principally rests are—

1st. Every body continues in its state of rest or of uniform motion until compelled by impressed forces to change its state.

2d. Change of motion is proportional to the resultant of the impressed forces, and takes place in the direction of the straight line in which that force acts.

3d. There can be no action of a force without a contrary and equal reaction.

The *work* of a force is the product obtained by multiplying the intensity of the force by the space passed over by its point of application.

According to the above axioms or fundamental principles, the effort of any force must be opposed by an equal and contrary effort from some other force. In cases of bodies free to move under the influence of any force, a portion of the resistance to the external force is always supplied by the inertia of the body. If no other force acts upon the body than the force which produces the motion, the whole of the resistance will be supplied by inertia, and the expression which has been employed,  $F = Mv$ , gives the relation between the force and the resistance in terms of the mass and velocity. The quantity  $Mv$ , called by some writers quantity of motion, and by others momentum, may be interpreted as implying that this is the *measure* of a force which, acting for a unit of time, generates the velocity  $v$ . If the force continue to act on the body so as to accelerate the velocity, the *work* of the impressed force must be equivalent to the work of the resistance during any given time or through any given space. A body moving, for instance, with a velocity  $v$ , and having by the action of an impressed force its velocity changed to  $v'$ , the change of momentum will be  $M \cdot (v - v')$ . The force necessary to produce this change in the time  $t$  will be  $F = M \cdot \frac{v - v'}{t}$ . If during this

time we suppose the body to have passed with a uniformly accelerated velocity over the space  $s$ , the *work* of the force  $F$  will be  $Fs$ . But the space  $s$  is equal to the mean velocity multiplied by the time, or equal to  $\frac{v + v'}{2} t$ , and we have

$$F \times s = M \cdot \frac{v - v'}{t} \times \frac{v + v'}{2} \cdot t = M \cdot \left( \frac{v^2 - v'^2}{2} \right).$$

If the body start from rest, the initial velocity will be 0, and we shall have

$$F \times s = \frac{Mv^2}{2}.$$

The same may be proved whether the impressed force is constant or variable; and the important principle is thus established that the product of the mass of a body multiplied by half the square of the velocity with which the body is moving, is equivalent to the *work* of the impressed force which produces this velocity in the body. And generally a change in the value of  $\frac{Mv^2}{2}$  is always equivalent to the *work* of the force which produces the change. The quantity  $\frac{Mv^2}{2}$  is called *living force*, and sometimes *actual energy* of the body, because a body moving with the velocity  $v$  will always require the expenditure of the work represented by  $\frac{Mv^2}{2}$  to bring it to rest.

In cases where external resistances act on the body in opposition to the impressed force, the work of the resistance, added to the work of inertia, will be equivalent to the work of the impressed force. This gives rise to a very simple enumeration of the laws of all machines—viz. the work of the effort or prime mover must always, during any

interval of time, be equal to the total work of the resistances added to the actual energy or living force accumulated in the moving pieces. If during a given period the living force of any piece is alternately increased and diminished, the quantities of energy stored and re-stored may just equalize each other; and such a piece may be employed simply for the purpose of storing up and restoring work, as a regulator. The common fly-wheel is such a piece in machinery.

If a body has a rotary motion about any axis, the actual energy or living force due to the rotation is expressed in terms of the angular velocity and the moment of inertia of the body with reference to the axis. If the angular velocity be represented by  $\alpha$ , the actual energy due to rotation will be  $\frac{\alpha^2}{2g} I$ ; the moment of inertia  $I$  being found by

means of what is called the radius of gyration, which is that radius or distance in a rotating body the square of which is the mean of the squares of the distances of the particles of the body from the axes. It is found by geometrical solution. For the fly-wheel this radius is approximately equal to the mean radius of the rim.

When a body in motion is constrained to move in a curve, the force which causes it to deviate at each instant from the tangent is found by multiplying the mass by the square of the velocity, and dividing by the radius of curvature. The deviating force is equal and opposite to the influence which tends to draw the body away from the axis, the centrifugal force, and hence the *centrifugal* force is always proportional to the square of the velocity, and inversely as the radius of curvature.

In the application of the laws of dynamics to fluids the principle of living force holds true as for solids. Every fluid mass in motion has a living force proportional to the mass, multiplied by the square of the velocity.

The force of heat is derived from the same general dynamical law. It has been demonstrated that the molecules of all bodies have a constant vibratory motion, and these molecules having weight, the energy exerted when a body is cooled is equivalent to the expenditure or change of living force; and when a body is heated, the vibratory motion of the particles being increased in velocity, living force or actual energy is stored.

The property of matter which is called inertia, by virtue of which masses in motion possess a force which is appropriately called *living force*, is of great importance in the economy of machines, and of special importance also to living beings. In nearly all motions of animals this principle acts to aid the muscles in the execution of particular movements, which would otherwise be accomplished by fatiguing exertions, and would often be otherwise impracticable.

The demonstrations and applications of the various principles which have been enunciated, with their secondary consequences, usually occupy entire volumes. Works of this character have generally been entitled works on mechanics, and are often divided into two subjects or parts, *statics* and *dynamics*, but the tendency of modern writers is to exclude the word *mechanics* from definitions connected with abstract science, and to employ the term *dynamics* to designate the whole science of force. W. P. TROWBRIDGE.

**Dynamic Units** are units for measuring forces and their effects. The simple unit of force has been defined under DYNAMICS. A unit of work combines two elements—viz., force acting, and space through which it acts; and is the product of a unit of force and a unit of distance. Such is the foot-pound, which is the work done in raising one pound one foot; or the kilogrammètre, the work done in raising one kilogramme one mètre. A unit of power, or of rate of working, involves the additional consideration of time. It is a definite amount of work conventionally fixed upon for purposes of comparison as the work of a unit of time. Thus, the horse-power, the unit of rate commonly used in this country in estimating the performance of machines, is 550 foot-pounds per second, or 33,000 per minute. The *cheval-vapeur* (French horse-power) is 75 kilogrammètres per second, or 4500 per minute; equal to 542½ foot-pounds per second, or 32,550 per minute, nearly—a little less than the former. W. P. TROWBRIDGE.

**Dynamite.** See EXPLOSIVES, by GEN. H. L. ABBOT, U. S. Army.

**Dynamite-Gun**, used for throwing dynamite. An experimental gun for this purpose was made in New York City and tried at Fort Hamilton in Apr., 1884. The gun consists of a tube 40 feet long and one-eighth of an inch thick, with a bore 4 inches in diameter, connected with a large steel cylinder supplied with compressed air by a steam-engine. The target was 8 feet by 10 feet, 1¼ miles distant, and the projectile first used was 22 pounds in weight and loaded with sand instead of dynamite; after-

ward two shots were fired loaded with fulminate of mercury. Neither of the shells exploded until it struck the earthworks, and both penetrated 4 or 5 feet into the earth. The projectiles were discharged at an air-pressure of about 500 pounds, and the experiment, which was conducted by Col. John Hamilton and Lieut. E. L. Zalinski, was entirely successful. The pressure is to be increased to 2000 pounds. This gun is not intended to supersede powder-guns, but it will be a valuable auxiliary, as it can be used with equal advantage on land or at sea.

**Dynamometer** [from the Gr. *δύναμις*, "force," and *μέτρον*, a "measure"], an instrument or apparatus for measuring energy exerted or work performed. Any contrivance may be so called which indicates the intensity of a force used to produce motion. The work done is found by multiplying the mean effort thus indicated into the space passed over by the point where the force is applied. A dynamometer may record only the intensities of the force, space being ascertained independently; or it may record both force and distance traversed. A spring attached to a plough-beam may, by suitable mechanism, be made to record the varying force of traction, and thus become a dynamometer. The mean force shown by it, multiplied into the length of the furrow, will give the work of the animals drawing the plough. Prony's friction dynamometer is the form most easily applied to revolving shafts. A flexible band, enveloping either the shaft or a drum turning with it, resists the driving force by its friction. The resistance is measured by the weight required to keep the band from turning with the shaft; and this weight, multiplied by the distance it would have been carried in a given time if it had revolved with the shaft, gives the work of the prime-mover. Hirn's torsion dynamometer measures the force applied to a shaft, by the torsion caused by such force in the shaft itself. The torsion dynamometer and the spring dynamometer are best suited to measure variable forces; but there are instruments of this class in which force is measured by the resistance of fluids driven through small apertures. For measuring the work of fluid pressure, the steam-engine indicator is the dynamometer in common use. In this, the pressure of the fluid upon a small piston is resisted by a spiral spring. A pencil which moves with the piston traces upon a moving slip of paper a curve, of which the ordinates give the pressure, while a straight line perpendicular to these shows the distance passed by the surface pressed. The mean pressure multiplied by this distance gives the work done. (For Brewster's chromatic dynamometer see POLARIZATION OF LIGHT.) W. P. TROWBRIDGE.

**Dyrrhachium.** See DURAZZO.

**Dysentery** [Gr. *δυσεντερία*, from *δυσ*, "ill," "painful," and *εντερά*, "intestines"], a febrile disease, characterized by paroxysms of pain in the bowels, and by scanty though often frequent bloody, mucous stools. The glands and tissue of the large intestine are inflamed, and sometimes, though rarely, the small intestine shares the disorder. It may be acute or chronic, and is a frequent and formidable disease, especially in hot climates. It is sometimes epidemic, and then is peculiarly fatal among children. Many times it attacks and decimates armies. Sporadic cases in civil practice usually recover with little treatment. Pain is relieved by opium or Dover's powder. Gentle purgatives are extremely useful. Enemata of warm water will often relieve tenesmus. Astringents, copaiba, opiated starch injections, etc., are useful adjuvants in some cases.

Niemeyer regards epidemic dysentery as a disease distinct from the common or sporadic disease. He considers it truly infectious. The severer cases of this disease are not much benefited by treatment. Even the mild cases are apt to assume a chronic form, which may prove fatal. This disease is akin to cholera, and perhaps to intermittent fever. It is endemic in Southern Europe. The endemic dysentery of Egypt is a distinct disease, caused by the presence of a trematode worm (the *Bilharzia hæmatobia*) in the walls of the intestine. REVISED BY WILLARD PARKER.

**Dysmenorrhœa** [from the Gr. *δυσ*, "ill," *μήν*, a "month," and *ρῆω*, to "flow"], painful and difficult menstruation, is sometimes caused (1) by flexion or displacement of the uterus, in which case the proper treatment is the restitution of that organ to its normal position; (2) by an excessively or morbidly excitable nervous condition, best relieved by sedatives at the time of attack, and by supporting treatment and correct hygienic regimen; (3) it is said to be caused by uterine rheumatism, in which case it may require the treatment appropriate to rheumatism; (4) when associated with endocervicitis or endometritis it is often benefited by local treatment with caustics, etc.; (5) a variety of other local troubles may cause it, and may require special treatment.

**Dyspepsia** [Gr. *δυσπεψία*, from *δυσ*, "difficult," and

*πέπω*, to "digest"], a disordered functional state of the stomach without appreciable organic disease; indigestion of food, with the resulting symptoms, such as flatulence, pyrosis, pain, etc. Dyspepsia may be the forerunner or concomitant of consumption or of Bright's disease, but it is much more frequently the result of improper habits with regard to food, exercise, etc. Its treatment is important and difficult. In cases where the coats of the stomach are irritable, bismuth is a standard, safe, and useful remedy. The mineral acids, as the nitro-muriatic, are believed to correct depraved secretions. The hyposulphites are sometimes useful where microscopic plants (*Sarcina* and *Torula*) exist in the stomach. Rhubarb with alkalies, followed by sulphate of quinia, is frequently beneficial. The bitter tonics tend to correct gastric atony. In all cases the patient should have the best hygienic conditions.

When there is no gastric catarrh or ulceration there is great, and often complete, relief obtained by sea-bathing, nutritious food, and the administration of iron. Dyspepsia with depression of spirits and a red uric-acid deposit in the urine is often cured by water-treatment, with visits to saline mineral springs. In short, there is no disease with a greater variety of causes and symptoms, or which requires more judgment and skill in treatment. Neglected dyspepsia must be placed in the numerous class of causes which tend, by impairing nutrition and depressing the tone of the system, to prepare the way for pulmonary consumption. (See INDIGESTION.) REVISED BY WILLARD PARKER.

**Dysphagia** [from the Gr. *δυσ*, "difficult," and *φαγῖν*, "to eat"], a difficulty in swallowing, caused by paralysis, disease of the muscles of the throat, quinsy, œsophagitis, carcinoma, stricture, or spasm of the œsophagus; or it may be a symptom of hysteria, tetanus, or hydrophobia. Its treatment is various, according to the disease of which it is a symptom.

**Dysphonia** [from the Gr. *δυσ*, "difficult," and *φωνέω*, to "speak"], a difficulty in speaking. The most common variety is the *dysphonia clericorum*, or "clergyman's sore throat," a follicular inflammation of the pharynx, accompanied by huskiness of the voice, with more or less coughing, hawking, and expectoration. The follicles of the fauces and the pharynx are larger or more apparent than in health. The follicles occasionally discharge hard or elastic lumps of mucus, greatly to the alarm of the patient. Ulceration may supervene, and the patient may be constantly inclined to swallow. Time, rest, muscular exercise, tonics, travelling by sea or land, are all useful in the treatment.

**Dyspnœa** [Gr. *δύσπνοια*, from *δυσ*, "difficult," and *πνέω*, to "breathe"], a difficulty in breathing, a common symptom in most diseases of the heart or lungs. If the difficulty is increased by lying down, so that the patient can only breathe with any comfort when erect, it is called *orthopnœa*. Dyspnœa is sometimes the result of some functional or organic nervous disease, as hysteria. It is then relieved in most cases by diffusible stimulants. In other cases the character of the dyspnœa is remarkably varied, and the treatment is as various; belladonna, stramonium, cannabis, chloral, ipecac, and many other remedies are often useful. Strict temperance in eating and drinking should always be observed.

**Dytiscideæ** [from *Dytiscus* (the diminutive of the Gr. *δύτης*, a "diver"), one of the general], a family of aquatic coleopterous insects formed from the Linnæan genus *Dytiscus*, now divided into several genera. There are many species, of which the largest attain a length of nearly two inches. The general form is oval and the surface smooth. They are pentamerous—that is, have all the tarsi five-jointed. They are remarkable for the oar-like shape of their swimming-legs. All the species are found in marshes, lakes, and the still parts of rivers. When they come to the surface to breathe, they rest with the back downward and the extremity of the abdomen exposed to the air, the organs of respiration being in the last segment. They feed voraciously upon all kinds of animal food. They fly well, and often leave the water by night. Before changing into pupæ the larvæ secrete themselves in the earth. The larvæ are called "water-tigers," from their habit of attacking and devouring insects, tadpoles, and even fishes.

**Dziggetai**, or **Koulân** (*Asinus Onager*), a species of wild ass abounding in Eastern Turkey, Persia, Afghanistan, and the Punjab. It is one of the swiftest of quadrupeds, and cannot ordinarily be overtaken, even by the Arabian horse, and the greyhound can follow it successfully only on the open plains. These animals live in troops, under a leader who rules them despotically. They are extremely wild, for they are much hunted, not only for their excellent flesh, but for the great difficulty and excitement of the chase. They are pursued by falconry, but are more frequently shot with the rifle. They are of a brown color, with a black stripe along the back.



## E.

**E** (pron. *ee*), the fifth letter and second vowel of the Roman and of most modern alphabets. The Greeks had two vowels represented by the Latin *e*—the one short (*e*, *epsilon*), the other long (*η*, *eta*); *e* stood for the number 5, *η* usually represented 8. The Sanscrit has only one *e*; this is always long (see *SANSKRIT*), and is usually represented in the Western languages by *e* circumflexed (*ê*). In the Arabic and Persian the vowel *fatha* (see *ARABIAN LANGUAGE*), being a somewhat obscure sound, is often represented in the European languages by *ê* (short), though it properly corresponds to short *â*; thus we may write *el-Korân* or *al-Korân* for "the Koran," *er-rasheed* (*rashid*) or *ar-rasheed*, the surname of Haroun (Haroun), the celebrated caliph of Bagdad. In like manner, the Arabian prophet's name may be written either Mohammed or Mohamad. The Arabs have no vowel sound corresponding to long *ê* (*ê*), although this frequently occurs in the Persian.

In most of the modern European languages *e* occurs more frequently than any other letter. This remark is especially true of the French and English. One reason of this is that *e* (mute) in these languages usually replaces the terminal letter or letters of Latin or Greek words, as in the following nouns: *fame*, from the Latin *fama*; *muse* (Lat. *musa*; Gr. *μουσα*); *plume* (Lat. *pluma*); *bile* (Lat. *bilis*); *cone* (Lat. *conus*; Gr. *κωνος*); *face* (Lat. *facies*); so also in adjectives, as *prone* (Lat. *pronus*); *pure* (Lat. *purus*); *vile* (Lat. *vilis*), etc. All the foregoing derivative words are French as well as English. In a few instances the final *e*, though found in English, is omitted in French; as *pine* (Lat. *pinus*; Fr. *pin*); *wine* (Lat. *vinum*; Fr. *vin*), etc.; but more frequently the reverse occurs, particularly in adjectives; thus we have *arid* (Lat. *aridus*; Fr. *aride*); *avid* (Lat. *avidus*; Fr. *avide*); *livid* (Lat. *lividus*; Fr. *livide*), etc., etc. (For the different sounds of our *e*, see *PRONUNCIATION OF THE ENGLISH LANGUAGE*.)

**E** in music is the third note in the diatonic natural scale. As a Latin preposition, *e* is put for *ex* by way of euphony, both as a separate word and in composition.

**Each'ard** (JOHN, D. D., an English clergyman, born in Suffolk in 1636. He became a fellow of Catherine Hall, Cambridge, in 1658. He wrote "The Ground and Occasions of the Contempt of the Clergy and Religion inquired into" (1670), and a "Dialogue on Hobbes' State of Nature" (1672). He was a writer of considerable humor, but of no great ability. Died July 7, 1697.

**Ea'die** (JOHN, D. D., LL.D., a divine of the Scottish United Presbyterian Church, born at Alva, Stirlingshire, May 9, 1814, died at Glasgow June 3, 1876. He graduated from the University of Glasgow, studied theology in the seminary of the United Presbyterian Church, was appointed pastor of the Cambridge Street church, Glasgow, in 1835, and professor of biblical literature in the seminary in 1843. In 1863 he formed the new Lansdowne church, of which he was minister until his death. Besides commentaries on the Epistles to the Ephesians (1854), Colossians (1856), Philipians (1859), Galatians (1869), Thessalonians (1877; published posthumously), two volumes of discourses—"The Divine Love" (1855) and "Paul the Preacher" (1859)—and several treatises on the history of the English Bible, he prepared a "Concordance to the Scriptures" (1839), "The Bible Cyclopædia" (1848), "The Ecclesiastical Cyclopædia" (1861), etc. (See JAMES BROWN, "Life of John Eadie," London, 1878.)

**Ead'mer, or Edmer**, an English historian and monk. He entered in his youth the Benedictine monastery at Canterbury, and became a friend of Saint Anselm. He was elected bishop of Saint Andrew's in 1120, but the Scottish king would not allow him to be consecrated by the archbishop of Canterbury, and he soon returned to his monastery. He is one of the most important historians of the time. His works are "Historiæ Novorum," in six books, giving the history of the three archbishops of Canterbury, Lanfranc, Anselm, and Radulf, edited by Selden (London, 1623) and reprinted in Gerberton's edition of Anselm's "Works" (Paris, 1675); a "Life of Anselm," edited by Surius; a letter to the monks of Glastonbury about the life of St. Dunstan, and another to the monks of Winchester about episcopal election; the "Lives" of St. Bregwin, St. Oswald, and St. Odo, edited in Wharton's "Anglia Sacra;" a "Life of St. Wilfrid of York;" and some minor treatises hitherto wrongly ascribed to Anselm, all of which are found in Migne, "Patrologia," 159. Died Jan., 1124.

**Eads** (JAMES B.), LL.D. See APPENDIX.

**Eagle** [Lat. *aquila*; Fr. *aigle*; Ger. *Adler*], the name of several species of rapacious birds of the order *Raptores* and family *Falconidæ*. They belong to the genera *Aquila*, *Haliaetus*, etc., and are characterized by hooked beaks and sharp, powerful claws. About seventy species are known. They have great powers of flight and of vision, are diurnal and solitary in their habits, and use their claws in killing their prey. The eagle was regarded by the ancients as a symbol of royalty, and has the proverbial distinction of being the king of birds. Large specimens of the eagle measure three and a half feet in length, and nine feet from tip to tip of the expanded wings. These birds usually breed in mountainous districts or forests, remote from human habitations. They are all monogamous, and it is said that a pair will live together in perfect harmony until death separates them. They build their nests on a high tree, a ledge of rock, or on some inaccessible cliff. The nest is inartificially constructed of sticks, which are rudely arranged. The eagle is supposed to live to a great age, more than one hundred years.

The golden eagle (*Aquila chrysaetos*) is a magnificent bird found in Europe, Asia, and North America, deriving its name from the golden-red color of the feathers which cover its head and neck. The plumage of the body is a rich dark-brown. This species is the largest of the European eagles. It feeds on hares, lambs, pigs, fish, etc., which it carries to its nest. When in pursuit of its prey it is very audacious, and has been seen to carry off a hare before the noses of a pack of hounds.

It is stated that the golden eagle can be tamed, and has been trained to catch game for its master. The flight of this bird is very graceful, and presents an interesting spectacle. It sweeps through the air in a series of spiral curves, rising with every spire, and making no perceptible effort or motion with its wings. According to Ruskin, "the projection of the brow is the essential point in an eagle's head. To keep the sunshine above from teasing it, the eye is put under a triangular pent-house, which is precisely the most characteristic thing in the bird's whole aspect." The imperial eagle (*Aquila imperialis*), which inhabits Asia and Southern Europe, is nearly as large as the golden eagle, and is similar in appearance. It may be distinguished from the other species by the white patch on its scapulars. Its head and neck are covered with feathers of a deep fawn-color. It generally builds on lofty trees.

Much more common than the golden eagle is the sea eagle, also called the white-tailed and the cinereous eagle, because the adults have a grayish-brown color with pale head, yellow beak, and white tail—characters of plumage which, however, the young ones do not assume until the third or fourth year of their age. It lives chiefly along the coasts of the sea or the banks of inland waters, as it principally feeds on fish and the refuse which may be thrown up on the shore; it takes, however, also lambs, hares, and rabbits. It sometimes builds on the ground and sometimes in a high tree, but always in a lonesome and inaccessible place, on the ledge of a steep cliff or in an island in a lake. The nest is very rude, consisting merely of a mass of sticks with a hollow, lined with grass, in the centre. The species is found all over the northern part of the Old World, from Ireland to Kamtschatka, and in Europe it breeds as far to the southward as the Albanian Mountains.

The national bird of the U. S. is the bald eagle (*Haliaetus leucocephalus*), which has a white head, neck, and tail. It is said to lay its eggs in the same nest year after year. It is fond of fish, which it generally steals from the osprey. Its habit is to watch near a river or other water until an



Harpy Eagle.

osprey has caught a fish, which the eagle snatches in the air or catches as it falls from the claws of the osprey. The bald eagle is widely distributed through different regions of North America, and frequents the sea-coasts, lakes, and large rivers. It measures from thirty-five to forty inches in length. (See *BALD EAGLE*.)

The genus *Harpyia* includes a single species, the harpy eagle (*Harpyia harpyia*), a fierce and powerful bird of Mexico and of Central and South America. A single stroke of its bill has been known to break a man's skull.

**Eagle**, a gold coin of the U. S., is equivalent to ten dollars, and bears the figure of an eagle. The largest gold-piece coined in the U. S. is a double-eagle = \$20. The eagle weighs 258 grains Troy, and being nine-tenths fine, contains  $232\frac{2}{3}$  grains pure gold.

Eagle is also the name of an ancient coin of Ireland, current in the thirteenth century.

**Eagle**, in heraldry, a bearing of frequent occurrence, and often assumed by sovereigns as the emblem of empire, from having been borne on the legionary standard of the ancient Romans. The eagle of Russia is *or*, with two heads displayed, sable, each ducally crowned of the field; the whole imperially crowned, beaked, and membered gules. The eagle of Austria is also displayed with two heads. The Prussian eagle has only one head. The U. S. adopted (1785) the bald eagle, his wings displayed, proper, as the national emblem.

The eagle was also one of the most ancient Roman military standards. In 104 B. C. it became the distinctive ensign of the Roman legions. It was made of bronze or silver, and was carried upon a short staff. An eagle of gold was the royal emblem of ancient Persia.

**Eagle** (HENRY), U. S. N., born April 7, 1801, in the city of New York, entered the navy as a midshipman Jan. 1, 1818, became a lieutenant in 1827, a commander in 1844, a captain in 1855, and a commodore in 1862. He commanded the bomb-vessel *Ætna* at the siege of Vera Cruz, and was civil and military governor of the province of Tobasco, Mexico (1847-48). He commanded the Monticello at the attack on Sewell's Point Battery, Va., May 19, 1861, and from June, 1861, to July, 1862, commanded the frigate *Santee* of the Gulf blockading squadron, during which service a boat-expedition from the *Santee* captured and destroyed the privateer *Royal Yacht* in the harbor of Galveston, Texas. Retired Jan. 1, 1863. D. at New York Nov. 26, 1882. FOXHALL A. PARKER.

**Eagle, Bald.** See BALD EAGLE.

**Eagle Bridge**, R. R. junction, Rensselaer co., N. Y. (see map of New York, ref. 5-K, for location of county), on the Hoosick River and on the line of White Creek township, Washington co. Pop. in 1880, 96.

**Eagle Hawk** (*Morphnus*), a name given to several species of birds of prey of the family Falconidae, similar in form to the eagle, but inferior in size. They are natives of South America, the East Indies, and Africa. They have short wings and long legs. Some of them are beautiful. Like the eagles, the eagle hawks are all monogamous, keeping themselves to a single mate and living together in perfect harmony through life. Like the eagle, the eagle hawk is also assisted by his mate in hunting, and the matter is often managed in a very clever and sportsman-like manner.

**Eagle Pass**, capital of Maverick co., Tex. (see map of Texas, ref. 6-F, for location of county), on R. R. and the Rio Grande, 248 miles S. W. of Austin. During the civil war it had a large trade with Mexico. Pop. in 1880, 1627.

**Eagle River**, capital of Keweenaw co., Mich. (see map of Michigan, ref. 1-F, for location of county), on Lake Superior, about 195 miles E. N. E. of Duluth. Copper is mined in the vicinity and shipped here. Pop. not in census of 1880.

**Eagle Wood**, the fragrant wood of *Aloexylon Agallochum* or *Aquilaria ovata*, a tree of the order Aquilariaceæ, indigenous in the tropical parts of Asia. It is used for burning as incense.

**Ea'gre** [probably from the sea-jotun (Eggr (which see))], a Norse word used to express the sudden rise of the tide in the mouth or estuary of a river. It is often called the BORE (which see, by PROF. ARNOLD GUYOT, Ph. D., LL.D.).

**Eames** (CHARLES), an eminent lawyer and journalist, born at New Braintree, Mass., Mar. 20, 1812, graduated at Harvard in 1831 and studied law. In 1845 he took a situation in the navy department at Washington, and soon became an editor of the Washington "Union." He was sent by President Polk as commissioner to the Sandwich Islands, whence he returned in 1850. After several years of journalism he became U. S. minister to Venezuela under President Pierce. After his return, in 1858, he attained high reputation as an admiralty lawyer. Died at Washington, D. C., Mar. 16, 1867.

**Ear, Anatomy of the.** For the perception of sound the essential structure is a nerve capable of receiving and transmitting sonorous vibrations. Some animals (as spiders), possessing no special organ of hearing, nevertheless show a distinct recognition of sounds. The lowest animals, Protozoa, have no specialized organs of sensation. In some of the Acalephæ (belonging to the Radiata of Cuvier), as *Medusa*, small sacs arranged around the margin of the disk

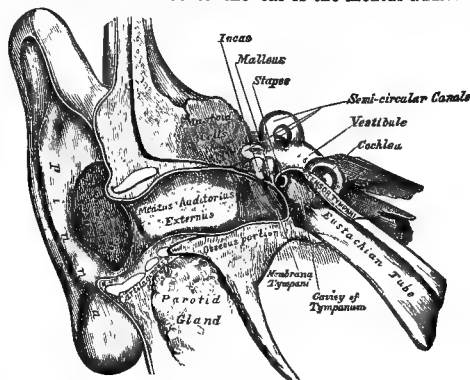
appear to represent the ear in a rudimentary form. Many of the Mollusca have auditory organs. In Gasteropoda (e. g. snails) these are connected with the pedal ganglia, seeming thus to aid directly in the guidance of locomotion. Cephalopoda, the highest of the Mollusca, have the organs of hearing connected with the head, as they are in Vertebrata. Worms also often have auditory vesicles in the head, connected with the cesophageal nervous ring. Grasshoppers and locusts have similar organs, either at the sides of the first abdominal segment or on the main segments of the anterior legs. In the lobster and other large Crustacea they are placed in the basal joints of the first pair of antennæ. Probably they have a similar situation in some insects, which appear to find each other by hearing sounds, made especially by those of the male sex.

All vertebrate animals, except *Amphioxus*, have distinct organs of hearing. They differ much, however, in the different classes. Fishes have no external or middle ear, and no cochlea in the internal ear. Amphibia also are without a cochlea; some have a tympanum, others none. Reptiles, except the crocodile, are quite destitute of external ears. All of them except serpents have a tympanum, and several an externally visible membrana tympani. The columella in them is either one small bone or a row of bones in the tympanic cavity. It is homologous with the stapes or stirrup-bone of mammals. Comparative anatomists generally consider the other tympanic bones (incus and malleus) to be homologous with the "quadrate" and "jugal" bones, which support the jaws in birds, reptiles, and fishes; being thus, in all of these animals, outside of the ear. Some anatomists, however, assert the existence within the tympanum of reptiles of a rudimentary incus and a cartilaginous malleus. No external ear exists in any fish or reptile. Birds, especially owls, present it in the form of a circular arrangement of feathers. In birds the middle ear (tympanum) contains only a single bone, the columella, with processes of cartilage representing the other bones. The cochlea of the internal ear is, in birds, a conical, slightly twisted double canal; the semicircular canals in them are large.

Mammals always have the internal and middle ear complete, and mostly also an external ear. This is slight, however, in diving quadrupeds, as the otter and beaver, and wanting altogether in the whale, seal, mole, ornithorhynchus, and armadillo. Several aquatic animals have a valve near the entrance of the external meatus or canal of the outer ear, which closes when they are under water, protecting the membrana tympani against excessive pressure. The elephant also is provided with a sort of valve or ear-flap. Bats are endowed with very large and sensitive external ears. Many quadrupeds (e. g. the horse and dog) have considerable muscular power over their ears, by which they can turn them so as to receive sound from different directions. Man has three rudimentary muscles of the same kind, but they are commonly powerless and without use.

**The Human Ear.**—This consists of three distinct, though connected, parts—the external ear, the middle ear or tympanum, and the internal ear or labyrinth.

Of the outer ear, the expanded part is the pinna; its prominent rim or margin is the helix. The ridge next within this is called the anti-helix; it divides above. Its lower and front part encircles a cavity, the concha, below which are two opposite prominences, tragus and anti-tragus. The lowest, soft, flexible part is the lobule. The whole external ear, except the lobule (which is formed of fat and connective tissue), is composed of cartilage covered with skin, well supplied, however, with nerves as well as blood-vessels. The entrance to the ear is the meatus auditorius



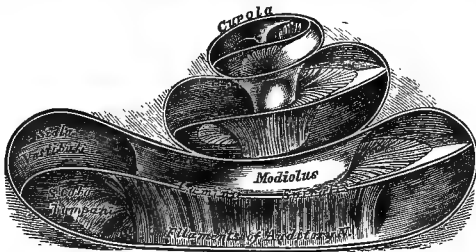
The Human Ear.

externus. It is about an inch and a quarter long, directed forward and inward, slightly curved. Near its orifice are

the ceruminous glands, secreting the ear-wax. At the bottom of the meatus is the membrana tympani.

The *middle ear*, or tympanum, is a sort of drum or hollow organ, containing air, and through its middle a small chain of bones—the malleus, or hammer-bone, the incus, or anvil, and the stapes, or stirrup. The tympanum communicates with the throat (pharynx) by means of the Eustachian tube. The fenestra ovalis, or round window of the tympanum, is a membranous partition between the internal part of the tympanic cavity and the vestibule of the labyrinth or internal ear. The fenestra rotunda is a round membranous "window" between the tympanum and the cochlea of the labyrinth. Three muscles are asserted by most anatomists to exist in the tympanum—the tensor tympani, luxator tympani, and stapedius. The second of these is considered by some to be only a ligament.

The *internal ear* is composed of the vestibule, cochlea, and three semicircular canals. The vestibule is the middle portion, the cochlea is anterior, and the three canals are above and behind the vestibule. Within the latter are two small bodies, the otoliths, or ear-stones, composed of carbonate and phosphate of lime. The semicircular canals always differ definitely in their direction, two being vertical and



The cochlea (enlarged).

one horizontal. The cochlea is shaped somewhat like a snail-shell. In its centre is a conical bony axis, the modiolus. Around this is a spiral canal, within which is the lamina spiralis, partly composed of bone and partly membranous. This divides the canal into two passages or scalæ—the upper, communicating with the vestibule, scala vestibuli, and the lower, communicating through the fenestra rotunda with the tympanum, scala tympani. The bony part of the lamina spiralis has a grooved margin, the uppermost edge of which, towards the scala vestibuli, supports a finely-toothed membrane, lamina denticulata. From each of these margins of the lamina spiralis is given off a fine periosteal layer—the upper one the membrane of Corti, the lower the basilar layer. Between these is a space called by Kölliker the scala media. Within this space are arranged two sets of minute rod-like bodies, parallel to each other, radiating from the axis of the cochlea, those of the two sets being inclined towards each other above. These are the rods of Corti. Looked at in a certain direction with the aid of a lens, they resemble somewhat the keys of a piano.

The whole inner surface of the bony labyrinth is lined by a fibro-serous periosteal tissue. This secretes a thin fluid, the perilymph. The membranous inner labyrinth, which duplicates, as it were, the osseous wall of the vestibule and semicircular canals, secretes a similar liquid, the endolymph. The auditory nerve (portio mollis of the "seventh pair" of cephalic nerves, according to anatomists) is subdivided into branches which are distributed to all the parts of the internal ear. Those filaments which enter the cochlea form a sort of ganglionic plexus in the scala tympani; thence proceed some very delicate nervous extremities, which, in the scala media, are brought into relation with the rods of Corti, and probably also with certain large nucleated cells in their vicinity called the cells of Claudius. (For physiology of auditory apparatus, see Acoustics.) See also "Treatise on Diseases of the Ear," by D. B. St. John Roosa, New York.

HENRY HARTSHORNE.

**Ear, Diseases of.** The auditory canal is frequently the seat of foreign bodies, as in children, who put beads, buttons, etc. in the ear, or when insects, as bugs and bees, enter the ear. The canal, however, is chiefly obstructed by cerumen, or ear-wax, which may accumulate in great quantity, so as to occupy and occlude the entire passage and exclude sounds. It may press on the tympanum (drum of ear). It is a most frequent cause of deafness. Cerumen is to be removed by the surgeon with forceps or probes, and also by the ear-syringe and warm water or weak alkaline solutions. The auditory canal is frequently the seat of little abscesses, or "boils in the ear." They are painful, though not dangerous. For a time they occlude the passage and cause partial deafness, which subsides with the pain when the abscess discharges. The treatment should be warm poultices and fomentations to the region of the

ear, leeching in severe cases, and free use of sweet oil and laudanum in the ear until the abscess breaks. The membrana tympani, or drum of the ear, may be injured by the introduction of sharp instruments, or ruptured by sudden impaction of air compressing it from without, as by a box on the ear, the noise of a loud explosion, as of blasting, cannon, or even firearms. It may also be ruptured by air from the throat through the Eustachian tube suddenly and forcibly pressing from within, as in violent blowing of the nose, vomiting, and paroxysms of whooping-cough. Such ruptures usually heal. Ulcerative perforations may be minute or include nearly the whole drum. Often, if the Eustachian tube be not closed, the person can blow air from the throat through the perforated drum into the external auditory canal with a perceptible sound. An artificial drum or membrana tympani of hard rubber can be worn. Moistened cotton wool, introduced clean each day, in a measure effects the same result. The Eustachian tube is liable to be occluded by catarrhal thickening of its lining membrane, the product of catarrhal throat-troubles. This is the explanation of the most frequent form of deafness, catarrhal deafness. The Eustachian tube is to be restored to its open state by the Eustachian catheter or Politzer's bulb. Often deafness is associated with symptoms of cerebral disease which indicate that the auditory nerve is involved at its origin or course in the brain.

The chief diseases of the ear are these; 1. Deafness; 2. Otorrhœa, or purulent discharge from the ear; 3. Otagia, pain in the ear, the result of abscess or acute catarrh or inflammation, and often reflex or sympathetic, dependent on sore throat, or, again, a pure neuralgia, with no existing ear disease, caused by poor health, impoverished blood, or nervous and hysterical temperament. (See DEAFNESS.)

E. D. HUDSON, JR.

**Earl** [from the Ang.-Sax. *eorl*, "hero," "chief;" Norse, *Jarl*], a British title of nobility, next in rank to a marquis, and one degree higher than a viscount. It was formerly the highest rank of hereditary nobility of England. After the Norman Conquest the title of earl was used by the English to express the French *comte*, "count" (Lat. *comes*). Hence the wife of an earl is still styled a countess. In the reign of Edward III. earldoms were granted by letters-patent to earls and their heirs. Earldoms were gradually converted from territorial into merely titular honors.

**Earle** (PLINY), an American inventor, born at Leicester, Mass., Dec. 17, 1762. He invented a machine for making cards for carding cotton and wool. Died Nov. 29, 1832.

**Earle** (PLINY), M. D., was born at Leicester, Mass., Dec. 31, 1809. He was a son of Pliny Earle, the inventor. He was educated at the Friends' school at Providence, R. I., and graduated as M. D. in 1837. He was resident physician of the insane asylum at Frankford near Philadelphia (1840-42), physician in the Bloomingdale asylum, N. Y. (1844-49), and has long been superintendent of the insane asylum at Northampton, Mass. He has published many valuable reports and papers on the treatment of the insane.

**Earle** (THOMAS), a lawyer, a brother of the preceding, was born at Leicester, Mass., April 21, 1796. He practised law in Philadelphia, was distinguished as an opponent of slavery, and was a member of the constitutional convention of 1837. In 1840 he was nominated for the office of Vice-President of the U. S. by the Liberty party. Died July 14, 1849. He published several legal and other works.

**Earlham College** was chartered in 1859. Both sexes are admitted. There is a preparatory department, with a two years' course of study, two college courses, a classical and a scientific, of four years each. The libraries contain about 3500 volumes. The college is healthfully located about 1 mile W. of Richmond, Ind.

**Earlville**, on R. R., La Salle co., Ill. (see map of Illinois, ref. 3-E, for location of county), 73 miles W. S. W. of Chicago. It has manufactures and a steam-mill. Pop. in 1880, 963.

**Early** (JOHN), D. D., bishop of the Methodist Episcopal Church South, was born in Bedford co., Va., in 1786, joined the Virginia Methodist conference in 1807, was one of the chief founders of Randolph-Macon College, Va., and was a laborious and eminently successful preacher of Methodism in his native and adjacent States. He took a prominent part in the proceedings which in 1844 divided his denomination into Northern and Southern sections, was elected first book-agent of the Southern division, and in 1854 was ordained as one of its bishops. He was distinguished by long public services, administrative ability, and great energy of character. Died Nov. 5, 1873.

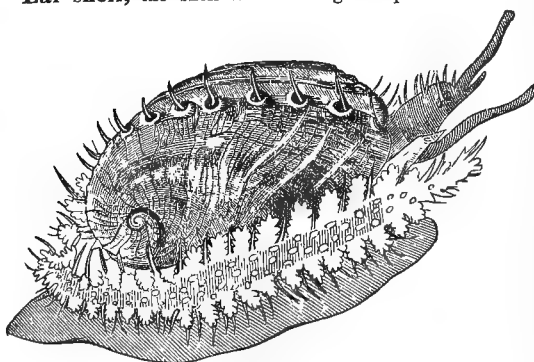
**Early** (JUBAL A.), an American general and lawyer, born in Virginia about 1818, graduated at West Point in 1837. He afterwards studied law, and served in the Mexican war as a major. He joined the Confederate army, was

a major-general at Gettysburg in July, 1863, and commanded an army which invaded Maryland in July, 1864. He was defeated by Gen. Sheridan near Winchester, and at Fisher's Hill in Virginia, on the 19th and 20th of September. On the 19th of Oct., 1864, he attacked the Union army at Cedar Creek, Va., in the absence of Gen. Sheridan, who arrived in time to rally his retreating army and to gain a decisive victory. After the war he returned to the practice of law in Richmond, Va.

**Earnest**, the payment of money, the delivery of a part of any goods sold, or the performance of a simple ceremony to "bind a bargain." The performance of ancient and now meaningless ceremonies as a pledge of good faith is lawful earnest in Scotland and some other countries, but money or goods only are held to constitute earnest in England and the U. S. The seller cannot sell to a third party that for which earnest has been paid. A party who has paid earnest can demand the goods, but the seller is not obliged to deliver them till the whole price is paid. If the buyer fail to demand and pay for his goods, the seller, after due notice, can sell again and keep his earnest. In some countries a party who fails to keep a contract loses his earnest, and may be compelled to fulfil his contract besides.

**Earring**. See JEWELRY.

**Ear-shell**, the shell of various gasteropods of the



Ear-shell.

*Halitidæ* family. Of these, the *Haliotis tuberculata*, a mollusk of Europe and the tropics, is edible. The genera and species, living and fossil, of this family are numerous and widely distributed. Some of the shells are used in inlaying, and resemble MOTHER-OF-PEARL (which see).

**Earth, The**, is the dwelling-place of man; the noble garden given him by his Creator to cultivate and to enjoy; the scene of his activity, the means of his development, and the theatre of his history. As such it cannot fail to become one of the most prominent objects of his study.

I. *The Earth in the Universe and the Solar System*.—The earth is a star among the innumerable stars which float in the boundless space of the heavens. Unlike those bright bodies, however, the existence of which is revealed to us only by the rays of light which they send to our eyes, it is not self-luminous; it possesses no other light than the feeble reflected rays which it borrows from the splendor of a mighty neighbor. The earth is one of the more modest members of a small family of similar stars, clustered and revolving around the central luminous orb of the sun, with which they form the SOLAR SYSTEM (which see).

The arrangement of the members of the solar system shows law and order everywhere, and strongly favors the idea, suggested by the celebrated astronomer Laplace, of a common origin, which makes it really a *family* of stars, whose parent is the sun.

The planets, in their order of distance from the sun, are Mercury, Venus, the Earth, and Mars, all of small size, which form a first group; then comes the cluster of the asteroids, followed by another group of four large planets—Jupiter, Saturn, Uranus, and Neptune—whose orbit forms the extreme boundary of the solar system.

In the first group, that of the small planets nearer the sun, no satellites are found except one, the moon, which graces the earth. In the second, that of the large planets, they are numerous. Jupiter has four. Saturn's heaven presents the glorious spectacle of eight moons, accompanied by the phenomenon, unique in the solar system, of a broad, flat, luminous double ring, revolving, like its satellites, around the body of the planet. Uranus has four, and perhaps more; Neptune, as yet, is known to have but one.

The distances of the planets from the sun are not equal. They gradually increase from Mercury to Neptune, so that the distance from the orbit of Mercury to that of each fol-

lowing planet is nearly double the distance from Mercury to the preceding one. That ratio fails, however, in the case of Neptune. For each planet one revolution around the sun is a year; one rotation on its axis, marked by a succession of light and darkness, is a day.

The velocity of these motions is also subject to law. The rapidity of revolution around the sun is greatest in Mercury, and gradually diminishes in the other planets, as their distance from the sun increases, to Neptune, in which it is slowest. The velocity of rotation, on the contrary, is greatest in the large planets more distant from the sun, Jupiter and Saturn turning upon themselves in about ten hours, while the four smaller planets have, like the earth, a day of about twenty-four hours.

The density of the planets, again, varies with their distance from the sun. Mercury is the most dense, and has a specific gravity of about eight times that of water, which is a little more than that of iron; the earth five and a half, and the other small planets nearly the same; while the specific weight of Jupiter is one and a third, or little more than that of water; and that of Saturn, the lightest of all the planets, is only seven-tenths, or less than water, which makes it comparable to a similar volume of cork or light wood.

Thus, in all respects, the earth occupies a happy intermediate position. By its size it belongs to the group of the small planets, but it is the largest of them. Its distance from the sun makes it equally free from the intense glare and the burning heat which prevail on Mercury, and from the dimness of light and the cold which probably are the share of the mighty sister planets, Jupiter and Saturn. The relative length of its day, seasons, and year establishes harmonious relations between them, such as cannot exist in the outer planets, owing to the great disproportion between the excessive shortness of their days compared with the great length of their year.

The earth thus seems to be better fitted than any other member of the solar system for sustaining that noble world of living forms, vegetable, animal, and human, which adorn its surface and give to our globe its highest value. Nay, whatever be the past or future destinies of the other planets in this respect, it may be doubted whether any of them possesses, at present, the physical conditions without which a life-system at all similar to our own cannot be conceived as possible.

II. *The Earth considered in itself*, as a great individual organization, can be studied under two aspects—either in its past or its present condition. A close examination of the earth's crust and its organic contents shows that the terrestrial globe, like every individual body in nature, large or small, had its period of gradual growth before its present perfect state. The very structure of the rocks proves a gradual formation. The continents emerged by successive steps from the bosom of the ocean; their surface was wrinkled by mountain-chains rising one after the other; tribes of plants and minerals, different from the existing ones, succeeded each other during untold ages. These great phases of the existence of the earth, geology studies and describes. (See GEOLOGY.) Physical geography considers the globe in its present condition, as the full-grown earth, with man upon it, in its state of highest perfection.

III. *General Form and Dimensions*.—The general form of the earth, like that of most of the heavenly bodies floating in space, is a sphere, on which, for the sake of convenience, we may distinguish the *poles*, or the two extremities of the axis of its rotation; and the *equator*, which is a great circle traced midway between the two poles, the plane of which passes through the centre of the sphere, cutting its axis into two equal parts. The mean diameter of the earth, given by the great geodetic measurements, by which the true form and dimensions of the globe have been ascertained, is about 7916 English statute miles. The equatorial diameter, however, which measures 7925½ miles, exceeds the length of the polar diameter, or the length of the axis, which is only 7899, by about twenty-six and a half miles, so that a point on the surface of the polar region is over thirteen miles nearer the centre of the globe than a point on the surface of the equatorial regions. This proves that the earth is not a perfect sphere, but a sphere-like body, or spheroid, slightly compressed about the poles and bulging about the equator. That form is accounted for by the effect of the rotation of the earth, which causes a tendency of the matter to fly off and to recede from the poles, where the velocity of rotation is but slight, towards the equator, where the velocity is greatest. That small deviation from the regular spherical form is in itself of little importance, but it teaches us that at some former period the earth must have been in a semi-fluid state, after which it was consolidated in its present shape.

The most recent and accurate measurements seem to indicate some other irregularities in the figure of various

parts of the globe, which, however, are not yet sufficiently determined to be mentioned here.

The following table gives the principal dimensions of the earth in English statute miles:

*Dimensions of the Earth.*

Equatorial diameter.....	7925.65	Radius.....	3962.82	miles.
Polar diameter.....	7899.17	Radius.....	3949.58	"
Difference.....	26.48	Difference.....	13.24	"
Mean diameter.....	7916.17	Radius.....	3958	"
Circumference at the equator.....	24,899	miles.		
Surface of the globe.....	196,900,278	square miles.		
Contents or bulk.....	260,000	millions of cubic miles.		
In round numbers easily remembered: diameter, 8000; radius, 4000; circumference, 25,000 miles; surface, 197,000,000 square miles.				

IV. *The Globe and its Circles.*—The representation of the earth most true to nature is the artificial globe, which, however, looks like a perfect sphere, for the polar compression is too small to be visible to the eye. On a globe of twelve inches the difference between the polar and equatorial diameters would amount only to a twenty-fifth of an inch. The outlines of the continents and oceans, the course of rivers, and other geographical features of the surface can be drawn correctly on the globe, while on flat maps there can be only an approximation to their true form.

On the globe are seen several sets of circles not belonging to the natural features of the surface, the object of which will be easily understood.

*Parallels and Meridians.*—In order to find out the precise location of a place or of any point on the face of the earth, two sets of circles are traced—one in the same direction as the equator, the other at right angles, passing through both poles. The first are called *parallels*, because they are parallel to the equator and to one another. The last are called *meridians* (from the Latin *meridies*, "noon"), because all places situated on such a circle have mid-day at the same time.

All the parallels except the equator are small circles—that is, smaller than the greatest circumference. All the meridians are great circles which intersect each other at the poles, and the planes of which pass through the axis of the earth.

All these circles, great or small, are divided into 360 equal parts, or degrees, each degree into sixty minutes, and each minute into sixty seconds; further subdivisions are given in decimal parts of a second. The mode of expressing these divisions in writing is seen in the following figures:  $20^{\circ} 32' 5''.9$ , which mean twenty degrees, thirty-two minutes, five seconds, and nine-tenths of a second. (See DEGREES OF LATITUDE AND LONGITUDE.)

*Climatic Zones.*—There are four parallels, usually made prominent in globes and maps, which are peculiar limits in the distribution of light on the surface of the earth. Two are traced at the distance of about  $23\frac{1}{2}^{\circ}$  on each side of the equator, and are called on the north the *Tropic of Cancer*, and on the south the *Tropic of Capricorn*. The other two,  $23\frac{1}{2}^{\circ}$  from either pole, are the *North Polar* and the *South Polar Circles*, also called the *Arctic* and *Antarctic Circles*. The two tropics mark the extreme limits of the central region where the sun, in its yearly course, can be seen vertical, the sun being vertical on these parallels on the longest days of the year—viz., the 21st of June in the northern, and the 21st of December in the southern hemisphere. The polar circles are the parallels on which the longest day is twenty-four hours, and mark the limits of the circular area around the poles within which the summer sun does not set every day. The globe is thus divided into six bands, or *zones*, in three groups, which, from the general character of their temperature, are termed the warm or *torrid*, the *temperate*, and the *frigid* zones. The portion of the earth's surface occupied by each of the zones is very unequal. Their comparative area, in English square miles, is as follows:

North tropical zone.....	39,109,628	} Warm regions.....	78,219,256
South tropical ".....	39,109,628		
North temperate zone.....	51,110,763	} Temperate regions.....	102,221,526
South temperate ".....	51,110,763		
North polar ".....	8,229,748	} Cold regions.....	16,459,496
South polar ".....	8,229,748		
The whole globe.....	196,900,278	English square miles.	

It is thus seen that, by a wise arrangement of Providence, the temperate regions, most favorable to man's development, are the most extensive; next are the warm regions; while the frigid zones, unfit for man's progress, cover but an inconsiderable portion of the earth's surface.

*Ecliptic.*—A last great circle is to be noted, which intersects the equator at an angle of about  $23\frac{1}{2}^{\circ}$ , and touches the two tropics. When the axis is inclined  $23\frac{1}{2}^{\circ}$  from the perpendicular position, the plane of this circle is horizontal, representing the plane of the orbit in which the earth moves around the sun. This circle is the line through which the plane of the orbit cuts the surface of the earth, and marks the apparent course of the sun from one tropic

to the other during the seasons. It is called *ecliptic* because eclipses happen only when the moon is in the same plane, or very near it.

V. *Density and Weight of the Earth.*—To find out the absolute and specific weight of the enormous mass of the earth, and by it that of all the bodies of the solar system and of the sun itself, seems so bold an undertaking for man's littleness as to savor of rashness. Still, it has been done quite satisfactorily by physicists and astronomers.

If we weigh equal volumes of pure water, stone, iron, lead, gold, and other substances, their weights are found greatly to differ. A cubic foot of stone weighs as much as two cubic feet and a half of water; one of iron, as much as seven and a half; of lead, as eleven and a half; of gold, as nineteen. That is to say, that, under the same volume, the last substances contain as many times more matter than water, and their *density*, or *specific weight*, is greater in the same proportion. By three different methods, the results of which very nearly agree, the average density of the earth has been found to be five and two-thirds times as great as that of water. In other words, it would require five and two-thirds globes of water of equal bulk to balance the globe of the earth. The volume of the earth being known, as well as its density, its absolute weight may be computed, which is about 5852 trillions of tons—a number which we can write down, but of the magnitude of which we can scarcely form any conception. (See DENSITY OF THE EARTH.)

Considering that the materials composing the surface—water and rocks—have a density so much smaller than the average, we must surmise that in the interior of the globe either the metallic substances greatly prevail, or that matter is in a state of very great compression.

VI. *The Earth's Internal Temperature.*—We are so much accustomed, at the surface which we inhabit, to look to the sun—that is, to an outside source—for all the heat we enjoy, that we almost forget to ask whether the earth has a temperature of its own, independent of that which it receives from that great common reservoir. But when we remember that the warm springs around which so many gather for health or pleasure rise from beneath the surface; when we observe the greater heat of the waters of the Artesian wells, the even and warm temperatures of the deep mines, and especially the torrents of hot steam, of molten rocks, which ascend from unknown depths to the mouths of volcanoes and flow along their slopes,—we must recognize that the interior mass of the globe has a higher temperature than that of its surface, the source of which is in itself. The earth, like the sun, is a warm body in the midst of the cold space of the heavens.

But if so, can we form an idea of the amount of that proper heat? To do this, we must try to establish the law of its increase from the surface downward.

*Warm or Thermal Springs.*—The temperature of the innumerable springs which bring back to the surface the rain-waters absorbed by the earth-crust, feed the brooks and rivers, and minister to the wants of life, vegetable and animal, is generally about equal to the mean annual temperature of the air and the ground at the places where they issue. It is nearly the same in all seasons, so that spring-water appears cold in summer and warm in winter. But while spring-water is scarcely ever cooler than the mean temperature of the surface-ground, it is often found to possess a much higher temperature, ranging even to that of boiling water. These springs, warmer than the average, are termed *thermal* springs, even though their temperature be but a little superior to that of ordinary springs.

It is believed that this higher temperature is imparted to the spring-water by the deep-seated layers of rock among which it circulates. The deeper the rain-water penetrates into the earth's strata the warmer it becomes. This view is sustained by the fact that the thermal springs most abound in the mountains and in all the regions where the earth's strata are most disturbed, broken, and creviced, as in the volcanic districts. (See THERMAL SPRINGS.)

The famous Geysers (or spouting springs) of Iceland, which, volcano-like, throw out at intervals, with tremendous force, from a vertical chimney, a column of boiling water sometimes ten feet in diameter, and reaching often over 100 feet in height, give us a magnificent as well as instructive exhibition of the power of steam generated and gradually accumulated in a heated volcanic soil. Similar spouting springs, on a still grander scale, are found at the head-waters of the Yellowstone, Madison, and Snake rivers in the Rocky Mountains. (See YELLOWSTONE VALLEY.) The temperature of the water in the Geysers is fully  $212^{\circ}$  F., and even higher a few feet down in the shaft. Thermal springs of all grades of temperature are abundant in all parts of the globe.

The phenomenon of the warm springs is thus too general to be attributed to local or accidental causes. It proves that at no great depth below the surface a temperature exists which is not inferior to that of boiling water; but as



we do not know from what depth these warm waters come, they do not afford the means of ascertaining the law of its distribution. This we have to learn from observations made at known depths in Artesian wells and in mines.

Careful observations, made by sending down self-registering thermometers to different depths in Artesian wells, give us a clue as to the temperature of the strata in which the water is contained, and the law of its distribution. In order, however, to obtain the true rate of increase, we must start from the mean annual temperature of the ground, which is not always found at the surface. The surface layers are affected by the heat of the seasons, and are warmer in summer and colder in winter. But these variations gradually diminish downward to a depth at which they become insensible, and where the degree of heat is constant, and equal to the average annual temperature of the air above. It is evident that the greater the extremes of heat and cold, the deeper will they be felt below the surface. In our latitude the layer of invariable temperature reaches the depth of from sixty to eighty feet; while in the equatorial regions, where the temperature is nearly the same the whole year, it is found at a few feet, and grows gradually deeper towards the colder and more variable latitudes. From this invariable layer the increase downward has to be reckoned.

Among the most remarkable of the Artesian wells in which such observations have been made are those named in the following table, which gives the temperature observed in these wells at these various depths:

Depth in feet.	Temperature, Fahr.	Number of feet for increase of 1° Fahr.
Grenelle, Paris.....1798.....	82.4.....	58
Neu Salzw. Prus. 2288.....	92.5.....	55
St. Louis, Mo.....2199.....	79.2.....	83
Louisville, Ky.....2086.....	82.5.....	67
Columbus, Ohio.....2775.....	88.0.....	73
Sperenberg, Prus.....4162.....	122.0.....	75

This shows that the temperature invariably increases from the surface downward, but also that temperature at the same depth is different in different wells, and therefore the rate of increase greater in some places than in others.

*Temperature in Mines.*—Observations of temperature made in deep mines, first in France in the middle of the last century, and since in all parts of Europe, give similar results. The increase of heat downward is constant, but the rate of increase often differs widely, even in mines situated at no great distance from each other, according to the nature of rocks and their power to transmit heat. In the Prussian mines, where a long series of investigations have been made with the greatest care, the most rapid rate is 1° Fahrenheit for every 27 feet; the slowest, 1° for every 197 feet—the average 1° for 92 feet. In the mines of Saxony the average is 1° for 72 feet. Six of the largest mines in England give 1° for 44 feet; Daleoath mine, in Cornwall, 1° for 75 feet. In America, the Virginia coal-mines show an increase of 1° for 60 feet. Even the frozen soil of the middle Siberian plains, which has a thickness of nearly 600 feet, and near the surface a temperature of only 10° Fahrenheit, shows a steady increase down to the depth at which the temperature reaches the melting-point.

The average of all known observations, made in various parts of the globe, both in Artesian wells and mines, gives an increase of heat towards the interior of about one degree of Fahrenheit for every fifty-five feet—a very rapid rate indeed, which leads to an important conclusion.

*Conclusion.*—If this universally increasing temperature in the interior of our earth continues in a regular progression downward, the temperature of boiling water will be reached at 9000 feet, or less than two miles from the surface—a distance only equivalent to a moderate-sized mountain. At thirty miles the heat would be sufficient to melt all the rocks and metals contained in the earth's crust. But as we have some reason to believe that the progression becomes gradually slower, we may admit as probable that the solid, unmelted crust has a greater thickness, reaching, perhaps, if not exceeding, 100 miles.

Startling as this result may be, it is the hypothesis which best accounts for the facts just mentioned, and for the phenomena of geology.

*Volcanoes.*—Artesian wells and thermal springs prove an internal temperature reaching the boiling-point of water; but volcanoes, and the torrents of melted, fiery lava, which escape from their open mouths, demonstrate the existence in the bowels of our planet of extreme temperatures, which tell us that the above conclusion is not a mere fancy, for the volcanic phenomena are too general, and too much connected with the great fractures of the earth's surface, to be accounted for, as has been tried, by mere local chemical causes. (See VOLCANOES.)

*Arrangement of Volcanoes on the Earth's Surface.*—While the reader is referred to the article VOLCANOES for a particular description of them, it seems proper to offer here

some remarks on their general distribution, as forming one of the most remarkable features of the earth's surface. Though volcanoes are but local and apparently independent accumulations of ejected materials, they are mostly arranged in long, straight lines, more or less interrupted. Humboldt was the first to show that the six volcanoes of Mexico, among which the noble Orizaba and Popocatepetl are kings, are on a straight line which stretches across the continent, and, when prolonged beyond in the Pacific, strikes the volcanic islands of Revillagigedo. He draws from that fact the plausible inference that they have all issued from one long fissure extending across the body of the table-land. The volcanoes of South America are all on the long line of the Andes; those of North America on the line of the Sierra Nevada and Cascade ranges. On a similar line are also the numerous volcanoes of Sumatra, those of Java, and many others along the coast of the Asiatic continent.

Other volcanoes seem more isolated, or form groups composed of a central volcano surrounded by secondary ones. Vesuvius and Etna in Europe; the Canary Islands, the Azores, and Iceland in the Atlantic; the Sandwich Islands and the numerous groups of Polynesia in the Pacific, and many more in the Indian Ocean, are usually considered as examples of this class.

*Linear and Central Volcanoes.*—The celebrated geologist L. von Buch first called attention to this difference, and accordingly divided volcanoes into linear and central. The first class he conceived as raised on a single fissure; the second, on a number of crevices radiating from a centre, as if the result of a violent vertical upheaval. This classification, however, has hardly the importance which has been attached to it, for the groups of the so-called central volcanoes are mostly arranged on a line or zone; and even in many groups, as in Iceland and the Sandwich Islands, the disposition of the single volcanoes in parallel lines is unmistakable.

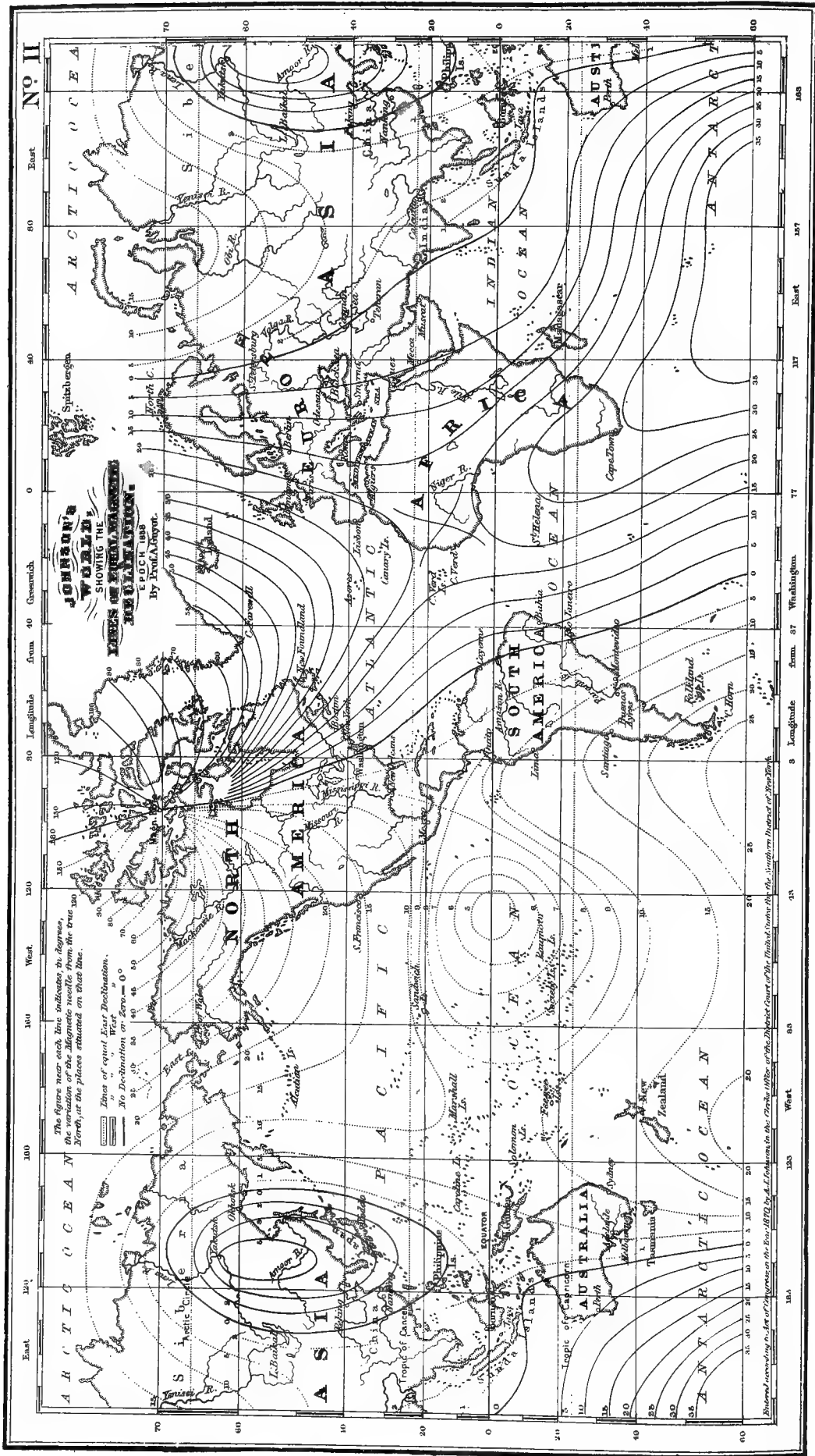
*Distribution of Volcanoes.*—Though volcanoes are found in every continent and ocean, and in all latitudes, they are not equally distributed on the surface of the globe. They follow certain lines and cluster in distinct groups. The most important feature of their distribution is, that nearly all are situated along the mountain-chains and rows of islands which border the shores of the continents, while the interior of these great land-masses is nearly free from them. Leaving out a few extinct volcanoes, the only well authenticated exception to that rule is the existence of a few volcanic centres around the Thian-Shan Mountains, in the very heart of the continent of Asia, midway between the Arctic and Indian oceans, nearly two thousand miles from the sea in every direction—the volcano Bo-Shan, with lava streams; that of Turfan; the Solfatara of Ourumtzi, which sometimes emits ashes.

The number of volcanoes, extinct and active, is variously estimated. Humboldt, in "Cosmos," counted 407. More recently, Dr. Fuchs enumerates 672, of which 270 are still in a state of undoubted activity. Of these 270, 175 are on islands, and 95 on the continents, but again mostly on the sea-shore. This uniform proximity of volcanoes to the sea has caused a prevalent belief that sea-water is a necessary condition of their existence. It will be seen, however, that this may perhaps be a hasty conclusion.

*Two Great Volcanic Zones.*—There are two great terrestrial zones in which are found, arranged in long lines or isolated groups, nearly all the volcanoes of the globe.

The first zone is the vast circle of mountain-chains, peninsulas, and rows of islands which surround the Pacific Ocean and girdle it with a belt of burning mountains. Beginning at the extreme point of South America, in Terra del Fuego, with the somewhat doubtful volcano of Sarmiento, it extends along the Andes, in which are found three of the most remarkable series of volcanoes, separated by intervals of hundreds of miles, those of Chili, Bolivia, and Ecuador counting together sixty-seven volcanoes, twenty-seven of which are still active. Then follows the rich group of Central America, with fifty-seven volcanoes, twenty-two being active. The series of Mexico has six active volcanoes, besides full as many extinct ones. In North America, the series of the Sierra Nevada and Cascade Mountains, the group of Alaska, and the long series of the Aleutian Islands, have together over eighty volcanoes, half of which are active, mostly in the Aleutian Islands. Passing to the Asiatic continent, we find the series of Kamtschatka peninsula, with not less than thirty-eight volcanoes, twelve of which are active; the line of the Koorile Islands with twenty volcanoes, half of which are now extinct; the group of the Japan Islands, which numbers forty-six volcanoes, with only seven active. Between Japan and the Philippine Isles twenty-three volcanoes may be counted, of which seven are active; in the Philippine and Molucca Isles, thirty-one, most of which are in a state of activity. At last the Australian





line: New Guinea, with three active; New Britain, with two active and one extinct; New Hebrides, with two; New Zealand, with seven extinct and two active volcanic cones, terminate that brilliant girdle of fiery beacons around the Great Ocean. Including those which are extinct, the number of volcanoes in that zone reaches 392.

The second volcanic zone, though less continuous, is hardly less remarkable. It is a belt of broken lands, islands, peninsulas, and inland seas, which runs in a slanting direction around the globe, separating the northern from the southern continents. Starting from Central America, with its isthmus full of volcanoes, its landlocked seas, its peninsulas and islands, and the volcanic series of the Lesser Antilles, it passes through the volcanic groups of the Azores and Canary Islands to the Mediterranean and its peninsulas, including the active volcanoes of Europe—Vesuvius, Etna, the Lipari Islands, and Santorin. Entering Asia Minor, with its numerous extinct volcanoes, it passes through Arabia, the Red Sea, the Persian Gulf, and the two peninsulas of India, all rich in traces of the activity of the internal fires. Thence crossing the East Indian Archipelago and its hundreds of burning mountains, it reaches those of the Friendly Isles, and running through all the Polynesian volcanic groups, meets again the great isthmus of Central America. Including those of the latter region, we find in this zone 168 volcanoes.

The two zones just described contain therefore, together, no less than 560, or five-sixths of all the existing volcanoes.

Where the two zones intersect each other, in Central America and in the East Indian Archipelago, the volcanic forces also display their greatest intensity. Central America, with Mexico and the Antilles, has eighty-five volcanoes. In the East Indian Archipelago, the long line of the Sunda Islands alone possesses eighty, and those of the Philippine Islands with the Moluccas, and of New Guinea with New Britain, swell the number to 117. Thus in these two regions are crowded over 200, or nearly one-third of all which are known.

The remaining volcanoes not included in these two great belts are either scattered in the midst of the oceans, as the Sandwich Islands group in the Pacific; Bourbon and Mauritius in the Indian; Cape Verde Islands, Ascension, St. Helena, Tristan da Cunha in the Atlantic Ocean; or in the broken polar lands, like Iceland and Jan Mayen Island in the Arctic; Erebus and Terror in the Antarctic Ocean.

**Height of Volcanoes.**—Volcanoes are of all heights, from the submarine cones which do not reach the surface of the ocean to that of Sahama in Bolivia, the highest of the known volcanoes, which rises to 23,000 feet above it. Nay, if we accept as probable the idea that such volcanoes as Mauna Loa, nearly 14,000 feet high, have their base at the bottom of the deep ocean which surrounds them, the total elevation of such a structure may even reach that of the highest mountains of the globe.

The peculiar distribution of volcanoes on the surface of the globe, described above, may help us to understand the nature and the causes of volcanic action, which are not to be confounded with the more general force which has upheaved the continents and sunk the basins of the oceans. Three facts are here prominent and significant: 1st. Nearly all volcanoes are either along the highest edge of the continents, or in the great central zone of fracture. 2d. Most of them affect a linear arrangement. 3d. The agent at work in these mighty engines is mainly vapor of water, or steam-power.

If we admit, as we have every reason to do, that the interior of the earth is a fiery mass, this must be considered the primary source of volcanic action. Its effect will be most intense in the deep fissures which establish a ready communication with the surface. Nowhere are the earth's strata more deeply broken than on the very edge of the continents; and geology demonstrates that it is on the mighty chasms caused by the upheaval of these vast bodies of land that mountain-chains like the Andes, the Sierra Nevada, and the other mountains encircling the basin of the Pacific Ocean have been raised. There also the volcanic vents abound in long lines, following either the top or the foot of the mountain-chains. The same may be said of the central zone of fracture.

It is not, however, to the heat of this fiery interior mass, but to its slow cooling, and the contraction which is the consequence, that we must ascribe the wrinkling and breaking up of the solid exterior crust, and the formation of those grand features of the surface of our planet which add so much to its beauty and usefulness.

In this view, volcanic action is not the cause, but a consequence, of the upheaval of mountain-chains and continents, and the frequent proximity of volcanoes to the sea does not imply the necessity of sea-water for their formation. Rain-water and Artesian waters also, which, instead of reappearing on the surface in the form of springs, pene-

trate a few miles deep in these subterranean cavities, may become so overheated, under high pressure, as to explain the usual volcanic phenomena. If so, the lavas flowing from a volcanic chimney may not necessarily be connected with the great reservoir of the melted interior. There can be no doubt that a close connection exists between the phenomena of volcanoes and those of earthquakes. (See EARTHQUAKES.)

**VII. Terrestrial Magnetism.**—The earth exerts a directing force upon the magnetic needle, acting like a magnet. (See MAGNETISM.) In whatever portion of the globe—on the ocean or on land, on mountains or deep valleys—a magnetic needle, freely suspended so as to move easily in every direction, no matter how it is placed, will always turn in a definite direction, one pole pointing towards the north, and the other towards the south pole of the earth. The pole of the needle directed by the north pole of the earth, being of contrary magnetism, is the south pole of the needle, but for convenience is marked north on the compass, because it points towards the geographical north.

The magnetic poles, however, do not coincide with the geographical poles, but are found to be more than 20° from them; nor do the magnetic meridians passing through the poles of the needle, and the magnetic poles of the earth, coincide with the geographical meridians. The needle, therefore, seldom points to the true north, but usually to the east or west of it. The difference between the magnetic and the true north is called *magnetic variation* or *declination*. This declination may be either east or west of the true north; but there will be also a line where the needle points to the true north, and which is the line of no declination, from which the variation has to be counted. By connecting together all points which have equal declination we obtain a system of lines which show at a glance, as in Map No. II., the direction of the needle in all parts of the world. On the map the eastern declination is distinguished by dotted lines and a light-brown color, and the western by full lines and blue color, the line of no declination between being heavier.

**Secular Variation.**—It is found that the declination does not remain the same at any one place, but the magnetic poles with their system of meridians are gradually travelling from west to east and from east to west; and as these oscillations take centuries to complete their course, this is called *secular variation*. A map of the lines of declination must therefore refer to a particular date. The one here given shows the declinations as observed in the year 1858. It will be seen that the line of no declination in the Western World passes through Rio de Janeiro, the mouth of the Amazon, somewhat west of Washington, through Lake Huron, and the magnetic pole as found by Sir James Ross in Boothia Felix, under the 70th degree of N. lat. In the Eastern World it passes through the western part of Australia, west of the peninsula of India, and through the Caspian and White seas. A region of abnormal declinations in Central Siberia seems to indicate the existence of a secondary magnetic pole in that part of the world.

The map shows that when crossing the Atlantic from Liverpool to New York the voyager will find the variation of the compass, which in Liverpool is about 25° west, increasing to 30° in mid-ocean, and then rapidly diminishing from Newfoundland to New York, where it is only about 7°. Beyond the line of no variation, passing near Washington and the great lakes, the needle points east of the true north, and continues so across all the continent and the Pacific Ocean, where it again begins to point west before reaching the islands and the coast of Asia. It is evident that both the traveller on land and the mariner have to correct the indications of the needle for variation to get the true points of the compass. The amount of declination can easily be found by comparing the direction of the needle with the north star.

The following table of the declinations observed in Paris since 1580 will show the course of the secular variation in the northern hemisphere:

*Declinations observed in Paris.*

Year.	Declination.	Year.	Declination.
1580.....	11° 30' east.	1816.....	22° 25' west.
1618.....	8       "       "	1817.....	22   19   "
1663.....	0       "       "	1823.....	22   23   "
1678.....	1   30 west.	1827.....	22   20   "
1700.....	8   10   "	1828.....	22   5   "
1780.....	19   55   "	1829.....	22   12   "
1805.....	22   5   "	1835.....	22   4   "
1814.....	22   34   "	1854.....	22   10   "

This table shows that—

1st. The extent of the variation was over 31°.

2d. In 1663 the declination was zero, the needle pointing due north.

3d. From 1580 until 1814 the needle moved towards the west.

4th. Since 1814 it has moved backward towards the east.

5th. The rate of this movement is not uniform, but is greater near the minimum, and least near the maximum point of declination.

There are minor variations in the declination which follow the periods of the day and of the year, and seem to be in close connection with the temperature of the atmosphere and the position of the sun.

The mariner's compass is but a needle attached to a circular sheet of talc moving freely on a pivot, on which is marked the direction of the winds according to thirty-two points of the compass. The whole is placed in a box with double suspension, so as to keep it horizontal even amid the motion of the waves.

**Magnetic Inclination.**—A magnetic needle so suspended as to move freely in a vertical direction will adjust itself in the magnetic meridian, and in each hemisphere one of its poles will dip towards the pole of the earth. This is called the *Magnetic Inclination*, and the needle itself is called a *dipping needle*. (See *DIPPING NEEDLE*.) At the magnetic pole the needle stands vertical; at the magnetic equator, horizontal; between these extremes it takes all intermediate positions. The inclination, like the declination, is subject to periodic and secular variation. In Paris, as will be seen in the table below, it was  $75^\circ$  in 1671, while in 1853 it was only  $66^\circ 28'$ .

Sir James Ross in 1832 saw the dipping needle stand within one minute of a degree of the vertical position near Baffin's Bay. When tracing the lines of equal dip on a Mercator's map, we find that they coincide in a remarkable manner with the isothermals or lines of equal mean temperature, indicating a close connection of the distribution of heat with that of magnetism, and seemingly a common cause for both.

The inclination, like the declination, is subject to periodic and secular variations. The last is shown in the following table:

<i>Inclinations observed in Paris.</i>			
Year.	Inclination.	Year.	Inclination.
1671.....	$75^\circ 00'$	1820.....	$68^\circ 20'$
1780.....	$71^\circ 48'$	1825.....	$68^\circ 00'$
1798.....	$69^\circ 51'$	1831.....	$67^\circ 40'$
1814.....	$68^\circ 36'$	1853.....	$66^\circ 28'$

It appears from the table that since the year 1671 the inclination has steadily diminished at the rate of about three to five minutes a year.

**Magnetic Intensity.**—The intensity of magnetic force can be measured by causing a dipping needle to oscillate, and

counting the number of its oscillations in a given time. The greater the number of oscillations in a minute of time, the more intense is the attractive force. The lines of equal magnetic force, though not identical with, are very similar to, those of equal inclination.

Modern science is inclined more and more to consider magnetism as but a form of electric activity, for every electrical current causes a magnetic current moving at right angles to it. If we admit, with the learned Ampère, that electrical currents caused by the action of the sun on the revolving earth are constantly moving from east to west around the globe, we must expect a magnetic current at right angles which will make our earth a magnet.

If the earth is a magnet, so are, no doubt, all the other planets, and the sun itself; and our globe is but a link in a great chain of heavenly magnets bound together by mutual attraction and comprising the whole solar system.

**VIII. The Surface of the Earth.**—The surface of the earth, as stated before, measures 197,000,000 of English square miles. Nearly three-quarters of it are covered by the waters of the sea, one-quarter only of the solid crust rising above them. Both dry land and water are surrounded by the atmosphere as by a common garment.

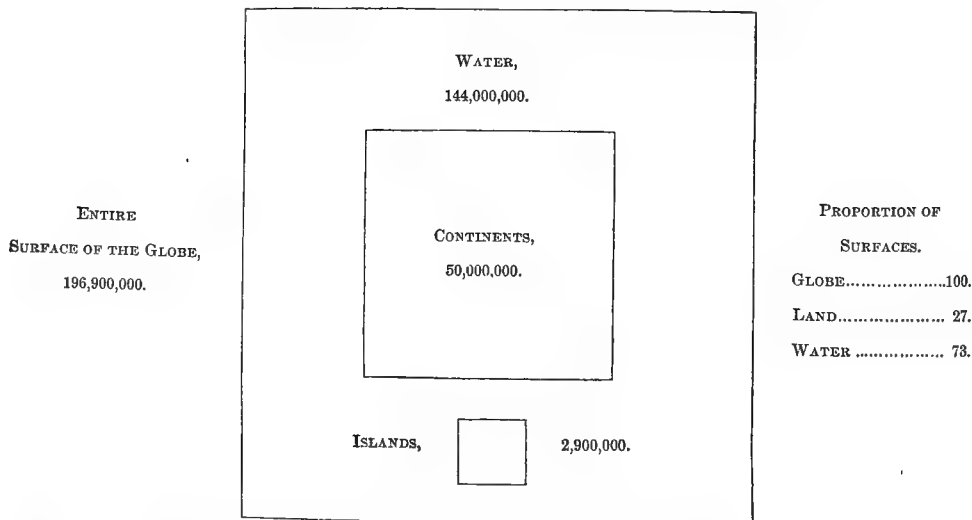
The solid land, the liquid surface, and their gaseous envelope are the three geographical elements which, under the influence of the sun, support life, vegetable and animal, and the mutual play of which it is the province of physical geography to consider. As the extent and forms of the land-masses and oceans, and their relative situation, deeply modify the nature of the climate and regulate the distribution of life, the study of their general arrangement is of primary importance.

**General Arrangement of Land and Water.**—The principal facts in this respect are the following:

1. The solid land is not gathered together in a single large mass, nor is it uniformly scattered over the sea in fragments of about equal size, but forms a few large bodies, called continents, and a multitude of much smaller fragments, called islands, which surround the coasts of the continents and dot the broad expanse of the oceans. This peculiar division into individual bodies favors diversity of climate and richness of development in the domain of life.

The relative amount of land and water on the surface of the globe is made clear to the eye in the following diagram, in which the large square is the surface of the globe; the inner squares, the area of the continents and islands; and the surrounding area, the water-surface. The figures indicate the areas in English square miles:

Fig. 1.—Relative Area of Land and Water, in English Square Miles.



2. Looking on the artificial globe from above, we see the masses of land crowded around the North Pole to about the 70th degree of latitude, and from there extending towards the South Pole in three directions, dividing into three bands of land, which taper as they advance, and terminate in three points—South America, Africa, and Australia, far away from the Antarctic Pole. Looking on the globe from the opposite side, we see the broad sea surrounding the South Pole, and sending three great arms between the bands of land, the Pacific, Atlantic, and Indian oceans. The North Pole might be called the *Continental*; the South Pole, the *Oceanic Pole*.

3. We observe, further, that each of these main bands of land is cut transversely in two by a region of inland seas and broken lands, isthmuses, peninsulas, and islands; the Gulf of Mexico and the Caribbean Sea, with the great isthmus of Central America and the Antilles, separating as well as uniting North and South America; the Mediterranean Sea, with its peninsulas and islands, lying between Europe and Africa; and the Malayan Archipelago, with its lines of islands and landlocked seas, between Asia and Australia.

These regions are parts of a broad transverse band, whose position can be traced from Behring Straits as a centre, with

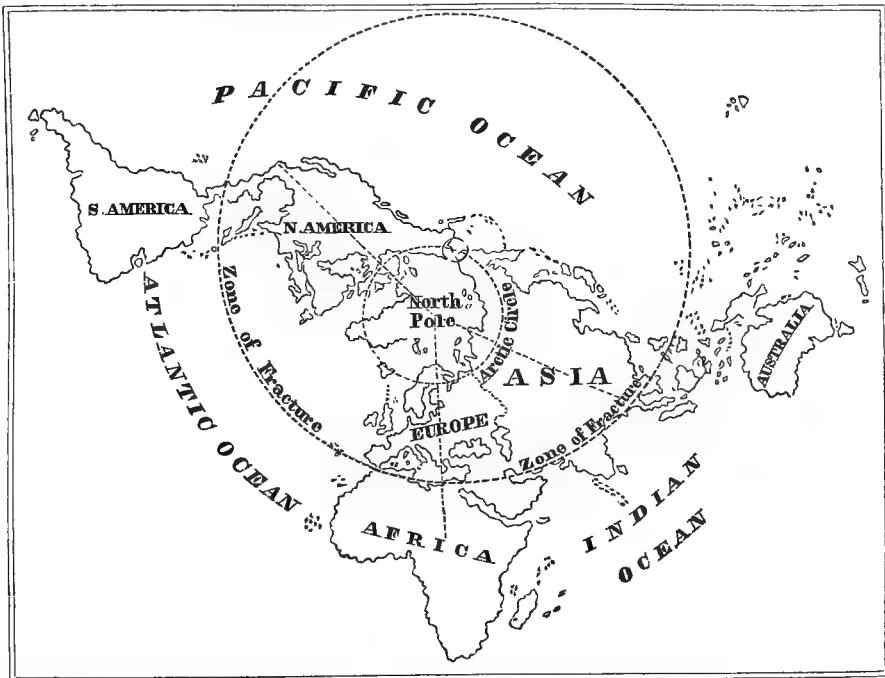


a meridian arc of  $80^\circ$  as a radius, and which we would call the *central zone of fracture*. This disposition is shown in the accompanying map on a polar projection, in which the

zone of fracture is marked by a circle passing through the middle of it.

4. As the lands are nearer the North Pole, and expand

FIG. 2.—Radiating Arrangement of the Land Masses.

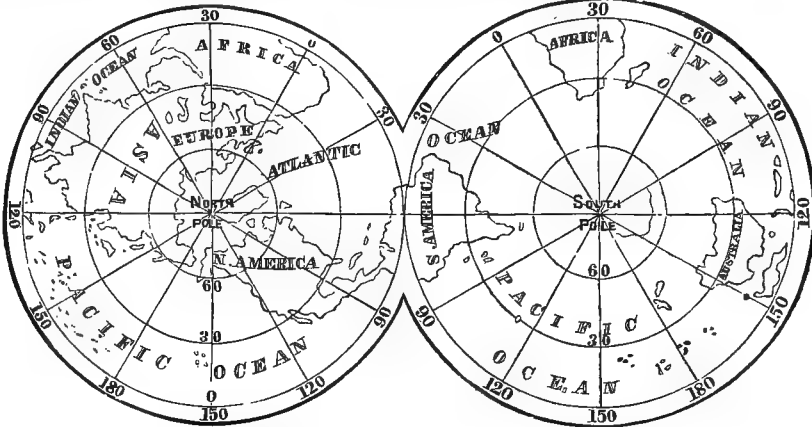


to the north while they taper to the south, the northern hemisphere contains nearly three times as much land as the southern hemisphere, in which water correspondingly predominates, as shown in fig. 3.

Northern Hemisphere.

FIG. 3.

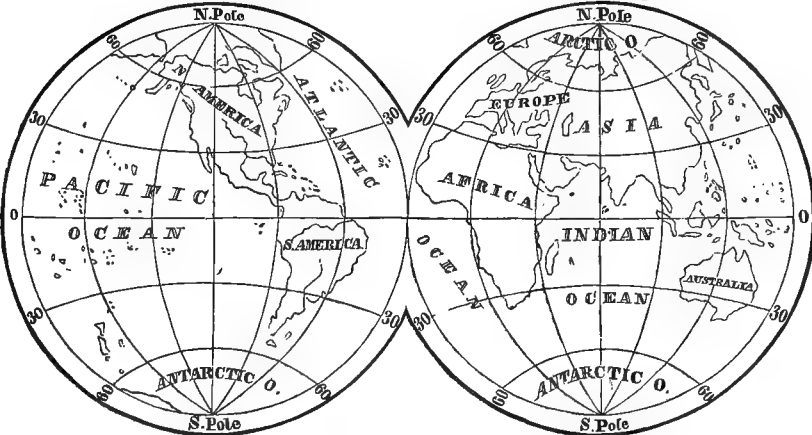
Southern Hemisphere.



Western Hemisphere.

FIG. 4.

Eastern Hemisphere.



The New World.

The Old World.

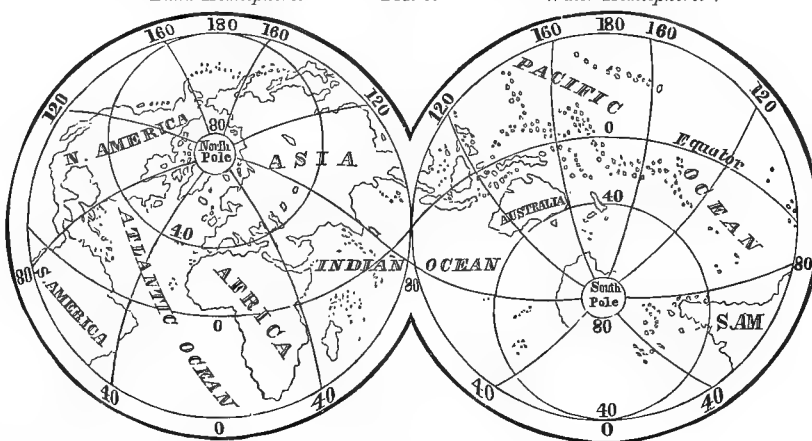
5. As the lands are crowded on the north and east sides of our planet, the north-eastern hemisphere contains more land and the south-western hemisphere more water than any other we can devise. They are therefore contrasted by the celebrated Carl Ritter as the Land and Water Hemispheres. In the land hemisphere are gathered together the largest parts of all the great continents, making over six-sevenths of all the land, and occupying only a little

less than one-half of the surface. In the water hemisphere, Australia, the smallest of the continents, stands alone, with only the southern points of Asia and South America, making less than one-seventh of the land, and leaving twelve-thirteenths of the surface to the water. The centre of the land hemisphere is about London; that of the water hemisphere at some point in the ocean south of New Zealand.

Land Hemisphere.

Fig. 5.

Water Hemisphere.



6. The central zone of fracture divides the land masses into three northern and three southern continents, which form two groups of a very different nature, the northern continents being mostly situated in the temperate and the southern in the tropical regions.

The relative extent of the various groups just mentioned are here tabulated for convenient reference, and the areas given in English square miles:

	Land.	Water.	Total.
The earth.....	52,900,000.....	144,000,000.....	196,900,000
North hemisphere.....	38,780,000.....	59,670,000.....	98,450,000
Southern hemisphere.....	13,965,000.....	84,485,000.....	98,450,000
Eastern hemisphere.....	36,100,000.....	62,850,000.....	98,450,000
Western hemisphere.....	15,900,000.....	82,550,000.....	98,450,000
Land hemisphere.....	45,000,000.....	53,450,000.....	98,450,000
Water hemisphere.....	7,000,000.....	91,450,000.....	98,450,000

FIG. 6.—The Areas of Continents compared in English Square Miles.

NORTH AMERICA, 8,892,000.	EUROPE, 3,785,800.	ASIA, 17,317,900.
SOUTH AMERICA, 6,957,500.	AFRICA, 11,556,700.	
	AUSTRALIA, 3,425,200.	

The general distribution of land and water, just considered, and the extent and relative position of the great land masses among themselves, are of the utmost importance. The action and reaction of land and water upon each other greatly modify the distribution of heat and moisture, due to the general laws arising, as we shall see, from the spherical form of the globe. Land absorbs and radiates heat more readily than water, and thus causes extreme temperatures, which never occur on the surface of the ocean. Similar extremes of moisture and dryness are found only on the continents. As heat and moisture essentially regulate the development of organic life, the final character and value of each part of the globe, in this respect, are determined by the size, form, and grouping of the bodies of land in the midst of the oceans. We have now, therefore, to turn our attention to the specific forms of the continents and oceans, on which so much depends.

*Land and its Configuration.*—The portion of the solid crust of the earth rising above the surface of the ocean is divided, as we have seen, into six great bodies, the continents, besides innumerable smaller ones, the islands. In both we must notice the horizontal forms, or the line of contact of land and water as shown in the maps, and the vertical forms, the elevations and depressions, the mountains and plains, or the forms of relief. (See CONTINENT.)

The amount of indentation in each continent is shown in the following diagram (fig. 7), in which the inner square represents the line enclosing the unindented area, without the islands; the outer line, the actual length of the coast with its windings. The difference between the two gives

the true measure of the indentation. It is easy to perceive at a glance how much the northern continents differ from the southern in this respect:

It is a fact full of meaning that the indented, well articulated continents are also, and have always been, the abode of the most civilized nations. The unindented ones, shut up in themselves, and less accessible from without, have played no important part in the drama of history. We must remember, however, that the variety of contours is but the expression of a more complicated inner structure, which, together with the climatic situation of the northern continents in the temperate regions of our globe, has a large share in this remarkable result.

The following table gives the length of the coast lines of the six continents compared with their area, without the islands, in English miles:

Area and Length of the Real Coast Line of each Continent.

	Area.	Length of coast line.
Europe.....	3,565,200 sq. miles.....	19,800 miles.
Asia.....	16,216,600 ".....	35,500 "
North America.....	8,261,000 ".....	27,700 "
Africa.....	11,314,300 ".....	16,200 "
Australia.....	2,948,300 ".....	8,760 "
South America.....	6,889,500 ".....	15,700 "

The table shows that Europe has 4000 miles of coast more than Africa, which is three times larger; and that North America, which is only little larger than South America, has 12,000 miles more of coast.

We have thus far taken a view of the outward forms of the masses of land as bounded by the waters of the ocean.



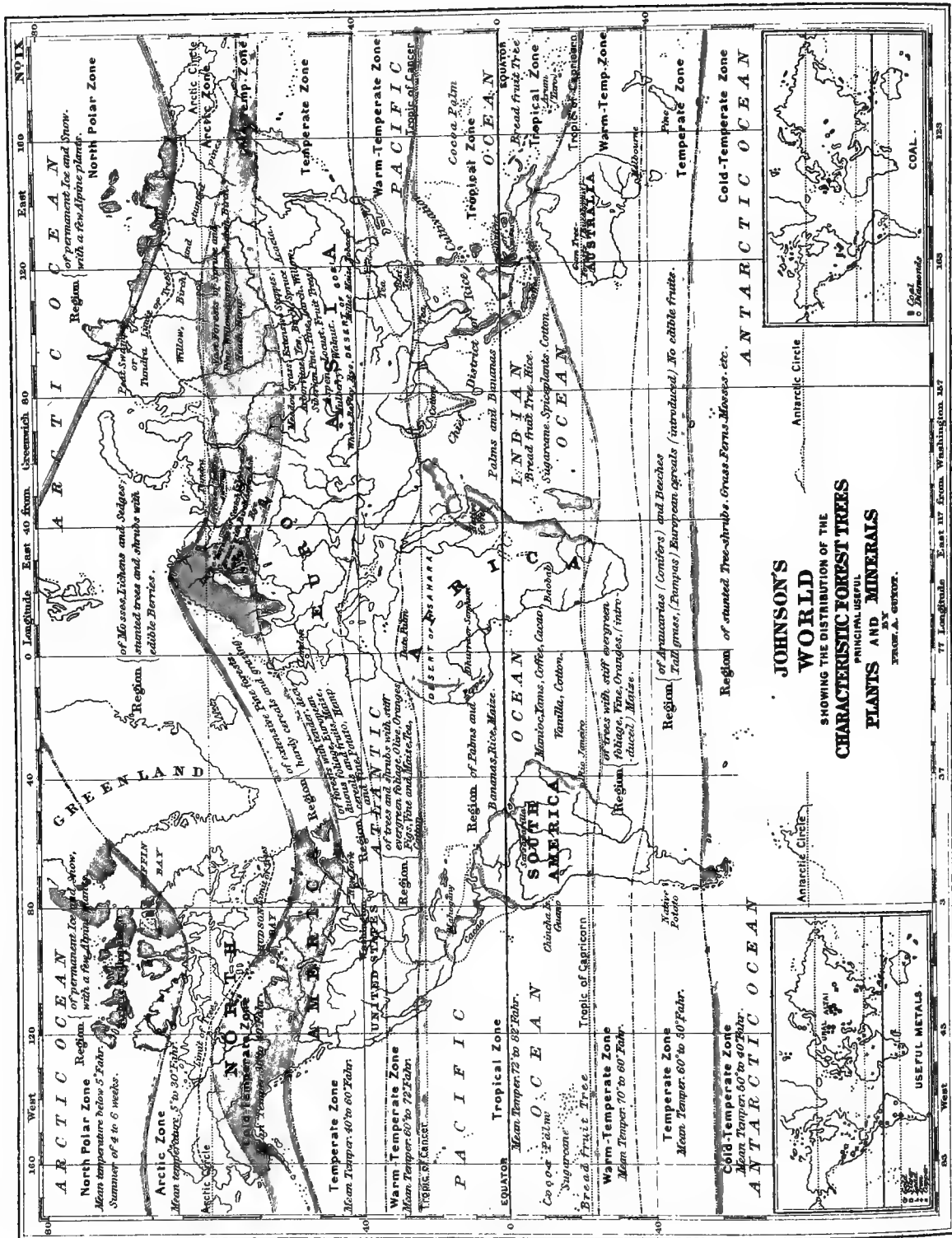
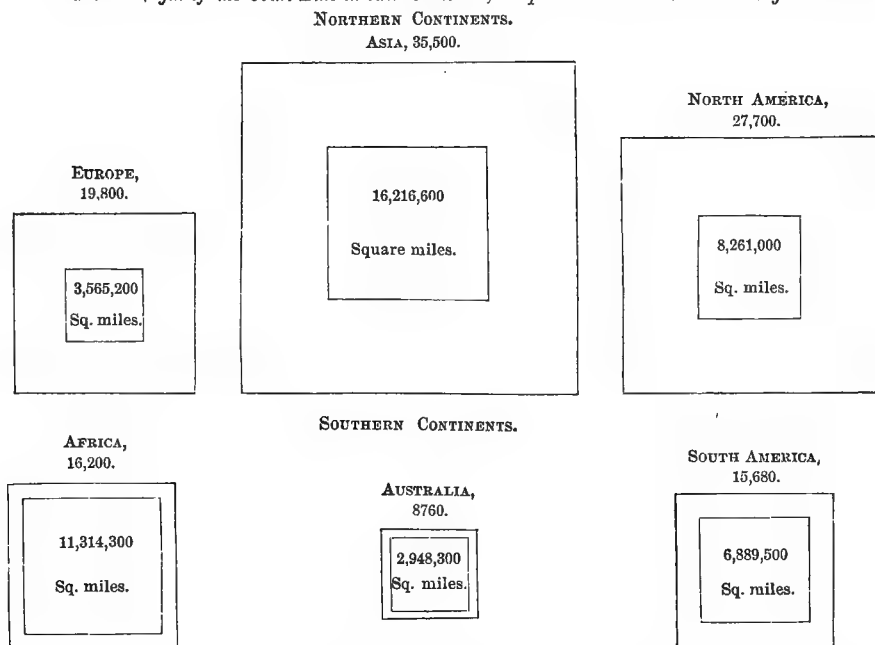


FIG. 7.—Length of the Coast Line in each Continent, compared with the Line Enclosing its Area.



To complete our view we must consider them as solid bodies, and study their vertical forms.

*Vertical Forms, or Relief.*—The configuration of their surface, as diversified by plains, highlands, mountains, and valleys, constitutes the *relief* of the continents, the characteristic features of which reveal their internal structure.

The elevation of a place above the level of the sea is usually reckoned from the level of the sea as a common base, and its height above the ocean is called its *absolute height* or *altitude*.

Though the loftiest mountains of the globe, compared with the diameter of the earth, are but as grains of sand on a globe of several feet in diameter, this element of altitude acts so powerfully on climate and organic life that its knowledge is of primary importance. An elevation of level of 350 feet is sufficient to diminish the mean temperature of a place by one degree Fahrenheit; that is to say, the effect is the same as if the place were situated seventy miles farther north. A few thousand feet of height change entirely the aspect and usefulness of a country. It is, again, the relief which controls the drainage of the continents, directs the course of the flowing waters, and shapes the river-basins. Although the forms of relief are infinitely varied, we may refer them to two great classes:

1st. The elevations in mass and by great surfaces, which are called plains or lowlands when they are only a little elevated above the level of the ocean, and plateaus or tablelands when their elevation is more considerable and presents a solid platform, a basis of great thickness.

2d. The linear elevations or chains of mountains, which are distributed on the borders of the plains and tablelands, or, more rarely, scattered in isolated groups. To the mountain-chains the valleys correspond, as the low plains to the plateaus.

*Plains and Lowlands.*—The lowlands and plains occupy nearly one-half of the surface of the continents. They are most extensive and unbroken on the Arctic slopes of the three continents of the north, and on the eastern or Atlantic side of the New World. The great Siberian plains extend from the north-eastern part of Asia to the Ural Mountains and the Caspian Sea, and continue through Russia and Northern Germany to the low land of Holland. In North America we find extensive lowlands marked by the valley of the Mackenzie River and the plains of the Mississippi Valley. In South America, the Llanos or plains of the Orinoco, the Selvas or plains of the Amazon, the Pampas or plains of the La Plata basin, form an uninterrupted series of lowlands which continue through the Patagonian plains to the extremity of the continent, along a line of 3500 miles. We may mention, again, among the large plains of the world, the interior of the Australian continent. The historical plains of China, Hindostan, and the Euphrates in Asia, celebrated and useful as they always have been, are smaller and of a more local character.

The nature of the surface in the lowlands is extremely

variable. The vast alluvial plains, almost perfectly level, which are the work of the present rivers, and are formed along the great streams and in the deltas formed at their mouths, correspond best with the idea of a low plain. Such are the plains of the delta of the Mississippi, including the flat bottom, from thirty to eighty miles, comprised between the bluffs of the river; the plains of the Amazon; those of the Orinoco and La Plata; the plains of the lower Ganges and Brahmapootra; the delta of the Nile; the plain of Lombardy, and others of less note. In all these the view stretches unobstructed, as on the broad ocean, without meeting an elevation deserving the name of a hill. Other plains, like those of Northern Germany, the Caspian Sea, and a part of the Siberian plains, are the sandy bottom of an ancient ocean, and offer slight inequalities incident to local accumulation of sand drifted by the currents, or to some other accidental cause. Others, again, are undulating, like many of the vast treeless plains which cover most of the western portion of the Mississippi basin, or, like the eastern Siberian plain, are diversified by numerous hills. The nature of their surface is not less varied. In the Siberian plains large tracts called Tundra are endless frozen swamps full of mosses and lichens, while the hilly parts are covered with forests. To the south-west stretch immense grassy steppes, in which roam the nomadic Kirgheez. Salt sandy plains surround the Caspian Sea. Dense forests cover Central Russia, open treeless but fertile prairies its more southern plains. In North America, the wet, alluvial plain of the Mississippi delta, the open and fertile prairies of the upper Mississippi, the barren and, in part, salt plains of the far West, are very distinct types, with a value to man not less different. In South America, the Llanos of the Orinoco, a burnt waste one half the year, a rich pasturage the other half; the plains of the Amazon, covered with a luxuriant forest of over a million of square miles; and the treeless Pampas, with their tall grass and forests of thistles, are all forms which exhibit the endless variety of nature.

The low plains may be counted among the most valuable portions of our globe. There the waters, rushing down the slopes of the continents, meet, and bringing with them the spoils of the uplands, accumulate the rich alluvial soil on which at all times men have gathered by millions. There civilization began and developed, and an inexhaustible fertility supplied all the wants of the full-grown nations. China, India, Babylonia, and Egypt had their heart and centre in the alluvial plains, fertilized by the mighty rivers which traverse them.

The altitude of these useful basins is remarkably small. The central part of each of those just mentioned does not average 500 feet above the sea-level. The Mississippi at St. Louis, 1000 miles from the sea, is hardly 400 feet above it. The Amazon, at a similar distance inland, does not reach 250 feet of altitude. The Siberian plains, those of the Ganges, Euphrates, and the valley of the Nile, have all



altitudes of the same order. It would require, therefore, but a slight depression of the continents to cover all these rich countries with the waters of the ocean.

The following table shows the approximate area covered by the lowlands in each continent, in English square miles, with the proportion to the whole surface:

	Lowlands.	Proportion.
Asia .....	7,116,000 square miles.....	$\frac{1}{3}$
Europe.....	2,541,000 " .....	$\frac{1}{6}$
Africa .....	3,614,000 " .....	$\frac{1}{4}$
North America...	3,840,000 " .....	$\frac{1}{5}$
South America...	5,417,000 " .....	$\frac{1}{3}$
Australia.....	2,551,000 " .....	$\frac{1}{4}$

**Plateaus and Highlands.**—The name of plateau is usually applied to elevations in mass, or surface elevations, the absolute height of which exceeds a thousand feet. Plateaus, or table-lands, are swelled portions of the continents, often raised to a great height between two chains of mountains, which form their margin, as the plateau of the Great American Basin between the chains of the Rocky Mountains and the Sierra Nevada, and that of Thibet between the snowy chains of the Himalaya and Kuen-Lun. Or they descend by a series of terraces to the sea, as the plateau of Mexico, or, again, slope gradually into the lowlands, as the great plains of the far West in North America, which from an altitude of five or six thousand feet at the foot of the Rocky Mountains, pass by imperceptible steps into the centre of the Mississippi Basin.

Though the name plateau rather implies a flat surface, it may also be hilly, or even mountainous, but in all cases the lowest part of it still remains thousands of feet above the ocean. If no well defined limit can be given at which a rising surface begins to deserve the name of plateau, striking differences in the climate and the vegetable and animal life distinguish the table-lands as one of the main types of geographical forms.

The plateaus most remarkable for their elevation are the elongated, valley-like highlands situated between the two chains of the Andes in South America, which have an altitude of from 10,000 to 13,000 feet, and those of Thibet between the Himalaya and the Kuen-Lun, which average from 10,000 to 16,000 feet. These may be called plateaus of the first order. The plateaus of a second order, though less elevated, averaging from 4000 to 7000 feet, are the most extensive, such as those of East Toorkestan and Mongolia in Central Asia; of Iran in Western Asia; the vast plateau which extends over all the southern half of Africa and Abyssinia; the long and broad swell which fills the western half of North America with a continuous mass of highlands from Alaska to Mexico. Plateaus of a third order, with from 2000 to 3000 feet altitude, occupy the large peninsulas of Deccan in India, of Arabia, Asia Minor, and Spain. The central part of France, Switzerland, and Bavaria, at the north foot of the Alps, and Transylvania, are plateaus of the same order.

The plateaus, together with accompanying mountain-

chains, form the backbone, or kernel, of almost every continent, determining its general shape, and to a great extent its drainage and water-courses. But they are in nearly all the least fertile and useful portions of the surface.

**Mountains and Valleys.**—Unlike the broad, elevated surfaces just described, the mountains rise in long and comparatively narrow lines or ridges, the tops of which are often deeply indented, offering to the eye a series of peaks apparently detached from each other. Each of these peaks or distinct elevations being often called a mountain, and receiving a special name, the appearance suggests for such a structure the usual name of a *chain* of mountains.

A mountain-chain, therefore, is not to be considered as a necklace of isolated mountains, touching each other only by their base, but rather as a solid prism, with a broad base and two opposite slopes, of which the upper edge is either nearly even, as in the middle Appalachian chains in Pennsylvania, or indented, as in the Rocky Mountains and the Alps. These indentations, however, even in extreme cases, as in the Alps, do not reach lower than half the height, leaving the larger part an unbroken, continuous mass.

The top of the chain from which the waters flow on opposite sides is the *crest*, and the notches between the peaks are the *passes*, from which usually descend transverse valleys, like deep furrows along the slopes. The mountain-ridges are seldom isolated, but usually united into *systems of mountains*, composed of a large number of more or less parallel chains with their intervening valleys. The Alleghanies, the Alps, and the Andes are such systems, and not simple chains.

**Formation of Mountains.**—Geology demonstrates that the mountain-chains are mostly formed by the uplifting of the layers of rock which compose the earth's crust. (See *GEOLOGY*.) These rocks having been deposited at the bottom of the ocean, as is proved by their texture and the abundant marine shells which they contain, were originally in a horizontal position, and are still so in the plains at the foot of the mountains. In the mountain-chains, however, the same are found in all degrees of inclination, up to a vertical position, the marine shells and pebbles in them standing on their edges, thus testifying that they have been disturbed since their materials were deposited. Indeed, most of the mountain-chains seem to have been produced by tremendous lateral compressions in the crust of the earth, which caused either a series of long folds, as in the Appalachians, or, when the action was more violent, deep fissures, whose upturned edges rose into high ridges, as in the Rocky and Sierra Nevada Mountains, the broken strata forming ragged peaks. There are, accordingly, two main types of mountain-chains, very distinct from each other. One we call *mountains by folds*, which are generally of moderate elevation; and the other, *mountains by fracture*, to which belong the highest of the globe. The Appalachian system in North America and the Jura Mountains in Switzerland are examples of the first; the Rocky Mountains, the Alps, and the Himalaya, of the second.

FIG. 8.—Chain of Mountains by Folds.



In the Appalachian and the Jura the mountains are curved into arches, either entire or broken on the top, forming a system of long, straight parallel ridges of about equal height, with intervening trough-like valleys, justifying

a comparison to the folds of a garment. The crest of the ridges, seen at the horizon, appears like a uniform undented line without sharp peaks or deep passes. The main valleys are longitudinal, the transverse valleys being few

FIG. 9.—Chain of Mountains by Fracture.

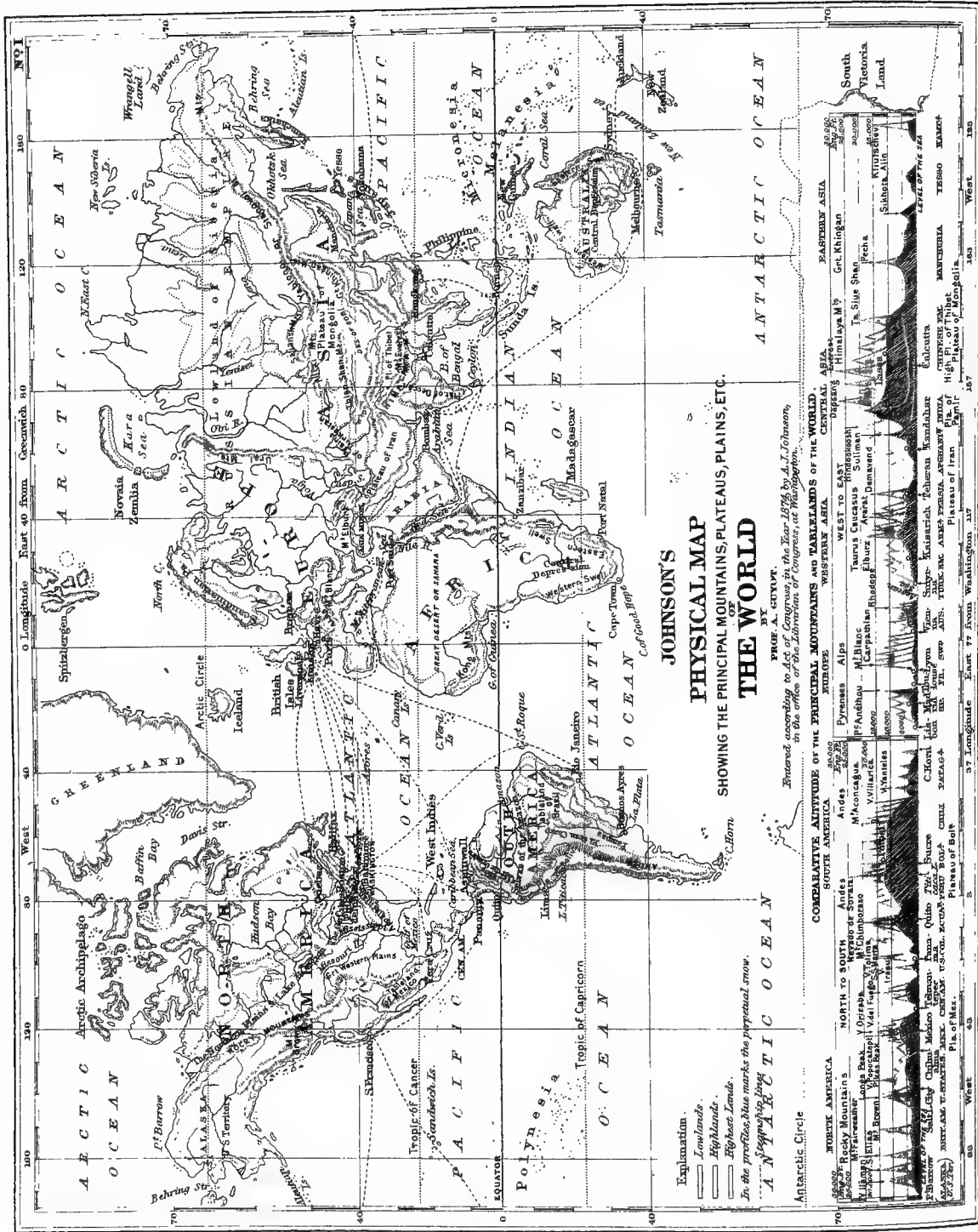
THE ALPS. MONT BLANC. TRANSVERSE SECTION.



and unimportant. Here and there, however, deep gaps cut the chains transversely to their base, allowing the rivers to escape from one valley to the other. In systems by fracture, like the Rocky Mountains and the Alps, there is one main central with lower subordinate chains. The parallel chains and the longitudinal valleys which separate them have not the same regularity. The crests are deeply indented, and cut down, to one-third or one-half of their height, into isolated mountain-peaks and passes, presenting to the eye the appearance of a saw, or in Spanish *sierra*, in Portuguese *serra*, which names are applied to

mountain-chains of this description. The longitudinal valleys, though sometimes of considerable size, are few, the transverse valleys numerous, with bald picturesque outlines and a series of fertile basins united by deep gorges and defiles. These systems of mountains are not to be conceived as one single chain; they are large mountainous zones, several hundred miles broad, whose general slopes, therefore, average but a few degrees. It is the peculiar combination of mountain-systems with plateaus and plains which constitutes the distinctive forms of relief of each continent, and also determines its general contours.



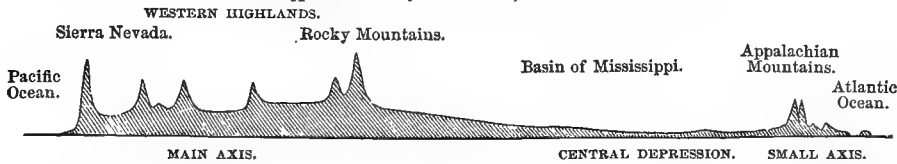


*General Laws of Relief.*—The examination of the general vertical forms of the masses of dry land leads to a recognition of certain great laws of relief which apply to every continent, or to certain groups of continents, or to the whole earth.

1st. Each continent has on one side a large system of highlands, plateaus, and mountain-chains which constitutes the principal feature of its structure, and may be

called its main axis. On the other side, along the opposite shore, is found a similar system, but diminutive in all its dimensions, extending over only a part of the continent, and forming a secondary axis. Between the two a general depression or low plain fills the interior. The direction of these two fundamental lines of highlands is not parallel, but converging, which gives to all continents the triangular form mentioned in the article CONTINENT (which see).

FIG. 10.—Typical Form of Continents, shown in North America.



A large swell on one side, a smaller converging one on the other, and a depression between the two, is the typical form of a continent. An island, however large, is never more than a part of it.

This typical structure can be traced in all continents, but in none more clearly than in North America. Here the main axis is formed by the large swell of the western highlands, stretching from the north-west to the south-east, without interruption, for 4500 miles, steadily growing in height from the shores of Alaska to the south end of Mexico, and filling from one-third to one-half of the width of the continent. The plateaus contained between the border chains of the Sierra Nevada and the Rocky Mountains average full 4000 feet, and reach in Mexico double that altitude, the high peaks of the mountain-ranges reaching from 12,000 to 15,000 feet. The secondary axis is the Appalachian system, extending from Nova Scotia to Alabama, in a south-westerly direction, for 1500 miles. Its average width is hardly one-fifth, and its elevation, plateaus, and peaks not one-half, that of the western highlands; but still it determines the trend of the Atlantic coast. Between the two axes the lowlands of British America and the vast plains of the Mississippi Basin stretch for 3000 miles from the Arctic shores to the Gulf of Mexico, hardly interrupted by a slight central swell of 1000 or 1600 feet in the region of the sources of the Mississippi.

In the sister continent of South America the same normal structure is evident. On the extreme western margin the high and massive swell which bears the peaks of the Andes, the highest of the New World, rises from the Pacific shores as a continuous wall of 4500 miles from the Isthmus of Panamá to Cape Horn. Opposite this main axis, on the Atlantic side, the Brazilian plateau, with its border chains 2000 miles long and from 3500 to 9000 feet high, forms the secondary axis. In the interior, 4000 miles of low plains extend without interruption along the eastern foot of the Andes, from the Llanos of Venezuela to the southern extremity of Patagonia.

In Asia and Europe, which together form one great continental mass, the typical structure, owing to the complication of their forms of relief, is not so easily traced, but it is none the less real. Here, instead of a continuous body of highlands, as in North and South America, we meet with a series of separated systems. The highest and most prominent chains of mountains, forming the main axis, are all nearer the southern edge—the Himalaya, the Caucasus, the Alps, and the Pyrenees. The low and extensive plains are all on the north, and about the centre lines of lower mountains mark the smaller axis. Asia-Europe, however, is divided into three distinct parts, each of which is almost a continent, Eastern and Western Asia and Europe, which have to be considered separately.

In Eastern Asia the main axis is clearly marked at the south by the gigantic swell of land contained between the border chains of the Himalaya and the Kuen-Lun, in which are found the highest plateaus and mountains of the world. On the north side we recognize the secondary axis in the chains of the Thian-shan and the Altai. Between these two zones of highlands extend, in a vast depression, the plains of East Toorkistan and of the so-called plateau of Mongolia, which, though having an altitude of from 2000 to 4000 feet, lie full 10,000 feet lower than the neighboring plateaus of Thibet. In Western Asia the plateau of Iran has its main swell on the south border, in the high mountains of Koordistan and the Taurus, and in the eastern half the river Ilmdend marks the direction of a central depression which sinks from 4000 to 5000 feet below the surrounding plains.

In Europe, the highest chains, the Pyrenees, the Alps, and the Balkans, which form the main axis, are all on the southern edge of the continental triangle, separating the

three Mediterranean peninsulas from the main body. In the centre, a slanting line of lower chains, the Carpathian and the Sudetic Mountains, the Riesengebirge, and the chains bordering the low plains of Northern Germany, form the minor axis. Between the two lie the low plains of Wallachia and Hungary and the numerous basins of Central Germany.

Africa has a double structure. The northern half conforms to Asia-Europe, its mountain-chains and plateaus running east and west, which explains its projection far into the Atlantic. The highlands of the Atlas along the Mediterranean, and the Kong Mountains on the Sea of Guinea, are two border swells, between which stretch the vast plains of the Sahara, whose average altitude does not much exceed 1500 feet. The southern half, as ascertained by Dr. Livingstone, is an unbroken plateau with two border swells running from north to south, as in North and South America, the higher one on the east, the smaller one, hardly less elevated, on the west, and a depression two or three thousand feet lower in the centre.

Australia has also a main swell on the east, with plateaus of 3000 feet and mountains of over 7000 feet; and a lower one in the west, extensive plains filling the centre between the two. It has, therefore, the real continental structure, and cannot be counted, as it sometimes erroneously is, among the islands.

2d. From this peculiar structure of the continents results the fact that in all the line of greatest elevation is placed out of the centre, on one of the sides, at an unequal distance from the shores of the seas. Hence arise two slopes, unequal in length and inclination. In North America, for example, the Rocky Mountains, which divide the Pacific and Atlantic slopes, are 800 miles from the Pacific shore, and over 2000 miles from the Atlantic, the western slope being less than one-third of the eastern. In South America the inequality is still greater. The Amazon takes its rise hardly more than a hundred miles from the Pacific, and its waters reach the Atlantic 2000 miles farther east, making the eastern slope twenty times longer than the western. This peculiarity has, as we shall see, the greatest influence upon the character of the drainage and the arrangement of the river-systems in each continent.

3d. All the prominent plateaus and mountain-systems of the globe are found to stretch chiefly in two principal directions. They extend either from east to west, with a slight deviation towards the north, on a line nearly parallel to the ecliptic, or else from north to south, slightly deviating to the east or west, and thus on a line at right angles with the first. The direction east and west predominates in the Old World, and controls the high ranges and plateaus which form the main body of the continents of Asia, Europe, and North Africa. The direction north and south predominates in the American continents, and gives them the great elongation towards the south which is characteristic of the New World. It is also found in South Africa and Australia. Distinguished geographers in the last century had already noticed these prevalent directions in mountain-chains, and called one class *parallel* and the other *meridian* mountains.

4th. The mountain-ranges and plateaus in the New World all belong to the north-and-south system, the transverse being almost absent; hence the great simplicity of structure and of outlines which characterizes the American continent. In Asia and Europe the two intersect each other. Though the main body is due to the chains and plateaus of the east-and-west system, it is crossed at right angles by numerous chains of the second system, which greatly diversify the surface and divide it into distinct regions, and, projecting far into the sea, form the beautiful peninsulas which so much vary their contours and enrich these continents. The high Bolor and the Ural Mountains in the interior of Asia, the chains which fill the peninsulas

of Kamtchatka, Corea, and of Indo-China, the Ghauts of India, the mountains of the Hellenic peninsula, the Apennines, the Scandinavian Alps, all belong to the north-and-south system. The same can be said of the southern half of Africa and Australia.

5th. The altitude of both the surface elevations and the mountain-peaks gradually increases along the axes of the continents to a maximum which is placed beyond the centre, towards one end, from which the heights rapidly decrease. Here also, as in the transverse sections of the continents, there is a long and a short slope. The following table of altitudes will exhibit this law, and also show that the two Americas form together one system of increasing heights from north to south, interrupted only by the zone of broken and sunken lands in Central America, and that Europe and Asia form another, increasing from west to east. Volcanoes, being but exceptions in the general relief, are omitted, unless they owe their altitude to the elevation of the base on which they stand. (See profile in Map I.)

#### NEW WORLD.

##### North America—Western Highlands.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
Plains of Alaska.....	800	Northern Rocky M'tns.....	4,000
Polly Banks, Upper Yukon.....	1,400	Mt. Murchison, Brit. Col.....	14,431
Central Plateau of British Columbia.....	2,000	Mt. Hood, Oregon.....	11,225
Great Plains of the Columbia Territory.....	2,000	Mt. Shasta, California.....	14,440
Great Basin, Utah, average.....	4,500	Fremont Peak, Wyoming.....	13,576
Great Salt Lake, ".....	4,235	Gray's Peak, Col. Terr.....	14,290
Colorado Plateau, ".....	6,000	Pike's Peak, Col. Terr.....	14,000
Plateau of Mexico, ".....	8,000	Mt. Whitney, Sierra Nevada.....	15,000
City of Mexico, ".....	7,473	Popocatepetl, Mexico.....	17,784
City of Toluca, ".....	8,818	Orizaba.....	17,879

##### South America—Andes.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
City of Bogotá, New Gran.....	8,655	Tolima, New Granada.....	13,360
City of Quito, Ecuador.....	9,520	Cayambe, Ecuador.....	19,386
City of Cuzco, Peru.....	11,500	Chimborazo, ".....	21,414
Lake Titicaca, Bolivia.....	12,500	Ilhampu, or Nevada de Sorata, Bolivia.....	23,000
City of La Paz, ".....	12,230	Illimani, ".....	21,155
City of Potosí, ".....	13,333	Aconcagua, Chili.....	22,422
Plateau of Catamarca, Argentine Republic.....	12,000	Yanteles, Patagonia.....	8,093
Valley of Tenunay, Andes of Chili.....	7,500	Sarmiento, Terra del Fuego.....	6,910

Thus the highest lands of the New World, surface elevations, and mountains are found in the plateau of Bolivia, around Lake Titicaca, and the heights steadily increase from the shores of the Arctic Ocean to that point for 7500 miles, while the line of descent to the Southern Ocean is only 2500 miles.

The same law is shown in the smaller axes, along the Atlantic in both continents, with some modification in the Appalachian system. Here the lowest part is a little above the middle point, about New York and New Jersey. Thence the heights increase towards the north and the south, but more gradually and to a greater altitude in the southern half, as shown in the following table:

##### Appalachian Mountains—Northern half, from South to North.

Eastern Chain.	Eng. feet.	Green Mountains.	Eng. feet.
Mt. Wachusett, Mass.....	2,018	North Beacon, Highlands.....	1,471
Grand Monadnock, N. H.....	3,718	Greylock, Mass.....	3,505
Moosehillcock, N. H.....	4,790	Killington Peak, Vt.....	4,221
Mt. Lafayette, W. Mts., N. H.....	5,290	Mansfield Mt.....	4,389
Mt. Washington, ".....	6,288	Mt. Marcy, Adirond'k Mts.....	5,370

##### Southern half, from North to South.

The Great Central Valley.	Eng. feet.	Mountains.	Eng. feet.
Easton, Pa.....	165	Blue Ridge, N. J.....	1,500
Harrisburg, Pa.....	328	Peaks of Otter, Va.....	3,993
Salem, Upper Roanoke.....	1,014	White Top, Va.....	5,530
Mt. Airy, Va.....	2,595	Black Dome, or Mitchell's High Peak, N. C.....	6,707
Bristol, Va.....	1,673	Clingman Mt., N. C.....	6,660
Knoxville, Tenn.....	900	Great Frog Mount'n, Tenn.....	4,226

In South America the Atlantic border of the Brazilian highlands rises to an altitude of about 3000 feet in the north, 4000 in the centre, and culminates with 9000 in the Serra Mantiqueira, south-west of Rio de Janeiro.

#### OLD WORLD.

##### Europe and Asia, from West to East.

Surface Elevations.	Eng. feet.	Mountains.	Eng. feet.
Plateau of Spain.....	2,300	Pyrenees, Pic Anethou.....	11,168
" " Bavaria.....	1,800	Alps, Mt. Blanc.....	15,781
" " Asia Minor.....	3,000	Caucasus, Mt. Elboortz.....	18,572
" " Armenia.....	4,000	Hindoo-Koosh Chain.....	20,000
" " West Iran, Persia.....	4,000	Karakorum Chain, Mt. Dapsang.....	28,278
" " East Iran, Afghanistan.....	6,000	Dhawalagiri, Himalaya.....	26,826
" " West'n Thibet.....	15,000	Gaurisankar, or Mt. Everest.....	29,002
" " East'n Thibet.....	11,000	Chamalari, Bhootan.....	23,944

In the smaller axis in Europe also the heights are steadily increasing from north-west to south-east. The Weser Mountains only average 1500 feet; the Thuringian Forest, 3000; the highest peak in the Riesengebirge rises to 5254; the culminating point in the Tatra, or High Carpathian Mountains, has an altitude of 8685 feet.

In the smaller Asiatic axis the Altai Mountains, which average about 5000 feet, culminate in the Bielucha, 11,000 feet, and the Sajan Mountains, 11,452 feet, in the west, and decrease towards the north-east.

In the New World, therefore, the highest lands are piled up in the south-west; in the Old World, in the south-east. In Africa, also, the land-masses increase in altitude from west to east and from north to south. The western systems, the Kong Mountains and the Atlas, are plateaus of from 2000 to 3000 feet in altitude, with mountain-chains in the latter of from 7000 to 11,000 feet. The volcanic group of the Cameroons, near the Gulf of Guinea, reaches 13,000 feet. The eastern swell rises to plateaus of 6000 to 8000 feet in Abyssinia, with mountain-peaks of 16,000 feet. The course of the Nile marks a long slope running up from the Mediterranean to the highlands of Abyssinia; and far beyond, on the same line, under the equatorial sun, the snowy peaks of Kenia and Kilimandjaro rise to 20,000 feet, and mark the culminating points of the whole continent. In the southern half also the two border swells unite into the high plateau of 5000 feet which fills the broad and massive point of the continent in the territory of the Cape Colony.

In Australia the same tendency is observed; the lands rise towards the south-east corner, and culminate there in the Australian Alps, where Mt. Hotham exceeds 7000 feet.

6th. On the whole, the reliefs begin with the vast low plains around the polar circle, and go on increasing from the shores of the Arctic Ocean towards the tropical regions. The highest elevations, however, are not found at the equator, but north of the Tropic of Cancer in the Old World, in the Himalayas, 28° N. lat.; and north of the Tropic of Capricorn in the New World, in the Andes of Bolivia, 16° S. lat. The effect of this law is to temper the burning heat of the tropical regions, and give them a variety of climate which seems not to belong to these countries. If this order were reversed, and the elevation of land went on increasing towards the north, the now most civilized part of the globe would become a frozen and uninhabited desert.

7th. The distribution of low plains, plateaus, and mountains is far from being uniform. Not only has each continent a different share, but also one or the other form of relief so predominates as to give it a special character, which has the greatest influence upon its climate and functions, both in nature and in man's history. The large, fertile basins of the Mississippi and Amazon are the most valuable and characteristic parts of the American continents; they are the continents of low plains. Africa has no low plain of any great extent, but is filled with vast table-lands; it is the continent of plateaus. Europe in its western and most important half is but a network of mountain-chains without high plateaus, and is the continent of mountains. Asia, as the common root of all, has all the forms of relief on the grandest scale and in equal proportion; the most extensive plains in the north, the largest plateaus in its centre, the highest mountains on its border, with the greatest variety in their combination. It is the master continent, the full type of all the others.

8th. All that has just been said of the general reliefs of the globe is summed up in a single great fact which can be thus expressed:

All the long, gentle slopes descend towards the Atlantic and its prolongation, the Arctic Ocean, while all short and rapid slopes are directed towards the Pacific and its dependant, the Indian Ocean.

*Formation of the Relief.*—These general laws which regulate the inequalities of our globe seem to point to a common geological cause, which may perhaps be found in the gradual cooling of our planet. We may conceive that owing to the contraction of the interior the hard crust, having become too large for its contents, shrunk and shriveled. Vast portions of its surface subsided, and formed the oceans where the waters are gathered together. Between these sinking areas the other portions of the crust were forced up in large swells, wrinkled into folds, or broken into high mountain-ranges, and formed between the Pacific and the Atlantic the American continents on one side, Europe and Asia on the other; between the Indian Ocean and the Atlantic, South Africa; between the same and the Pacific, Australia. This view is confirmed by the fact, pertinently pointed out by Prof. Dana, that the height of the border mountains and plateaus is in proportion to the width of the oceans which bathe their feet. The Pacific, which is the larger ocean, has on its border the high chains of the Andes and Sierra Nevada, and the short slopes;



while the Atlantic has the Brazilian and the Appalachian Mountains, and the long slopes; and a similar arrangement is found in the other continents. The interior, more remote from the seat of the upheaving force, remains depressed. The cause of the typical structure of all continents above described therefore becomes evident. Thus the almost infinite variety of the inequalities of the earth's surface is actually subject to a general law. Here, as elsewhere, everything has been made with order and measure, and no doubt with regard to a final aim, which it is for science to discover by patient and intelligent research.

**Islands.**—The innumerable smaller bodies of land called islands form only one-seventeenth of the total surface of the dry land. They are of two classes—the *Continental* and the *Pelagic* (or oceanic) islands.

The continental islands are mere fragments of the continental structures, situated by the side of them or not far away, as the British Isles; or in lines parallel to their coasts, as the Japanese and Australian islands and the West Indies; or forming a continuation into the ocean of their chains of mountains, only partially submerged, as the long line of the Sunda Islands. They have the same kind of rocks and of mountain forms, the same variety of plants and large animals, as the neighboring coasts of the continents to which they belong. They vary in size, from a mere isolated rock to such large bodies as the British Isles, the Japanese Islands, Madagascar, Sumatra, and the most extensive of all (if we exclude Greenland), Papua and Borneo, whose area exceeds 2,000,000 square miles.

The pelagic (or oceanic) islands are scattered, far away from the continents, in the midst of the oceans to which they belong. Their size is always small. Though sometimes found in lines, they are oftener arranged in groups. Navigators distinguish among them two classes, the *high* and the *low* islands, which are found actually to correspond to two natural groups, distinct in their forms, geological nature, and mode of growth. The high islands are volcanic cones with craters, many of them still active. The low islands are all of a coralline nature, and are the tops of submarine coral reefs.

**Volcanic Islands.**—It is a remarkable geological fact that the rocks which make up the body of the continents, such as sandstones, slate, granite, and the various metamorphic rocks, are entirely absent in the oceanic islands. We cannot therefore expect here the variety of mountain forms, hills, and valleys which diversifies the surface of the continents. The volcanic islands being the tops of volcanic cones rising above the surface of the ocean, the more or less circular form of their outlines, their elevation and rapid slopes, and their moderate size are easily understood. Some hardly reach the surface, their crater being filled by the water of the sea, as in Barren Island; others rise to alpine heights, as the peaks of Hawaii in the Sandwich Islands, reaching nearly 14,000 feet, the Pico de Teyde, over 12,000 feet, in the Canary Islands, and Tahiti, over 7000. Sometimes two or more volcanoes clustered together form a single island, which may then have a larger size and more irregular outlines.

**Coral Islands and their Formation.**—The coral islands are among the most striking phenomena of the tropical seas. (For description, see CORAL ISLANDS.)

**IX. Water.**—Water is the second great geographical element to be considered. It is the universal solvent which, by disintegrating and rearranging the materials of the earth's crust, was in geological times the principal agent in forming what is now the solid land. It is equally indispensable in fertilizing the soil and carrying on the process of animal and vegetable life.

The common reservoir of water is the sea, which, as we have seen, covers nearly three-quarters of the surface of the globe. By slow but constant evaporation it is carried into the atmosphere in the shape of invisible vapors, which, borne by the winds over the continents, are condensed and fall in beneficent rains. A portion of the rain-water evaporates again in the atmosphere, another sinks into the ground, through which it percolates, and reappears at the surface in the form of springs, or fills the quiet sheets of water which feed the Artesian wells. The remainder flows over the surface in rivulets and brooks, which unite, and, receiving new accessions at every step, form the mighty rivers which carry the surplus water back to the ocean from whence it came.

Thus is produced the vast network of streams which, like the arteries of the human system, convey the life-giving element to all parts of the globe.

Surface depressions filled by streams or springs form the numerous lakes spread over the continents.

In this ceaseless circulation we have to consider the oceanic, the atmospheric, and the inland waters (for which see OCEAN, RIVERS, LAKE, RAINS). ARNOLD GUYOT.

**Earth-closet,** a form of close-stool, designed to take

the place, to some extent, of the water-closet, and frequently made portable for convenience. It is well known that dry soils have wonderful disinfecting powers, owing to their property of absorbing ammonia and other gases. It is upon this absorbent quality that the usefulness of manures, when applied to soil, depends. Advantage is taken of this absorption in the construction of the earth-closet. The faeces are covered by a small quantity of thoroughly dried soil or peat, which completely absorbs all unpleasant and injurious vapors, and after a time the mass becomes perfectly inodorous. It is found that the same earth may, if necessary, be used over and over again, and that finally, when it has become thoroughly charged with excrementitious principles, it is one of the best forms of concentrated fertilizing material known. Considering the increasing value of commercial manures, and the serious prevalence in country as well as city, and in winter as well as in summer, of diseases caused by defective sewerage, it may be readily seen that the earth-closet question may become one of much importance. (See WARING, "Earth-Closets and Earth-Sewage.")

**Earth Currents.** See MAGNETISM, TERRESTRIAL.

**Earth'enware,** a general term for all wares made of earth, and afterwards baked. (See POTTERY, by PROF. C. F. CHANDLER, PH. D., LL.D.)

**Earth House,** or **Eird House,** the name given in Ireland and Scotland to a building under ground anciently used as a place of retreat for the people in time of war. It consisted generally of one chamber from twenty to sixty feet long, from four to ten in width, and from four to seven in height. It was built of unhewn stones, and entered from the top by an opening admitting only one at a time. They are sometimes called Picts' houses. They were mostly built on hillsides and other dry places. In the moor of Clova, in Aberdeenshire, more than forty of these houses are found near together. Bronze swords, earthen vessels, and implements of various kinds have been found in them.

**Earth Nut,** a popular name given to the tubers or subterranean stems of several plants—viz. the *Bunium flexuosum*, an umbelliferous plant which grows in Europe; the *Cyperus rotundus*, a native of Egypt; and the *Arachis hypogaea*, a leguminous plant often called peanut. The tubers of the *Bunium*, which resemble chestnuts, and are sometimes called *earth chestnuts*, are extensively used for food.

**Earthquakes.** We are accustomed to consider the ground on which we live as *terra firma*, a solid foundation for our heaviest structures. The earthquakes teach us, however, to our dismay, that it is by no means absolutely so.

These movements of the earth's crust are of all degrees of intensity, from the almost imperceptible vibration to the most violent convulsions, which change the face of the ground, and reduce the most substantial works of human handicraft to a mass of ruins.

The appalling nature of these commotions, and the phenomena attending them, were fully exhibited in the remarkable and oft-described earthquake at Lisbon, Portugal, on the morning of Nov. 1, 1755, the great festival of All Saints. The churches of the city were full to overflowing, when at forty minutes after nine a rumbling noise was heard like distant thunder, which gradually increased until it resembled the sound of heavy artillery. A faint shock was followed by a more terrific one, which levelled to the ground a greater part of the city, and in the space of six minutes 30,000 persons were buried under the ruins of the churches and other edifices, and 30,000 more perished before the end of the catastrophe. The ground seemed to undulate like the waves of the sea, the surrounding mountains of Arrabida and Estrella were seen rocking violently on their base, and broad chasms were opened in the earth and shut again. More than 3000 persons had taken refuge on a broad marble quay just constructed on the banks of the Tagus, when the sea, which had before retreated, came back with fury in a wave forty feet high, and swallowed up that unfortunate multitude, of which not one was ever seen again; then, rushing against the doomed city, continued its work of devastation. These oscillations of the sea were repeated several times, and on the spot occupied by that massive structure several hundred feet of water were found. Fires, kindled in the fallen dwellings, soon spread their flames over this scene of desolation, and the mass of burning ruins presented at night the spectacle of a vast conflagration, which finished the work of destruction. After this catastrophe the commotion of the ground continued for several weeks, and a very severe shock was experienced in December.

One of the notable features of the earthquake of Lisbon is the great extent of country over which it was felt. On land it was not confined to the Spanish Peninsula, but shook all Western Europe, pervading France, Northern

Italy, Switzerland, Germany, the British Isles, reaching as far as Scandinavia. The northern coast of Africa suffered considerably; nearly all the cities in Morocco were destroyed; the earth was rent asunder, letting out streams of water. The ocean was hardly less disturbed. An English ship, the *Nancy*, when 100 miles west of Cape St. Vincent, in Portugal, experienced a shock from below so violent that the men on the deck were thrown over a foot from the floor. It was supposed that the ship had run against a rock and touched bottom, while the sounding-lead indicated deep water all around, proving that the solid floor of the ocean had been shaken and the commotion transmitted through the water. Huge waves, raised by these oscillations of the earth's crust above and below the level of the sea, were hurled on the shores of the continents. In Cadiz a monstrous wave sixty feet high was seen to come from the high sea and dash against the city. In Tangier, on the African coast, the sea rose and fell eighteen times, and fifteen times in Funchal on the island of Madeira. These commotions of the sea crossed even the Atlantic. In some of the Lesser Antilles the sea rose to twenty feet, and similar waves were observed in the harbors of New York and Boston.

The immediate area of concussion, including the portion of the Atlantic affected by it, comprised a surface as large as the continent of Europe. If we add the extensive area covered by the earthquake waves which brought to the American shores the tidings of these convulsions, and that of the American coast which experienced slight shocks during the same period, the surface disturbed by the earthquake of Lisbon amounts, according to Humboldt, to four times that of the European continent. The propagation of the movement seems to have been such that Lisbon was the centre of a system of undulations or earthquake waves, decreasing in violence with their distance from that centre.

Another earthquake, not less celebrated in the annals of science on account of the thoroughness with which its phenomena were studied and recorded, is that which occurred in Calabria in the year 1783. Like that of Lisbon, it was a central earthquake, but its area did not much exceed 500 square miles. The violence of the convulsions, however, and the variety of their effects, were perhaps still more remarkable. On the 5th of Feb., 1783, the first shock threw down, in two minutes, most of the houses of the numerous cities and villages in a radius of fourteen miles around the city of Oppido, which seems to have been the centre of the earthquake. The undulations were so great that tall trees, bent to the earth, were seen touching the ground with their tops alternately on each side of the wave. The surrounding mountains were all in motion. Some of them seemed to jump up and down, and the shape of their summits was permanently changed. Houses were thrown up bodily, as by the power of an exploding mine, and placed on higher ground. Deep chasms opened and shut again; others remained gaping; land-slides obstructed the rivers, the courses of which were altered; and the surface of the country changed its aspect.

*Three Kinds of Motions.*—The Italians long ago distinguished three kinds of earthquake motions. The first is the *undulatory* or *wave-like* motion, which is the most common and the least destructive. The waves travel either in one direction, like the waves of the sea, or from a centre in somewhat concentric lines.

The second kind of motion is the *vertical*, acting from beneath, as the explosion of a subterranean mine. When violent, no human structure can resist its action. This kind, as well as the first, was repeatedly exhibited in the earthquake of Calabria. In the catastrophe which in 1797 destroyed the city of Riobamba in the Andes of Quito, says Humboldt, many corpses of the inhabitants were thrown several hundred feet high, on a hill beyond the brook Lican. A similar occurrence is recorded in the terrific earthquake of 1868. In the cemetery of Arica, on the coast of Peru, a large number of skeletons were disinterred and spread on the surface of the earth. The earthquake of the 18th of Sept., 1828, in Calcutta, owed its destructiveness to the fact that the main shock was a vertical one. Another one in Murcia, Spain, in 1829, destroyed or severely injured more than 3500 houses.

The third kind of motion is what is termed the *whirling* motion, the most dangerous, but also the rarest of all. It is thought to be proved by facts observed in the earthquake of Calabria, such as the twisted position of the several stones composing the two obelisks placed in the façade of the convent of St. Bruno in the small town of Stefano del Bosco. In the formidable earthquake of 1692 in Jamaica the surface of the ground was so agitated and broken up that some fields planted in different crops changed places, and were found as if twisted into each other.

The normal motion, however, is the wave-like, and it is possible that the other kinds are but the effect of various systems of waves intersecting each other.

The propagation of these undulations takes place either in a linear direction, along the mountain-chains, the undulations being then at a right angle with them, as in most of the earthquakes of the Andes; or from a centre, forming a series of concentric waves diminishing in intensity and gradually dying out, as in the earthquakes of Lisbon and Calabria. The first are *linear*, the second *central* earthquakes.

*Velocity of the Earthquake Waves.*—The velocity with which the earthquake waves move is variable, according to circumstances. Humboldt seems to assume, as an average between extreme cases, a velocity of twenty-three to thirty-two English miles in a minute, and this estimate does not seem far from the truth.

*Duration of Earthquakes.*—Though slight concussions or single vibrations of the ground often occur isolated, the great earthquakes hardly ever consist of one single shock, but of a series of successive shocks, some of which are of exceptional violence. These convulsions of the ground may be repeated at longer or shorter intervals during a period of several days and weeks, or even of several months and years, before the earthquake is at an end. The earthquake of Calabria was in this respect also remarkable. A careful and intelligent local observer, Dr. Pignataro, counted 949 shocks in the year 1783, 501 of which were of the first magnitude; and 151 in 1784, of which 90 were classified by him as of the first degree of force. Nearly four years elapsed before these oscillations ceased entirely and the earth came again to a state of complete rest. During the terrific earthquake of Cumana on the coast of Venezuela, which began on the 21st of Oct., 1766, destroying the city in a few minutes, the earth continued to be shaken almost every hour during fourteen months, and it was only when the commotions occurred once a month that the unhappy inhabitants dared to begin rebuilding their houses. After the earthquake which laid the beautiful city of Messina in ruins, the ground continued to be convulsed almost daily for ten years, which caused a feeling of insecurity of life which had the worst effect on the moral condition of the inhabitants. In the appalling catastrophe which destroyed the city of Lima and its harbor, Callao, in Peru, in Oct., 1746, the shocks were repeated every seven or eight minutes, and over 200 of the most violent kind were counted within twenty-four hours. In the great earthquake of Caracas on the 26th of Mar., 1812, fifteen shocks were felt on the first day, and they continued numerous every day until the 5th of April.

The general character of earthquakes seems to have been the same in all times. The descriptions of the most ancient on record and the most recent offer a striking coincidence. All the phenomena above described have been repeated in the latest of the great earthquakes, that which shook the western coast of South America and the mountain region of the Andes from Chili to Ecuador, on a line of over 1000 miles, in Aug., 1868. The flourishing city of Arica in Peru, the main harbor of commerce for Bolivia, was obliterated in a few moments. The beautiful city of Arequipa, in the Andes of Peru, was levelled to the ground, and its 50,000 inhabitants left houseless, and soon starving in the midst of its ruins. In the Andes of Ecuador the city of Catochay disappeared, and a lake covers the spot where it once stood. The cities of Ibarra, Ottavalla, and others were swallowed up, and not one of their 10,000 inhabitants was ever seen again. Over 300,000 people were left houseless, and the whole number of victims of that awful catastrophe is yet to be counted. The movements of the sea were not less striking. In Arica the sea retreated from the shore, carrying with it five ships which were in the harbor, and returning in a high and furious wave dashed to pieces four of them, and carried the fifth, the U. S. steamer *Waterer*, two miles inland. Similar motions were observed on the coast of Chili and of Peru, and an immense earthquake wave is said to have crossed the Pacific Ocean, striking in its course the Polynesian Islands, and reaching the Australian shores.

None of the natural phenomena are so immediately destructive of human life as earthquakes, as the recent examples just quoted suffice to show. These are equalled, and even surpassed, by some of older times. In the earthquake of Sicily in 1693 over 60,000 people perished. History has recorded an earthquake in the year 19 after Christ, at the time of the emperor Tiberius, which destroyed 120,000 lives. Another in 526, in the reign of the emperor Justin, which destroyed a number of large cities in Syria, among which was Antioch, cost the lives of over 200,000 human beings. Considering the greatness of the danger, the suddenness of action, the sense of perfect helplessness and insecurity it engenders, and all the appalling circumstances connected with an earthquake, no one can wonder that the feeling of terror which it inspires is one which increases with every new experience.

The number of earthquakes is much greater than is generally supposed. Carefully prepared catalogues of all recorded cases, such as those of Perrey, Kluge, and others, swell their number to several thousands. Indeed, the record of the last century, which, owing to the increased attention bestowed on natural events, is certainly more complete, shows that we may place earthquakes among the regular and continuous terrestrial phenomena; for though the great catastrophes may be rare, a week scarcely elapses without a commotion of the ground, worthy of notice taking place somewhere on the surface of the globe.

**Connection with Volcanic Eruptions.**—The immediate connection of earthquakes with volcanic eruptions is evident in many instances, but these are of a special kind. On the other hand, volcanic eruptions take place without earthquakes, as in the Sandwich Islands; and even in volcanic districts the most extensive earthquakes bear apparently no relation to the surrounding volcanoes, while a considerable number of severe and extensive ones occur in regions far removed from any active volcano, or even deprived of all volcanic rocks. Though the two phenomena may have a common cause or condition, they cannot be confounded in the same class.

**Connection with the State of the Atmosphere.**—The common belief is that earthquakes are accompanied by some extraordinary condition of the atmosphere, such as a very low or high barometric pressure, profound calm or high wind, sultry and damp weather, a prolonged drought, or peculiar electrical or magnetic disturbances; all of which have been considered as warnings of the coming event. But a careful scrutiny of the cases leaves this matter at present doubtful.

**Influence of the Seasons and the Hour of the Day.**—The dependence of earthquakes upon the seasons is more decided. Their number seems to be greater about the time of the equinoxes, especially the September equinox, than at any other. In the Molucca Islands during these periods, which are marked by the tempests accompanying the change of monsoon, the inhabitants do not dare to remain in their houses, but spend the season under tents. According to the records, a greater number of earthquakes occur in winter than in summer, which is the reverse of what is observed in volcanic eruptions. They seem also to be more frequent at night than in the daytime.

**Astronomical Influences.**—By comparing 7000 observations, Perrey found that the number of earthquakes is greater at the time of the syzygies, when the attractions of the sun and moon are combined and the moon is nearest to the earth, than at the time of the quadratures, when the moon is more distant; and also that the shocks are more frequent at the places where the moon is in the meridian. Wolf finds a coincidence with the periodicity of the sun's spots, the years in which the spots are most numerous being also those in which the earthquakes more frequently occur.

**Distribution of Earthquakes.**—The law of the distribution of earthquakes on the surface of the globe is of paramount importance for the explanation of these mysterious phenomena. The most general facts in this respect are the following:

1. There is no part of the globe absolutely free from earthquakes; the phenomenon is general.
2. There are circumscribed regions in which the surface is liable to be shaken simultaneously; such a region is an earthquake area.
3. A very significant fact, however, is that the most extensive of these areas of concussion, and those in which the earthquakes are the most numerous and violent, are situated within the two great zones of broken lands described above—the border zone around the Pacific Ocean, and the central zone separating the northern from the southern continents. In the first are found the celebrated earthquake areas of the Andes, that of the western coast of North America, and those of Kamchatka, Japan, and New Zealand. In the second we meet with the great Mediterranean area from Spain to Syria, with Italy, Greece, Asia Minor, and North Africa. The Arabian and Indian areas are in the same zone; and the two regions of the earth most convulsed by these terrific shocks, the earthquake areas of Central America with the Antilles, and that of the East Indian Archipelago, the really classic soil of earthquakes, are situated at the intersection of the two zones. Outside of these two zones only a few more large areas are found like that of which Iceland is the centre, and which extends to Scotland and Scandinavia, and another in Central Asia.

The analogy of this distribution with that of volcanoes is evident, but the domain of earthquakes, as remarked above, extends far beyond that of volcanoes. Both are most intense in their action along the great fractures of our planet, but it would be rash to infer from this fact that one is the cause of the other; they only require similar conditions for their manifestation.

**Theory of Earthquakes.**—Many explanations of the phenomenon of earthquakes have been proposed, but science must confess its inability to give, at present, a satisfactory one. Earthquakes are obviously due to various causes. Those preceding or accompanying a volcanic eruption must be, no doubt, referred to the action of the volcano; but the extensive earthquakes disturbing areas of hundreds of thousands of miles, and those which take place outside of volcanic districts, require a more general cause. Perhaps this may be found, which is also the opinion of Prof. Dana, in the increasing tension produced in the earth strata by the steady contraction of our cooling planet. To this cause geology refers the rising of mountain-chains on long fissures in the hard terrestrial crust, in the form of prisms with inclined planes, or of a succession of folds with large internal cavities. The settling under their own weight of these vast structures, and the lateral tensions thus engendered, coming from time to time to a paroxysm, might perhaps explain these crackings of the ground and convulsions along the mountain-chains and in the broken parts of the earth. In this view every difference of pressure, atmospheric or astronomical, from lunar and solar attraction, may have a share of influence in the phenomenon.

As to the influence of the seasons, the time of the day, of electricity, magnetism, and the solar spots, they show once more, if finally proved, how intimate are the relations of all physical agencies with each other, and how close an analysis is required to understand so complex a phenomenon.

ARNOLD GUYOT.

**Earths**, in chemistry, a term applied to compounds consisting each of a metal combined with oxygen. The earths proper are alumina, zirconia, ceria, glucina, thoria, didymia, lanthana, yttria, and erbia. Magnesia, baryta, lime, and strontia are called alkaline earths, because they are less soluble in water than true alkalies, though they exhibit alkaline reactions. Their carbonates are insoluble in water, and are not alkaline.

**Earth-shine** (or, as it ought to have been called, **Earth-light**), a reflection of the sun's light from the earth to the moon, and back to the earth again. This phenomenon is often seen when the moon is very old or very new, the outlines of the full moon being rendered visible by the reflection.

**Earthworks**, a military term applied to fortifications or constructions, whether for attack or defence, in which earth is the principal material employed. (See **FORTIFICATIONS**, by CAPT. O. H. ERNST, U. S. Army.)

**Earthworm** (*Lumbricus*), the popular name of a genus of Annelida of the order Terricolæ. The species are numerous, and they are found wherever the soil contains sufficient moisture to sustain their life. The earthworm has no head distinct from its body. It is composed of a succession of rings, sometimes amounting to 120 in number; it is without eyes or other external organs, excepting that on each ring it has eight short bristles pointing backward, which it uses in locomotion as the snake uses its scales. The mouth consists of two lips, the upper one being elongated; it has no teeth, and subsists by swallowing particles of earth, which, after the digestible matter has been extracted, is voided often on the surface of the ground in small intestine-shaped masses called *worm-casts*. It respire through pores which communicate with little sacs. It is hermaphrodite, but mutual fecundation takes place. The eggs often contain two embryos. The earthworm is covered with mucus, which enables it to glide through the ground without retaining a particle of the soil. Earthworms do not often visit the surface of the ground, except during night and when the ground is moist. Large specimens attain a length of nearly a foot.

**Ear Trumpet**, an instrument for the relief of defective hearing. Ear trumpets are of a great variety of forms, but they all depend upon the same principle—that of collecting and condensing the sound waves, and thereby intensifying the impression made upon the ear. It is found in practice that a nice adjustment of parts is not necessary; sound being readily reflected along conical tubes, either straight or coiled, with great facility. Cases of comparatively slight deafness are aided by the wearing of "cornets," or small ear trumpets attached by a spring to the ear, and concealed by the hair of the wearer.

**Ear Wax.** See CERUMEN.

**Earwig** [Ang.-Sax. *eor-wiega*, literally, "ear-beetle;" Fr. *perce-oreille*; Ger. *Ohrrurm*], (Forficulariæ), a family of insects, so named from the popular delusion that they have a propensity to creep into the ear. They form a connecting link between the Coleoptera and the true Orthoptera. They have a narrow body, strong and horny mandibles, long antennæ, and a pair of forceps at the extremity of the abdomen.

**Easement**, a legal term denoting, in its most comprehensive sense, the right which the public or an individual has in the lands of another, not inconsistent with a general property in the latter. It is in the nature of a charge or burden upon land. It is called a *dominant right*, while the land burdened is termed the *servient estate*. Easements may be mere personal rights, when they are said to be *in gross*, or they may be connected with the ownership of land. The latter only will be considered. 1. They are incorporeal. 2. They are imposed on corporeal property. 3. They confer no right to the substance of the land. 4. There must be two distinct estates—the dominant, to which the right belongs; and the servient, upon which the obligation rests. They are affirmative or negative. Affirmative, when the owner of the dominant estate may do some act on the servient; and negative, when the owner of the servient estate must refrain from doing some act, otherwise lawful, on his land. The most important instances are the right of way (the right of the owner of one piece of land to pass over the land of another), of water (the right of the owner of the dominant estate to receive water from or discharge it across the servient estate), of support of the soil or of the buildings of the dominant estate by the adjacent soil or buildings of the servient estate.

Easements exist at common law, and may be created by statute. Common-law easements may arise in various modes. 1. By nature. This is a brief form of expression of a legal rule, that the owners of adjoining parcels of land may have a burden imposed upon them not to disturb the natural state of things. Thus, where a natural stream of water flows from the land of one owner through the land of another, the former cannot divert or diminish the quantity of water which would otherwise descend to the proprietor below, nor can the latter prevent the stream from discharging its water across his land. Each has an easement "by nature" in the land of the other. 2. By dedication. This means an appropriation of land by its owner to a public use; e.g. as a street or park or public landing-place. The legal title to the land dedicated is not changed, but the public acquires a right to use it for the special purpose to which it is dedicated. These easements are sustained in law on the doctrine of estoppel, although there is no specific grantee. No particular form or ceremony is necessary to constitute a dedication. It is sufficient if the intention to dedicate appear, either by positive acts of the owner or long-continued acquiescence, and the public act accordingly. 3. By actual grant. In this case the nature and extent of the easement are determined by the words of the instrument creating it, which must be sealed. 4. By implied grant. An easement is created by implied grant when it is necessary for the enjoyment of that which is expressly granted or reserved. Thus, if A is the owner of two lots, the first of which can be approached only over the second, and conveys either to B, the owner of the back lot has by implication a right of way across the front lot. 5. By prescription. This is the enjoyment of the right or privilege for so long a time as to raise the presumption of a grant. The length of time necessary to raise this presumption varies in different States, but, after the analogy of the statute barring disputed claims to land, it is usually twenty years. To obtain by prescription an easement in the land of another its enjoyment must have been uninterrupted for the required number of years, adverse to the owner of such land, and exercised under a claim of right. It must be open, so that the owner may be presumed to know of it. In England it is held to be a rule of the common law that the right to light may be obtained by prescription. This is called the doctrine of "ancient lights." It would take place where the owner of one lot of land had windows opening on the vacant lot of another for twenty years. He would acquire such a right that buildings could not be constructed on the vacant lot so as to shut out the light from his windows. But in the U.S. this rule has frequently been repudiated by the courts as inapplicable to our rapidly growing and rapidly changing condition; and in a number of States an easement of light can be acquired only by express or implied grant.

Easements may be extinguished by a release given by the owner of the dominant to the owner of the servient estate, or by abandonment. The failure to make use of an easement (technically called non-user) for twenty years is strong evidence of abandonment if the easement was acquired by prescription, although the presumption may be rebutted; but if the easement were acquired by actual grant, no length of mere non-user would operate as an abandonment. In that case there must be acts inconsistent with the existence of the easement. An easement may also be extinguished by a union of the two estates in the same person. This is technically called "merger."

T. W. DWIGHT.

**East Aurora**, on R. R., Erie co., N. Y. (see map

of New York, ref. 5-C, for location of county), is beautifully situated, 17 miles S. E. of Buffalo. It has an academy, a foundry, and is the business centre of a wealthy farming region. Pop. in 1880, 1109.

**Eastbourne**, a watering-place of Sussex, England, 3 miles N. N. E. of Beachy Head, in a chasm between two cliffs, has a martello tower, a fort, and a chalybeate spring. Pop. in 1881, 21,595.

**East Brady**, a post-borough of Clarion co., Pa. (see map of Pennsylvania, ref. 3-C, for location of county), is situated about 70 miles N. of Pittsburgh, on the Alleghany River. The iron-works of the Brady's Bend Iron Company are located on the opposite bank of the river, and give employment to 1500 persons. East Brady is but 7 miles distant from the Butler county oil regions, and to this place much of the oil produced is run in pipe-lines, whence it is shipped to Pittsburgh and other markets. Pop. in 1870, 728; in 1880, 1242.

**East Bridgewater**, a post-township of Plymouth co., Mass. (see map of Massachusetts, ref. 4-J, for location of county), on the Old Colony and Newport R. R., 25 miles S. E. of Boston. It has valuable water-power, and large manufactures of brick, lumber, cotton-gins, iron, chains, nails, boots, shoes, and other goods. Pop. of township in 1870, 3017; in 1880, 2710.

**Eastburn** (JAMES WALLIS) was born in London, England, Sept. 26, 1797, and graduated at Columbia College in 1816. He was ordained deacon Oct. 20, 1818, by Bishop Hobart in Trinity church, New York, and soon after became rector of St. George's, Accomac, Va. He wrote an admirable Trinity hymn, besides versions of some of the Psalms. In 1817-18 he and his friend Robert C. Sands produced a poem called "Yamoyden." He died at sea Dec. 2, 1819.

**Eastburn** (MANRON), D. D., a Protestant Episcopal bishop, a brother of the preceding, was born in England Feb. 9, 1801. He came to New York, graduated at Columbia College in 1816, was ordained in 1822, became rector of the church of the Ascension in New York in 1827, and bishop of Mass. in 1843. He published lectures and addresses, "Lectures on the Epistle to the Philippians" (1833), and other works. Died Sept. 12, 1872.

**East Canaan**, on R. R., Grafton co., N. H. (see map of New Hampshire, ref. 6-E, for location of county), 52 miles N. of Concord. It has steam-mills. Principal business, farming and the manufacture of lumber. Pop. not in census of 1880.

**East Dorset**, on R. R., Bennington co., Vt. (see map of Vermont, ref. 9-B, for location of county), 25 miles S. of Rutland. It has marble-quarries of great value. Pop. not in census of 1880.

**East Douglas**, on R. R., Worcester co., Mass. (see map of Massachusetts, ref. 3-F, for location of county), 16 miles S. S. E. of Worcester and 46 miles S. W. of Boston. The extensive works of the Douglas Axe Co. are here. Pop. about 1500; not in census of 1880.

**Eas'ter** [Ger. *Oster*; Gr. *πάσχα*; Lat. *pas'cha*; Fr. *pâques*; etymology doubtful], the principal festival of the Christian year, observed in commemoration of the resurrection of our blessed Lord. The returns of this anniversary were originally regulated, and in imitation of this early usage have always continued to be, by the calendar of Judea, in which the months were continuous with the revolutions of the moon. A mean lunation being, roughly, twenty-nine and a half days long, twelve lunar months, or a lunar year, fall short of a solar year by about eleven days. The beginning of the Jewish year therefore goes backward on the natural year eleven days annually, requiring an intercalary month to be introduced in the third year, and again in the sixth, ninth, eleventh, fourteenth, and so on. Any anniversary regulated by such a calendar as this is consequently *movable* in reference to a calendar regulated by the sun. The Resurrection took place just after the Jewish feast of the Passover, which was held on the fourteenth day of Nisan, the first month of the year—that is to say, the fourteenth day of the moon, or not far from the time of full moon. The Christians of Jerusalem, and after them those of the Asiatic churches generally, were accustomed to hold the feast of Easter on this same day or simultaneously with the Jewish Passover. This usage was unacceptable to the Gentile churches in Italy and the West generally, which preferred to celebrate Easter on the Sunday following the fourteenth day of the moon; and the difference of practice in this particular led to grave dissensions between the East and West, which were at length pacified by the agreement reached in the Council of Nicea (A. D. 325), to make the Western usage universal. Since this early period Easter has always been observed throughout the world on the Sunday following the fourteenth of that lunation of which this fourteenth day falls

on the 21st of March or next later. In order to find the time of Easter for any given year, it would seem that we should calculate the exact time of the new moon in that year for March, and try whether the fourteenth day of that moon (the day of new moon itself being counted the *first*) would fall not earlier than the 21st; in which case the Sunday following this fourteenth day might be presumed to be Easter. But should this fourteenth day fall earlier than the 21st of March, we should conclude that the new moon of April must be taken. The ecclesiastical calendar, however, is only nominally dependent on the moon in the heavens, the true moon and the calendar moon sometimes differing in their age more than two days. The practical reason for this is, that if the astronomical time of new moon is taken, this time will not be the same in the local times of different longitudes; so that a meridian may always be assigned such that the same new moon may fall on different calendar days on different sides of it. And if the calculation is very nicely made, when new moon happens exactly at midnight of Saturday or Sunday in the middle of a large city like London, the east and west halves of the city may have their Easter upon two very different days. The ecclesiastical moon is therefore an ideal or artificial moon; and in determining the beginning and end of each lunation no account is taken of any differences smaller than a day. In order to divest the ecclesiastical calendar as much as possible of complexity, advantage is taken of the fact discovered by Meton, an Athenian astronomer in the fifth century before our era, that in a period of nineteen solar years the sun and the moon return almost exactly to the same relative positions which they occupied at the beginning of this period, the difference amounting to little more than the space the moon would move over in two hours. The calendar therefore assumes that the moons determining Easter will recur in the same order every nineteen years throughout an entire century, and sometimes throughout two or three centuries. The Easters themselves do not therefore necessarily recur on the same days of the month of March or April in each of these successive series of nineteen years, but would do so if the same days of the week always corresponded to the same days of the month. This, however, is not usually the case; and as Easter must be Sunday, it is necessary, in order to fix definitely the date of Easter in any given year, to know both the place of the year in the series of nineteen (or in the Metonic cycle) and also the day of the week on which the year began, or (what is practically the same thing) the dominical letter for the year. Various methods have been given for finding Easter, but all of them commence, expressly or implicitly, with the determination of these two elements. The rules given by Prof. de Morgan in the "Companion to the British Almanac" for 1845 occupy about a page. The formulæ of Delambre, in the first volume of his "History of Modern Astronomy," and those of Gauss, given in the first volume of the "Theoretical and Practical Astronomy" of the same writer, though concise as mathematical expressions, involve much laborious computation in their practical application. The following rules, however, originally devised by the writer of the present article, are very simple and easy. It is to be observed, first, that the fourteenth day of the Easter moon, being approximately the time of full moon, is called the *pascchal full moon*. The number of the year in the lunar cycle is also called the Golden Number. (See GOLDEN NUMBER.) Then, supposing that we know the golden number and the dominical letter, we find, for the present century, the pascchal full moon as follows:

If the golden number is *odd*: To four times the golden number add *ten*; and

If the golden number is *even*: To four times the golden number add *twenty-five*.

The result, in either case, if greater than twenty and less than fifty, is the date of pascchal full moon, *considered as a day of March* (that is to say, if it happens to be, say, thirty-three, it is the thirty-third of March = the second of April, and so on). If not greater than twenty and less than fifty, add *thirty*, or subtract *thirty*, or *twice thirty*, if necessary to make it so, and the result is once more pascchal full moon.

Then, to find Easter: To the constant number *eighteen* add the numerical value of the dominical letter (*i. e.* A = 1; B = 2; C = 3, etc.), and the sum, if greater than the value of pascchal full moon just found, is the date of Easter; but if not, add *seven*, or *twice seven*, or *three times seven*, and so on till a total is obtained which exceeds that value; and this total is the date of Easter considered as a day of March.

To find the golden number and the dominical letter: In either case first separate the hundreds in the number expressing the given year of our Lord from the years less than a hundred, and treat the parts independently of each other. First, for the dominical letter: If the hundreds be

divided by *four*, the remainder from the division will have one or other of the following values—viz., 0, 1, 2, 3. And the dominical letters belonging to the hundreds which give these remainders respectively will be A, C, E, G = 1, 3, 5, 7. These, for convenience, call *centurials*. Then for the *years* take half the largest number divisible by *four*—*i. e.* half the number of the latest leap-year—*increase this by seven*, and subtract the excess of fours (*i. e.* the remainder left in the previous division by four). To this result add the *centurial*, and the excess of sevens in the sum will be the value of the dominical letter; it being observed that if there is no excess the dominical letter has the value of seven itself, or is G. Leap-years have two dominical letters—one for January and February; the other, which is less than the former by a unit, for the remainder of the year. This last, which only is used in finding Easter, is that given by the rule.

To find the dominical letter for *Old Style* the process is the same except as to the *centurial*. The *centurial* for old style is found by adding *three* to the number of *hundreds*, and suppressing *sevens*. Thus, if the hundreds be *fifteen*, we have  $15 + 3 = 18$ . And 18 with seven dropped as often as possible, leaves 4, which is the old style *centurial*. If there is no excess of sevens, the *centurial* is seven itself.

Secondly, for the golden number: Add a unit to the number expressive of the given year; then divide the *years* by *twenty*, and add the quotient to the remainder. Next divide the centuries by *four*, and add the quotient to *five times* the remainder. Finally, add the two results, and the sum, if nineteen or less, is the golden number. If it exceeds nineteen, drop nineteen, or, if necessary, twice nineteen, and the number left, being not greater than nineteen, will be the golden number.

Take, as an example, the year 1873. For the dominical letter:  $18 \div 4$  gives 2 remainder, and the *centurial* is accordingly 5. The number of the largest leap-year in 73 is 72, and the half of this is 36. Then  $36 + 7 = 43$ , and  $43 - 1 = 42$ . Finally,  $42 + 5$ , with the sevens suppressed, is evidently 5 = E, which is the dominical letter of 1873.

For the golden number:  $1873 + 1 = 1874$ . Then,  $74 \div 20 = 3$ , with 14 remainder, and  $14 + 3 = 17$ . Also,  $18 \div 4 = 4$ , with 2 remainder, and  $2 \times 5 + 4 = 14$ . Then,  $17 + 14 = 31$ , and  $31 - 19 = 12$ , the golden number for 1873.

For Easter in 1873:  $12 \times 4 + 25 = 73$ . Then  $73 - 30 = 43$ , or pascchal full moon is the 43d day of March. To 18 add 5, the value of the dominical letter, and the result, 23, is smaller than the date of pascchal full moon. But  $23 + 7 + 7 + 7 = 44$ , which is greater than that date (43), and Easter is the 44th day of March, or the 13th day of April.

There is one case not provided for in the foregoing. If in finding pascchal full moon we obtain a result which is *exactly twenty* or *exactly fifty*, adding or subtracting thirty will not bring it between those limits. In this case pascchal full moon must be taken at 49. There is also an irregularity arbitrarily introduced by the mathematicians of Pope Gregory XIII., by whom the calendar was regulated, which is this: Should the rules above laid down give *forty-nine* directly as the date of pascchal full moon, *this must be reduced to forty-eight in case the golden number is 12 or upward*; not otherwise.

For centuries earlier or later than the present, the rules are the same, except that the numerical terms *ten* and *twenty-five* used in finding pascchal full moon are liable to variation (but do not always vary) in passing from century to century. The second of these terms always exceeds the first by *fifteen*. The first may be found for any century up to the forty-second by the following rule: From the number of the centuries take its fourth part and its third part (disregarding fractions in both cases), and increase the result by *two*. Thus, for the twentieth century we have  $20 - 5 - 6 + 2 = 11$ . Hence, these numerical terms for the next century will be 11 and 26. In *old style* dates these numerical terms are invariable, and are always *two* for odd golden numbers and *seventeen* for even. (See "Proceedings of the Protestant Episcopal Church in the United States" for 1871, Appendix.) The author of this article has also designed an instrumental contrivance for finding Easter by inspection, for any year from the beginning of the Christian era down to the end of hundredth century, in old style or new. This is constructed of card-board, and a facsimile of it, reduced in size, is given below. In the centre is a rotary disk, on the lower border or limb of which are inscribed the numbers below 100 which consist of even *twenties*, and also the zero. These are called *vigesimals*. On the upper limb appear all the numbers less than twenty, called *residuals*, the leap-year numbers being written twice. Around this disk is a fixed ring, bearing the dominical letters above and the centurial numbers below—the new style centurials being on the left, and the old style centurials on the right. The centurial numbers here employed are simply the remainders left in dividing the hundreds by 4



for new style and by 7 for old style. To use this for finding the dominical letter, turn the disk till the proper vigesimal of the given year stands opposite the proper centurial; then opposite the proper residual will be found the dominical letter (or letters) of the year. In case of leap-years there will be found two such letters, of which the lesser or right-hand one is the Easter dominical letter.

Around the fixed ring here described is a rotary ring bearing the numbers from 1 to 19 (the golden numbers), twice repeated, and at the left of these the vigesimals, arranged in regular order. Outside of this rotary ring is a second fixed ring, which bears on the left the numbers 0 to 19, arranged *en échelon*, so as to allow the natural sequence to be observed. These are called the centurials of the lunar cycle, and are simply what remains after suppressing the *nineteens* out of the hundreds in the given year of our Lord. Thus, in the year 4173 there are *forty-one* hundreds, from which, if we suppress  $19 \times 2 = 38$ , there will remain 3, which is the centurial for the forty-second century. On the right the same fixed ring bears the residuals, or excesses of twenties in the years of the incomplete century, in which it is not necessary to duplicate the leap-year numbers. When the movable ring is turned so that the proper vigesimal stands opposite the proper centurial, the golden number for the year will be found opposite the proper residual.

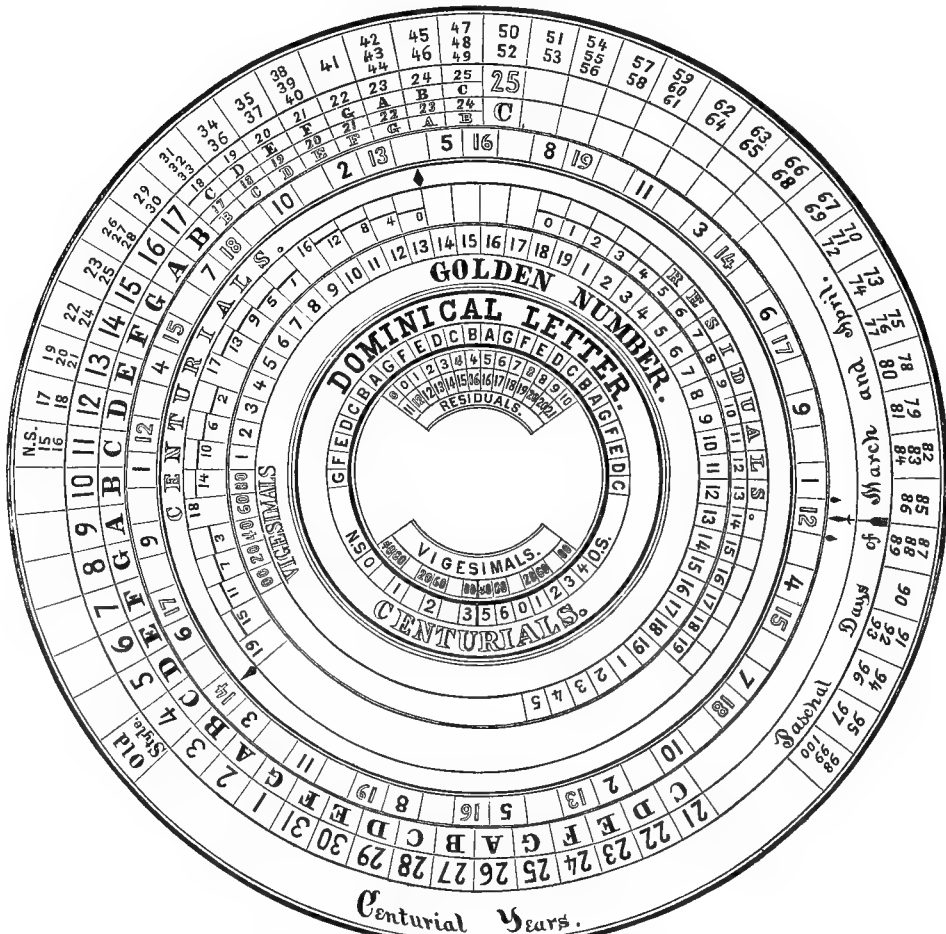
On this same fixed ring, outside of the numbers already mentioned, is an annular row of figures distributed without any obvious order, which embraces all the possible golden numbers from 1 to 19, each entered twice. Of these, all up to 11 are printed in full face; all from 12 to 19 inclusive in outline. Their use will presently appear.

Around this second fixed ring is a second rotary ring, on which are inscribed all the days of March and April on which paschal full moon or Easter can fall; together with the calendar letters belonging to them severally. From the 17th to the 25th of April the day numbers and letters are entered twice, the second or inner series being advanced beyond the outer by a single place. This same rotary ring also bears an arrow, which is designed to be used as an index. Finally, surrounding this rotary ring there is another fixed ring, in the several divisions of which are written the centuries from 15 up to 100, none below 15 being necessary, as the new style, or Gregorian reckoning, began in 1582. The use of the last-mentioned rotary ring is to find, first, the date of paschal full moon, and subsequently, by consequence, the date of Easter. In employing it, the ring is turned until the arrow points to the golden number for the year, when the date of paschal full moon will be found opposite the proper centurial number in the outer fixed ring. Then, looking along the series of letters to the right of the date of the paschal moon, Easter will be found immediately over the next succeeding dominical letter for the year. If the time of Easter for years before 1582 is sought, the paschal moon will be found, not opposite the century, but opposite the words "Old Style" written in one of the compartments into which the outer fixed ring is divided, and Easter will be opposite the proper dominical letter next following, as before.

As it is arbitrarily ruled that the paschal full moon shall never fall later than April 18th, and as a consistent method of computation or of instrumental determination would make it sometimes fall on the 19th, the double series of days and letters is introduced at the end of April in the

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outer revolving ring to meet this case. When, therefore, in the use of the instrument, paschal full moon would seem to fall on the 19th of April by the series of outer, full-faced figures, we must pass to the inner series of figures printed in outline, which will give paschal full moon on the 18th. Also, if the outer series of full-faced figures should at any

time directly give paschal full moon on the 18th, we must pass to the inner series again, and make paschal full moon the 17th, provided the arrow stands opposite a golden number printed in outline, but not otherwise. When the light-faced numbers are thus used instead of the full-faced for the paschal moon, the light-faced letters must of course also

be used in finding Easter. The table in figure on the preceding page is adjusted for the Easter of 1873. In 73 the vigesimal is 60 and the residual is 13. For 18 (centuries) the centurial is 2, and the Easter sought belongs to new style. It is seen that, 60 being opposite 2, the residual, 13, is opposite E; which is the dominical letter of 1873. In the first rotary ring the same vigesimal, 60, is opposite the golden number centurial, which is 18; and under the residual 13 we have 12, the golden number for 1873. Bringing, finally, the arrow of the outer rotary ring opposite to the golden number, 12, we find under 18 in the outer row of centuries, the 12th of April, which is the date of paschal full moon for 1873; and opposite E, the dominical letter of the year next following the date of the paschal full moon thus found, we have April 13th for the date of Easter.

This little instrument is useful in the solution of many questions connected with chronology and the calendar, besides that for which it was expressly constructed. Any person possessed of a little mechanical skill can construct a working instrument of this kind for himself, by copying this diagram on a scale about one-fourth larger.

The principal festivals and fasts of the Church dependent for the time of their celebration upon Easter are Septuagesima Sunday, nine weeks before Easter; Ash Wednesday, which is the Wednesday of the seventh week before Easter; Good Friday, which is the Friday next before Easter; Ascension Day, which is the Thursday of the sixth week after Easter; Whitsun Day, the seventh Sunday after Easter; and Trinity Sunday, the eighth Sunday after Easter.

F. A. P. BARNARD, *Columbia College.*

**Easter Island**, a small island of volcanic origin in the Pacific Ocean, is in lat. 27° 6' S., lon. 109° 30' W., and is 11 miles long and 4 miles wide. It rises 1200 feet above the level of the sea, and is scantily supplied with water. It is the easternmost inhabited Polynesian island. Its people were quite recently cannibals. They have traditions of their ancestors having come from the island of Oparo, 1900 miles distant. The island has wonderful colossal statues in stone, but the natives have no account of their sculptors.

**Eastern Archipelago, The**, also called **The Malay Archipelago** and **Australasia**, comprises all those islands which lie in the north-eastern part of the Indian Ocean. Area, about 650,000 square miles. They are divided, according to their position, into three groups. The first group comprises the Molucca Islands, the Spice Islands, Banda, Amboina, Ternate, and the Philippines; the second group consists of Sumatra, Java, and the small Sunda Islands east of Java, from Bali to Timorlaut; and the third comprises Borneo and Celebes, together with a large number of smaller islands, as Billiton, Banca, Singapore, etc. In its position this archipelago forms the connection between Asia and Australia. The soil is very fertile, and resembles in its products that of the neighboring countries of Asia. It has therefore attracted at all ages almost every nation. The original inhabitants consisted of many tribes, but all belonged to one race called the **MALAY RACE** (which see). At a later age the Arabs came to these islands, and as a consequence Mohammedanism gained a good many followers. At last, the Europeans came, and subjugated almost the entire archipelago, and especially the Dutch have become masters of the greatest number of islands; while the Spaniards have only the Philippines; the Portuguese, Dilli and part of Timor; and the British, Singapore and Labuan. Besides these races, a large number of Chinese are found throughout the islands. The total population is estimated at 22,829,000.

**Eastern Churches** is a title given to several bodies of Christians in Western Asia, Eastern Europe, and Africa. They are in three divisions. I. The Orthodox Greek Church, composed of ten independent bodies substantially one in discipline and doctrine, in mutual sympathy, and in deference to Constantinople, numbering about 78,000,000, of whom about 58,000,000 are in Russia. II. The National churches, consisting of: (1) The Nestorian (since 498 A. D.), numbering about 150,000 in Turkey and Persia, besides 70,000 (Independent St. Thomas Christians) in India. (2) The Armenian (since 491 A. D.), very widely dispersed, numbering about 3,000,000. (3) The Syrian: A. Jacobites (since 451 A. D.), numbering less than 50,000; B. Maronites (since 680 A. D.), numbering from 200,000 to 250,000, and since 1182 A. D. under the pope. (4) The Coptic, in Egypt (since 451 A. D.), numbering about 500,000. (5) The Abyssinian (since 451 A. D.), numbering about 3,000,000. These all went off from the Greek Church on Christological issues. III. The United churches, which have submitted to the pope, accepted the Filioque of the Latin Church and the doctrine of the two natures in Christ, and are allowed vernacular liturgies, clerogamy, and the

communion in both kinds. These churches are: (1) United Greek, mostly since the Protestant Reformation, and mostly in Austria, Poland, and Southern Italy, numbering nearly 4,500,000. (2) United Nestorian (since 1553), numbering 20,000 in Turkey and Persia, and 150,000 in India. (3) United Armenian (since 1316–34 A. D.), numbering about 100,000, among whom an anti-papal schism occurred in 1869. (4) United Syrian [Jacobite], very few in Syria (since seventeenth century), but 160,000 in India (since 1553). (5) United Coptic (since 1732), numbering about 10,000 or 12,000. (6) United Abyssinian (since 1828), numbering, it is claimed, about 50,000. These "United" churches owe their existence largely to the desire of the Roman Catholic Church to make up for the losses caused by Protestantism.

R. D. HITCHCOCK.

#### **Eastern Empire.** See BYZANTINE EMPIRE.

**Eastern Rite, or Oriental Rite.** Those branches of the Roman Catholic Church which acknowledge the supremacy of the pope, but which do not employ the Latin ritual, are said to be of the Eastern rite. In fact, they employ several different rituals. The United Christians of St. Thomas have no bishop of their own, but are under the vicar-apostolic of Verapoli, who is of the Latin rite; but the people and clergy use, in part, a modified Syrian rite.

The Eastern rite differs from the Latin, not only in the languages employed in the service (Greek, Slavic, Armenian, Syriac, Ethiopic, Coptic), but generally also in the use of both elements for the laity in the Eucharist, and in the permission of marriage to the lower clergy.

**Eastern Shore**, a name given to those parts of Maryland and Virginia which are E. of Chesapeake Bay, and sometimes applied to the whole peninsula, including, in addition, the entire State of Delaware. The Eastern Shore has been proverbial for its conservatism, and from the character of its inhabitants claimed the title of "the land of gentlemen;" but it is now traversed by railroads, and the excellence of its soil and climate for peach-culture and market-gardening has caused the development of much industrial enterprise. Its western side is remarkably indented by navigable rivers and creeks, affording great commercial advantages. The waters on both sides abound in oysters, which are a source of great wealth. The fisheries are also extensive. Most of the surface is low and level, but healthy. Malarial fevers are endemic at some places. The climate is singularly mild. Bog-iron ore of fine quality is extensively mined in some parts. Kaolin is found in the extreme N. Oak timber is cut in some parts for market.

**East Greenwich**, capital of Kent co., R. I. (see map of Rhode Island, ref. 5-G, for location of county), is on R. R. and Narragansett Bay, 14 miles from Providence. It has an academy (under the supervision of the Boston University), two cotton-mills, one woollen-mill, print-works, free library, a court-house and jail, and a good harbor. Incorporated Oct. 31, 1677. Pop. of township in 1870, 2660; in 1880, 2887; in 1885, 2658.

**East Had'dam**, a township of Middlesex co., Conn. (see map of Connecticut, ref. 6-F, for location of county), on the Connecticut River, 30 miles below Hartford, has a music seminary, 13 cotton-mills, 3 britania-shops, etc. Pop. in 1870, 2951; in 1880, 3032.

**East Hampton**, R. R. junction, Hampshire co., Mass. (see map of Massachusetts, ref. 3-E, for location of county), 5 miles S. W. of Northampton. It has manufactures of suspenders, pumps, thread, vulcanized rubber, buttons, etc., and is the seat of Williston Seminary, an excellent school for young men. It has a public library. Pop. of East Hampton tp. in 1880, 4206; in 1885, 4291.

**East Humboldt Mountains**, a lofty range in Elko co., Nev., some of whose peaks exceed 12,000 feet in height. Secret Valley and Fremont Pass cut the range, which is in parts well timbered with pines and firs, affording lumber. Its snows feed the springs by which Lakes Franklin and Ruby are supplied.

**East India Com'pany**, a famous joint-stock trading company formed in England to carry on commerce with the East Indies. In 1600 a royal charter was granted to a number of London merchants under the title of "The Governor and Company of Merchants of London trading to the East Indies." This charter gave them an exclusive right to trade for fifteen years within certain limits, which were of immense extent. They established factories at Surat, Cambay, and other places in India about 1612. The charter was renewed from time to time. Madras was founded in 1639, and Calcutta in 1645. In 1698 the king granted a charter to a rival company, but the two companies were united in 1702 under a new charter, with the title of "The United Company of Merchants trading to the East Indies." Every person who held £500 of the company's stock became

a member of the court of proprietors, who annually chose a court of directors composed of twenty-four members, each of whom must own £2000 of the stock. The executive power of the company was vested in this court of directors, each of whom retained his office for four years.

In 1708, Parliament granted the company the exclusive privilege of trading to all places eastward of the Cape of Good Hope to the Strait of Magellan. The monopoly of the China trade was abolished in 1833, and the company was then deprived of its original character as a commercial association. Many years before this date the company had become a great territorial power, and had laid the foundation of the British empire in India. By conquest and other means the company obtained sovereign power over vast regions of Hindostan. This region was coveted by the company not only as a source of commercial profit, but as a field in which their relatives might enrich and distinguish themselves by political and military enterprises. By the act 3 and 4 William IV. the functions of the East India Company were rendered merely political. It was to continue to govern India, with the concurrence and under the supervision of the board of control. All the real and personal property belonging to the company on April 22, 1834, was vested in the Crown, and to be held or managed by the company in trust for the same; and the stockholders were to receive an annual dividend of 10½ per cent. on a capital of £6,000,000 out of the revenues of India. The Sepoy mutiny of 1857, which was repressed with a great expenditure of life and treasure, combined with other causes, induced Parliament to transfer the dominion of India to the Crown. This change was effected, after strenuous opposition from the company, in 1858. (See INDIA.) The political affairs of British India are now managed by a minister, who is styled secretary of state for India, and a council of fifteen members.

The Scottish East India Company was formed in 1695, but soon met a calamitous fate.

The Danish East India Company was first organized in 1618. It was dissolved in 1634 and reorganized in 1670. A new company was formed in 1686, and a fourth in 1731. The king purchased the rights of the company in 1777. The charter was renewed in 1792, but the company has long since ceased to exist.

The Dutch company was formed in 1595, and several companies of the kind were united into one in 1602.

The French company was established in 1664, and dissolved by Louis XV. in 1770. A new one was formed in 1785, and dissolved in 1790.

A Swedish company was formed in 1741, and reorganized in 1806.

The Ostend India Company was created in 1718. In 1721 all Dutchmen were prohibited from supporting it, on pain of death. The emperor Charles VI. dissolved it in 1731.

**East Indies** [*Fr. Les Indes Orientales*], a collective term vaguely applied to Hindostan, Farther India, and the Malay Archipelago. (See INDIA.)

**Eastlake** (Sir CHARLES LOCK), F. R. S., D. C. L., an English historical painter, born at Plymouth Nov. 17, 1793. He visited Italy in 1817, and passed about nine years in Rome (1820-29). In 1828 he exhibited an admired picture of "Pilgrims to Rome Coming in Sight of the Holy City." He was chosen a Royal Academician in 1830, and became president of the Royal Academy in 1850. Among his works are "Christ Weeping over Jerusalem" (1841), "Helena" (1849), "Violante" (1853), and "Beatrice" (1855). He was appointed director of the National Gallery in 1855, and wrote "Materials for a History of Oil Painting" (1847), "Contributions to the Literature of the Fine Arts," and other works. He translated Goethe's "Farbenlehre" and Kugler's "History of Painting." Died Dec. 23, 1865. A biography of Eastlake was published by Lady Eastlake (born Elizabeth Rigby) in the second series of the "Contributions to the Literature of the Fine Arts" (1870).

**Eastland**, on R. R., capital of Eastland co., Tex. (see map of Texas, ref. 3-G, for location of county). Pop. in 1870, 88; in 1880, 539.

**East Liverpool**, Columbiana co., O. (see map of Ohio, ref. 2-J, for location of county), on R. R. and the Ohio River, 44 miles W. N. W. of Pittsburg; has potteries and manufactures of stone-ware. P. in 1870, 2105; in 1880, 5568.

**Eastman**, on R. R., capital of Dodge co., Ga. (see map of Georgia, ref. 5-I, for location of county), 56 miles S. S. E. of Macon. It has a fine court-house, presented to the county by Messrs. W. E. Dodge of New York and W. P. Eastman (from whom the county and town are respectively named). Pop. not in census of 1880.

**Eastman** (CHARLES GAMAGE), an American poet and journalist, born at Fryeburg, Me., June 1, 1816. He edited

the "Spirit of the Age" and the "Vermont Patriot," and was connected with other journals. In 1848 he produced a volume of poems.

**Eastman** (Hon. HARVEY G.), LL.D., born in Marshall, Oneida co., N. Y., Oct. 16, 1832. His education was that of the common school and the academy. Having taught in various places, he founded Eastman National Business College Nov. 3, 1859, in Poughkeepsie, N. Y. He was thrice elected to the majority of Poughkeepsie; a member of the New York State Assembly 1871 and 1876; for eight years State commissioner of public charities. He received the honorary degree of LL.D. from Ingham University. Died at Denver, Col., July 13, 1878.

**Eastman** (MARY HENDERSON) was born in Warrenton, Va., in 1818. In 1835 she married Captain Seth Eastman of the U. S. army, and long resided on the frontier. She has published many works illustrative of Indian character, and also "Aunt Phillis's Cabin" (1852), a reply to "Uncle Tom's Cabin."

**Eastman** (PHILIP), LL.D., born in Chatham, N. H., Feb., 1799; graduated at Bowdoin College in 1820; practised law. Died Aug. 7, 1869. He was one of the editors of the "General Statutes of Maine" (1840), and published a "Digest" of Maine law reports (1849).

**Eastman** (SETH), an army officer, born in Brunswick, Me., Jan. 24, 1808, graduated at West Point in 1829. He entered the infantry, and was teacher of drawing at West Point (1833-40). He published a "Treatise on Topographical Drawing" (1837) and a "History, etc. of the Indian Tribes" (1850-57). In 1863 retired with rank of lieutenant-colonel and brevet brigadier-general. D. Aug. 31, 1875.

**Eastman National Business College**, an institution in Poughkeepsie, N. Y., for the commercial and practical education of young men, was founded by the Hon. Harvey G. Eastman, LL.D., Nov. 3, 1859. From small beginnings it has grown into permanency and power. Up to 1884 more than 30,000 young and middle-aged men had availed themselves of its superior advantages. On the death of its founder, in 1878, its responsible management devolved upon his widow, Mrs. Minerva M. Eastman, assisted by a competent corps of experienced instructors. In October, 1884, Mrs. Eastman was married to Clement C. Gaines, a Virginian by birth and education, who is now the president of the college. The institution is a distinguished monument to the memory of its founder, who gave his life to the interests of mankind. CLEMENT C. GAINES.

**East New York**, R. R. centre, New Lots township, Kings co., N. Y. (see map of New York, ref. 8-B, for location of county), 6 miles S. E. of New York City. It has manufactures of shoes, etc. Pop. of New Lots township in 1870, 9800; in 1880, 13,655.

**Easton**, capital of Talbot co., Md. (see map of Maryland, ref. 3-G, for location of county), is on Tred Haven Creek, a navigable branch of the Great Choptank River, 16 miles from Chesapeake Bay and 35 miles E. S. E. of Annapolis, and on R. R., 42 miles from Clayton, Del., in a fine peach-growing region. It has peach-canning and fruit-drying establishments and manufactures of lumber, sash, castings, and farming implements; also an orphan asylum, gas-works, and a high school. It is the seat of a Protestant Episcopal bishop, and has the schools of the diocese of Easton. Pop. in 1870, 2110; in 1880, 3005.

**Easton**, township of Bristol co., Mass. (see map of Massachusetts, ref. 5-I, for location of county), on the Old Colony R. R., 18 miles from Boston, has a very extensive shovel-manufactory, a free library, and manufactures of boots, shoes, hinges, thread, etc. Pop. in 1870, 3668; in 1880, 3902; in 1885, 3948.

**Easton**, a city and R. R. centre, capital of Northampton co., Pa. (see map of Pennsylvania, ref. 4-J, for location of county), is situated at the confluence of the Delaware and Lehigh rivers, the scene of the famous treaty with the Five Nations, recorded as having taken place at the Forks of the Delaware. It is 75 miles from New York and 60 miles from Philadelphia. Easton is the seat of Lafayette College, and has a fine opera-house, gas and water works, street railways, etc. Its vicinity abounds in rolling-mills, furnaces, and other manufactories. Pop. in 1870, 10,987; in 1880, 11,924.

**Easton** (Col. JAMES), a Revolutionary officer, born at Hartford, Conn. He became a resident of Pittsfield, Mass., in 1763. He raised a Berkshire regiment in 1775, served at Ticonderoga, and in Canada under Montgomery, expending his whole fortune in the service. In 1776, after receiving the thanks of Congress, he was obliged by his enemy, Benedict Arnold, to leave the army, and died at Pittsfield, Mass., in poverty.

**Easton** (NICHOLAS), born about 1593, emigrated from Wales to Ipswich (Mass.) in 1634, and afterward lived in Newbury, Mass., and Hampton, N.H. Having had trouble with the officials, he removed to Rhode Island in 1638, and built the first house in Newport. He was governor of the United Colonies (Rhode Island, Providence, etc.) 1650-52. Died Aug. 15, 1675.—His son, JOHN EASTON, was governor of Rhode Island (1690-95), and wrote a "Narrative of the Causes which led to Philip's Indian War."

**East Orange**, a pleasant township of Essex co., N.J. (see map of New Jersey, ref. 2-D, for location of county), on R. R., 12 miles from New York. It has fine suburban residences. Pop. in 1870, 4315; in 1880, 8349.

**Eastport**, a port of entry of Washington co., Me. (see map of Maine, ref. 7-G, for location of county), is on Moose Island in Passamaquoddy Bay, at the extreme eastern point of the territory of the U. S. It has a good harbor, in which the tide rises twenty-five feet. Its prosperity is mostly derived from the lumber-trade and fisheries. Steamers ply to Boston, Portland, Calais, and St. John, N. B. Pop. of township in 1870, 3736; in 1880, 4006.

**East Portland**, Or. See APPENDIX.

**East River**, of New York, is a strait connecting Long Island Sound with New York Bay, and separating the city of New York from Brooklyn, which is about three-fourths of a mile distant. It is nearly 20 miles long, and is navigable by large vessels. A bridge has been built across this strait between New York and Brooklyn. About 7 miles from that city, on this strait, is a narrow and formerly a dangerous pass called HELL GATE (which see).

**East River Bridge**. See BROOKLYN and FOUNDATION.

**East Saginaw**, a city and important R. R. and commercial centre, Saginaw co., Mich. (see map of Michigan, ref. 6-J, for location of county), on the navigable Saginaw River, 17 miles from its mouth. It is well laid out and substantially built, has Holly waterworks, horse railroads, and a good system of public schools. It has a large trade by lake and rail in lumber and salt, having saw-mills capable of producing 135,000,000 feet of lumber per annum, and salt-manufactories which can produce about 200,000 barrels of salt in a year. The surrounding country is very fertile, but manufacturing is the chief pursuit. The city has extensive car- and machine-shops, a library association, and is the base of supplies for a large lumber region. It is nearly opposite the city of Saginaw. Pop. in 1870, 11,350; in 1880, 19,016; in 1884, 29,100.

**East St. Louis**, city and R. R. centre, St. Clair co., Ill. (see map of Illinois, ref. 9-D, for location of county), on the Mississippi River opposite St. Louis. It has a Roman Catholic college. Pop. in 1870, 5644; in 1880, 9185.

**East Tennessee University**. See TENNESSEE UNIVERSITY.

**Eastville**, capital of Northampton co., Va. (see map of Virginia, ref. 6-J, for location of county), is on a narrow peninsula, "the Eastern Shore," between the Atlantic Ocean and Chesapeake Bay, about 4 miles E. of the latter and 180 miles by water E. of Richmond. Pop. of Eastville district in 1870, 3395; in 1880, 3653.

**East Weymouth**, a village of Weymouth township, Norfolk co., Mass. (see map of Massachusetts, ref. 5-I, for location of county), on R. R.,  $1\frac{1}{4}$  miles S. of Boston. It has important manufactures of boots, nails, etc. Pop. of Weymouth township in 1880, 10,570; in 1885, 10,740.

**Eaton**, capital of Preble co., O. (see map of Ohio, ref. 6-C, for location of county), on R. R. and Seven-Mile Creek, 53 miles N. of Cincinnati. It has various manufactures, and is surrounded by a fine farming country. Pop. in 1870, 1748; in 1880, 2143.

**Eaton** (AMOS), an American botanist, born in Chatham, N. Y., in 1776, graduated at Williams College in 1799. He studied law and was admitted to the bar. In 1828 he became principal and senior professor of Rensselaer Institute at Troy. He published, besides other works, a "Manual of the Botany of North America" (1833; 7th ed. 1836). Died May 6, 1842.

**Eaton** (AMOS B.), son of Amos Eaton, was born in 1806 in New York, graduated at West Point in 1826, and June 29, 1864, commissary-general of subsistence U. S. A., rank of brigadier-general. He served as infantry officer, chiefly on the Northern frontier, till July 7, 1838, when he was transferred to the subsistence department, and served as commissary in the Florida war 1837-41, during Canada border disturbances, and in New York City 1841-46; as chief commissariat of Major-General Taylor's army in Mexico 1847-48, engaged at Buena Vista (brevet major), of the department of the Pacific 1851-55, and at New York City 1855-61. In the civil war was dépot commissary at New York City, and purchasing commissary for the armies in

the field 1861-64; and was in charge of the commissary bureau at Washington, D. C., 1864-74. (Brevet major-general U. S. A. for faithful, meritorious, and distinguished services.) Retired May, 1874. D. at New Haven, Conn., Feb. 21, 1877.

GEORGE W. CULLUM.

**Eaton** (DANIEL CADY), an American botanist, son of the above, was born at Fort Gratiot, Mich., Sept. 12, 1834, graduated at Yale in 1857, and at Lawrence Scientific School (Harvard) in 1860. He became professor of botany at Yale in 1864. He is the author of that part of Chapman's "Flora of the Southern States" (1860) which treats of the Ferns, and the corresponding part of "Gray's Manual" (5th ed. 1867), and has published various scientific papers.—His cousin, DANIEL CADY EATON, is professor of the history and criticism of art in Yale College.

**Eaton** (DORMAN B.), a native of Vermont, was graduated at the university of that State in 1848, studied law at the Harvard Law School, and began to practise as a lawyer in New York in 1850 jointly with the late Judge Kent; he edited the 7th edition of "Kent's Commentaries." He drew up the health laws of New York which created the board of health in New York City. In 1873 he succeeded George William Curtis as a member of the Civil Service Commission, and was its chairman until its dissolution, in 1875. In 1877 he published a large volume on the civil service of Great Britain, which has appeared in two editions. He drafted the national civil service act approved Jan. 16, 1883. In Mar., 1883, he was made a member of the new Civil Service Commission; resigned July 27, 1885. He has been a frequent contributor to newspapers and periodicals.

**Eaton** (GEORGE W.), D. D., LL.D., an American scholar and Baptist minister, was born at Henderson, Huntingdon co., Pa., July 3, 1804, and was educated at Ohio University and Union College, Schenectady, N.Y.; he was a fellow and tutor in Union College (1829-30), professor of ancient languages in Georgetown College, Ky. (1831-33), professor of mathematics and natural philosophy (1833-37) and ecclesiastical and civil history (1837-50) at the Literary and Theological Institution, Hamilton, N. Y., and professor of systematic theology at the same place (1850-61), president of Madison University (1856-68), president of Hamilton Theological Seminary and professor of homiletics (1861-71). Died Aug. 3, 1872.

**Eaton** (HORACE), M. D., was born at Barnard, Vt., June 22, 1804, graduated at Middlebury in 1825, graduated in medicine in 1828, was professor of chemistry and natural philosophy at Middlebury College (1848-54), and governor of Vermont (1846-48). Died July 4, 1855.

**Eaton** (JOHN, JR.), Ph. D., LL.D., American educator, born Dec. 5, 1829, at Sutton, N. H., graduated at Dartmouth in 1854; superintendent of public schools, Toledo, O. (1856-59), studied theology at Andover (Mass.) Theological Seminary (1859-61), ordained by the Maumee (O.) Presbytery (1861), commissioned chaplain of the Twenty-seventh Ohio Volunteers (Aug. 15, 1861), appointed superintendent of contrabands (Nov. 14, 1862) by General Grant, general superintendent of freedmen for Mississippi, Arkansas, West Tennessee, and North Louisiana (Dec. 15, 1862), and served as such till May 27, 1865, commissioned colonel of the Sixty-third U. S. colored troops (Oct. 2, 1863), breveted brigadier-general of volunteers (Mar. 13, 1865), assistant commissioner of the bureau of refugees, freedmen, and abandoned lands (May 27, 1865), established and edited the "Daily Post" at Memphis, Tenn. (1866-70), State superintendent of public instruction for Tennessee (1867-69), secretary of the board of visitors to the West Point Military Academy (1869), and was appointed U. S. commissioner of education Mar. 17, 1870. He has published many addresses and reports.

**Eaton** (JOHN HENRY), politician, was born in Tennessee about 1790, and represented that State in the U. S. Senate (1818-29), was secretary of war under his friend Gen. Jackson (1829-31), governor of Florida Territory (1834-36), and U. S. minister to Spain (1836-40). He published a "Life of Jackson" (1824). Died Nov. 17, 1856.

**Eaton** (Gov. THEOPHILUS) was born in Stony Stratford, England, about 1591, and was the son of a clergyman. He was for a time English agent at the Danish court, and afterwards was a reputable merchant of London. He came to Massachusetts in 1637, and was chosen a magistrate. He went to New Haven in 1638, and was the first governor of the New Haven colony (1638-57). Died Jan. 7, 1658.

**Eaton** (WILLIAM), GENERAL, an American officer, born at Woodstock, Conn., Feb. 23, 1764, was educated at Dartmouth College, and entered the army in 1792. He became consul at Tunis in 1799, and displayed courage and enterprise in a successful expedition which he conducted against Derne. He was about to attack Tripoli, when his opera-

tions were suspended by a treaty of peace between the U. S. and Tripoli in 1805. The Massachusetts legislature granted him 10,000 acres of land in Maine as a reward for his valor. Died June 1, 1811.

**Eat'on Rap'ids**, R. R. junction, Eaton co., Mich. (see map of Michigan, ref. 7-I, for location of county), on Grand River, 24 miles N. N. W. of Jackson. It is noted for its mineral magnetic springs, visited annually by thousands. Pop. in 1870, 1221; in 1880, 1785; in 1884, 2131.

**Eat'onton**, city, on R. R., capital of Putnam co., Ga. (see map of Georgia, ref. 3-H, for location of county), 21 miles N. N. W. of Milledgeville. Pop. in 1870, 1240; in 1880, 1371.

**Eau Claire**, a city and R. R. centre, capital of Eau Claire co., Wis. (see map of Wisconsin, ref. 4-C, for location of county), at the junction of Eau Claire and Chippewa rivers, and head of navigation on Chippewa River, has foundries, saw-mills, planing-mills, grist-mills, graded schools, a Wesleyan seminary, two parks, carriage and railroad bridge over the Chippewa, carriage and railroad bridges over the Eau Claire, and wagon and boiler shops. The principal business is lumbering, over 150,000,000 feet being manufactured in the vicinity yearly, and over 250,000 feet in the city and its immediate vicinity. It is the chief commercial city of N. W. Wisconsin. Pop. in 1870, 2293; in 1880, 10,119.

**Eau de Cologne**, 5 dēh ko-lōn' (Fr. pron. 5 dēh ko'-lōn'), or **Cologne Water**, a celebrated liquid perfume invented by Farina of Cologne, where large quantities of it are prepared. It is also made in France and almost all other countries. The following recipe affords a good imitation of the original article: Take of alcohol 1 pint; of the oils of bergamot, orange peel, and rosemary, each 1 drachm; of bruised cardamom seeds, 1 drachm; orange-flower water, 1 pint: distil one pint from a water-bath.

The secret of the composition of true cologne has been carefully preserved by the Farina family, and the different business-houses of Cologne bearing the name of Farina prepare perfumes which are by no means identical in odor. One of the family is reported to have published in 1863 the following as the formula for genuine eau de cologne: Take of oil of lavender 4 ounces; purified benzoin, oil of rosemary, each 2 ounces; strong alcohol, 9 gallons: dissolve the oil and benzoin in the alcohol, and to the solution add successively oil of neroli, oil of young orange (*huile des petite grains*), oil of lemon, each 10.4 ounces; oil of sweet orange, oil of lime-peel, oil of bergamot, each 20.8 ounces; tincture of rose-geranum flowers, a sufficient quantity. Macerate for several weeks, and then bottle the mixture. There are hundreds of recipes, many of which are vouched for as the genuine, but all, no matter how complicated the formula, are simply aromatized alcohol. It is essential that the alcohol be perfectly deodorized and freed from fusel oil before use.

There is a class of cologne-water obtained by macerating aromatic substances in alcohol for some time, and then distilling the whole. But these waters require to be allowed a few months of rest to develop their better qualities. It is probable that the original article was of this class. Good colognes have a rich and permanent odor, not clearly alcoholic. Not one of the essential oils employed should be recognizable by the sense of smell. The best brands have long borne the name of Jean Maria Farina, and there are many claimants to the original proprietorship of the name. In Cologne all children who can lawfully bear that name are promptly baptized with it.

**Eau de Javelle**, or **Javelle's Solution**, a chlorinated solution of potash, analogous to Labarraque's solution of soda. It has bleaching and disinfecting properties, and is employed in removing fruit-stains, etc. from linen. When swallowed in considerable quantity it has remarkably poisonous effects.

**Eau de Luce** (*Aqua lucie*), a soapy liniment made of ammonia-water mixed with tincture of oil of amber, mastic, and sometimes Mecca balsam. It is employed in Europe and the East as a remedy for the bites of snakes and insects.

**Eau de Vie**, the French for BRANDY (which see).

**Eaux Bonnes**, 5 bon (i. e. "good waters"), a fashionable resort of France, department of Basses-Pyrénées, 22 miles S. of Pau. Here are warm sulphur-springs, which are efficacious for affections of the lungs and chest, the skin, etc.

**Eaux Chaudes, Les**, lāz 5 shōd, a village of France, 2 or 3 miles S. W. of Eaux Bonnes, has warm medicinal springs. The waters have a wide range of usefulness in the diseases of the lungs, joints, and skin.

**Eaux Vives**, a town of Switzerland, canton of Geneva, near the city of Geneva. Pop. 5875.

**Eaves** [Ang.-Sax. *efese*, "brim," "brink," "eaves"], in

architecture, the lowest edges of the inclined sides of a roof, which project beyond the face of the wall, so as to throw off the water from the roof. The eaves are sometimes provided with a gutter and a downpipe, or they discharge the water directly on the ground.

**Ebal**. See GERIZIM.

**Eb'bert** (ISAAC), D. D., a minister of the Methodist Episcopal Church South, born at Elliott's Mills, Md., Mar. 2, 1817. He graduated at Augusta College, and joined the Ohio Conference in 1840. At the division of the Church he joined the Kentucky Conference, the Memphis Conference in 1858, and in 1870 the Little Rock Conference. He died in Paducah, Ky., in 1872. T. O. SUMMERS.

**E'bel** (HERMANN WILHELM), one of the most prominent writers on Celtic language and literature, born in 1820, became in 1858 professor at the gymnasium in Schneidemühl. He published, among other works, a new edition of Zeuss's "*Grammatica Celtica*" (1871), and many essays in the "*Zeitschrift für vergleichende Sprachforschung*," and in Kuhn's and Schleierher's "*Beiträge zur vergleichenden Sprachforschung*," some of which have been translated into English under the title "*Celtic Studies*" (1863).

**Ebel** (JOHANNES WILHELM), born at Passenheim, in the province of East Prussia, Mar. 4, 1734, died at Hohenegg, in Wurtemberg, Aug. 18, 1861. He studied theology at Königsberg, and there came under the influence of the theosophist Schönberr. In 1807 he was appointed pastor of Hermsdorf, and in 1810 preacher and teacher of the Frederick College in Königsberg. His pronounced evangelical views, his warm advocacy of practical Christianity, and—perhaps more than anything else—his success as a preacher, roused the ire of the rationalistic clergy, and he was formally accused of heresy before the consistory of Berlin in 1815. The trial resulted in his complete acquittal, and in the following year he was chosen preacher of the old Town church in Königsberg, the largest church in the city. His enemies, however, did not cease their persecutions. The wildest rumors were circulated concerning Schönberr's peculiar ideas of relative dualism, the mystical application of those ideas to the relation of the sexes, the hideous pretexts for immorality derived from those doctrines, and so forth. It became common to designate Ebel's followers as *Muckers*—that is, "hypocrites." Finally, the ministerial rescript of 1826 against mysticism, pietism, and separatism presented an opportunity of making a direct attack on him. He was charged with having founded a sect, and deposed by the consistory in a rather arbitrary manner (1835). The deposition led to a civil suit, which lasted for several years and was finally decided in the supreme court of the country; yet although Ebel was acquitted, not only from all charges of immorality, but also from the charge of having founded a sect, he was nevertheless deprived of his office, and spent the rest of his life in retirement. Of his works, "*Die Gedeeliche Erziehung*" (Hamburg, 1825) has been translated into English (London, same year). (See J. I. MOMBERT, "*Life of Ebel*," New York and London, 1882.)

**Ebena'ceæ** [from the Lat. *eb'enus*, the "ebon tree" (see EBONY)], a natural order of exogenous plants (trees or shrubs), mostly natives of tropical countries. They are allied to Oleaceæ and to Aquifoliaceæ. They have alternate entire leaves and axillary flowers, which are monopetalous and usually unisexual. Some species of this order are remarkable for the hardness and blackness of their wood, as the ebony. This order comprises the American persimmon (*Diospyros Virginiana*) and the Chinese kaki, the fruit of which is edible, like that of many other species. There are eight or ten genera and numerous species, of which a large majority are tropical.

**Eb'ensburg**, on R. R., capital of Cambria co. Pa. (see map of Pennsylvania, ref. 5-D, for location of county), 26 miles W. of Altoona. Pop. in 1870, 1240; in 1880, 1123.

**E'ber** [Lat. *Ebe'rus*], (PAUL), a German Protestant theologian, born at Ritzingen Nov. 8, 1511. He became professor of Hebrew at Wittenberg in 1556. Among his works are an "*Exposition of the Gospels*" and a "*History of the Jews*" (1561). He was a friend of Melancthon. Died Dec. 10, 1569.

**Eb'erhard** (JOHANN AUGUST), D. D., a German philosopher, born at Halberstadt Aug. 31, 1739, studied theology at Halle. He gained distinction as an elegant writer, and became professor of philosophy at Halle in 1778. He was a rationalist in theology, and an adversary of Kant in philosophy. Among his best works are an "*Apology for Socrates*" (1772), a "*Theory of the Fine Arts and Sciences*" (1783), a "*General History of Philosophy*" (1788), and an excellent "*Dictionary of German Synonyms*" (6 vols., 1793-1802). Died Jan. 6, 1809.

**Eberhard** (KONRAD), a German sculptor and painter,



born in Bavaria Nov. 25, 1768. He became professor of sculpture in the Academy of Munich in 1816. Among his works are statues of St. George and St. Michael. His best works are in Munich. Died Mar. 12, 1859.

**Eberhard im Bart**, the first duke of Württemberg, born in 1445, became count of Württemberg when only fourteen years old, and led a wild and dissipated life, but reformed after a voyage to Palestine, and became one of the most popular princes of Germany. Having consolidated his part of Württemberg with that of his cousin, the emperor created him in 1495, in consequence of his services to the empire, duke of Württemberg. Died in 1496. (See PFISTER, "Eberhard im Bart, erster Herzog in Württemberg," 1822.)

**Eb'erie** (JOHN), M.D., an American medical writer, born in Hagerstown, Md., Dec. 10, 1787. He was professor in Jefferson Medical College, Philadelphia, and other medical colleges, and published a "Treatise on Therapeutics" and other works. Died at Lexington, Ky., Feb. 2, 1838.

**E'berling** (CHRISTOPH DANIEL), a German scholar and writer, born at Hildesheim Nov. 20, 1741. He devoted himself chiefly to geographical studies, and for his great work, "Geography and History of North America" (Hamburg, 5 vols., 1793-99), he was thanked by the Congress of the U. S. His valuable collection of books and maps relating to this subject was purchased in 1818 by Israel Thordike, and presented to Harvard College. Died June 30, 1817.

**E'bernburg**, a small town of Bavaria, on the river Nahe, 20 miles S. W. of Mentz. Here is an old ruined castle which belonged to Franz von Sickingen, and was used as a place of refuge by Melancthon and other Reformers.

**E'bers** (GEORG MORITZ), an eminent Orientalist, born in 1837, lectured since 1865 in Jena on the language, history, and monuments of ancient Egypt, and became in 1870 professor of Egyptian archæology in Leipsic. His chief work is a "Commentary on the Books of Moses" ("Die Bücher Moses. Sachlicher Commentar zu Genesis und Exodus," vol. i., 1868). He also published a novel, "The Daughter of an Egyptian King" (3d ed. 1873), which was translated into English, both in London and in the U. S.; an essay in Virchow and Von Holtzendorf's collection, "Hieroglyphisches Schriftsystem" (1871), and "Through Goshen to Sinai," an account of his travels in Palestine (1872). In this work he agrees with Lepsius, and differs with Robinson, in making Serbal the mountain of the Law.

**E'bert** (FRIEDRICH ADOLPH), a German bibliographer, born near Leipsic July 9, 1791. He became chief librarian of the royal library at Dresden in 1828. He published, besides other works, a "Universal Bibliographic Dictionary" (2 vols., 1821-30). Died Nov. 13, 1834.

**Ebert** (JOHANN ARNOLD), a German poet, born at Hamburg in 1723. He translated Young's "Night Thoughts" into German, and wrote several original poems. Died Mar. 19, 1795.

**Eberus**. See EBER.

**E'bingen**, a town of Württemberg, 39 miles S. W. of Stuttgart, has large velvet, hat, leather, and shoe factories. Pop. 5029.

**E'bianites** [Heb. *ebion*, "poor"], a name given at first to all Christians, on account of their poverty; then given by Gentile Christians to Jewish Christians; and finally restricted to heretical Jewish Christians. Irenæus (between 182-188 A. D.) is the first to mention the Ebionites by name, though they are thought to be the "heretics" spoken of by Hegesippus some years earlier. The Pharisaic Ebionites rejected the writings of Paul, insisted upon the observance of the Mosaic ritual, and were humanitarians and millenarians. The Essenic Ebionites were more speculative and ascetic. Ebionism dates, according to Gieseler, from about 107 A. D., and in the fifth century had wholly disappeared. The New Test. knows of no sects in the Jewish Church, though the Council of Jerusalem already reveals the existence of different tendencies. But after the destruction of Jerusalem they occur, more especially after the foundation of Ælia Capitolina by Hadrian. R. D. HITCHCOCK.

**Eblana**. See DUBLIN.

**E'boli**, or **Evoli** (anc. *Eburi*), a town of Italy, province of Salerno. It has an annual fair. Pop. 6946.

**Eb'oli** (AÑA DE MENDOZA), PRINCESS OF, a Spanish lady, born in 1535, became the wife of the prince of Eboli. She was a mistress of Philip II. of Spain, and was accused of complicity in the assassination of Escovedo. Schiller has idealized her character in his "Don Carlos."

**Eb'onite** [named from its resemblance to ebony], a hard black compound obtained by blending caoutchouc

with variable proportions of sulphur, generally about half its weight. It is called vulcanite in the U. S.

**Eb'ony** [Lat. *eb'enum*; Fr. *ébène*], a very hard, heavy wood of a deep black color, is the duramen or heart-wood of several species of *Diospyros*, a tree of the natural order Ebenaceæ. It is heavier than water, takes a good polish, and emits an aromatic odor when burned. Ebony of excellent quality is obtained from the *Diospyros eb'enum*, which abounds in Ceylon and attains a large size. The ebony which comes from Mauritius and Madagascar is the produce of the *Diospyros reticulata*. Another species of *Diospyros* produces the beautiful wood called CALAMANDER (which see). Ebony is also obtained from the *Diospyros tomentosa*, which grows in India. This wood is mentioned by Virgil as coming from India: "Sola India nigrum fert ebenum." (*Georgics*, book ii. 116.) It is used by cabinet-makers. Ebony is produced in Texas, Mexico, and California from the japote or persimmon (*Diospyros Texana*), but the trees are there only of small size, seldom more than twelve feet high, and with a trunk only a few inches in diameter.

**E'brard** (JOHANN HEINRICH AUGUST), a German Protestant theologian, born at Erlangen Jan. 18, 1818. He obtained the chair of theology at Erlangen in 1847, became in 1853 consistorial councillor in Spire, and resigned in 1861. He is a prominent representative of the orthodox school. Among his works are "Christian Dogmatics" (2 vols., 1852), "The Divine and Human in Christianity" (1844), and a "Manual of the History of the Christian Church and Doctrines" (4 vols., 1864-66).

**E'bro** [anc. *Ibe'rus*; Fr. *Èbre*], a river of Spain, rises in the Cantabrian Mountains near the northern boundary of the province of Burgos. It flows nearly south-eastward through the provinces of Navarre and Saragossa, forms the boundary between Huesca and Teruel, and enters the Mediterranean 22 miles E. of Tortosa. The chief towns on its banks are Logroño, Tudela, Saragossa, and Tortosa. Its whole length is about 350 miles. Its navigation is rendered difficult by rapids and rocks. A canal nearly 100 miles long has been cut along the Ebro below Tudela.

**Ebul'ioscope** [from the Lat. *ebull'io*, to "boil," to "bubble," and the Gr. *σκοπέω*, to "see"], an instrument for ascertaining the strength of alcohol or other distilled liquids by observing the boiling-point and the barometrical pressure at the time of the experiment. These instruments are of various kinds; those of Vidal and of Conant are the best known.

**Ebulli'tion** [from the Lat. *ebull'io*, to "boil"], boiling; the violent agitation into which liquids are thrown by the rapid escape of their vapor when sufficiently heated. Before ebullition begins, if sufficient heat is applied, the temperature of the liquid continually rises; but when the liquid reaches the "boiling-point"—the point at which ebullition is seen—the temperature is constant. Ebullition is caused by the rapid escape of vapor. (See BOILING-POINT.)

**Eburi**. See EBOLI.

**Eburoides**. See IVIGA.

**Ecbat'ana**, or **Agbatana** [Fr. *Ecbatane*], a celebrated ancient city, the capital of Media, was situated near the base of Mount Orontes (*Ehrend*), about 165 miles S. W. of Teheran. Its foundation is attributed by tradition to Semiramis, but according to Herodotus it was founded by Deioce (708 B. C.). It stood on a conical hill, and was surrounded by seven concentric walls, each of which was higher than the next outer one. It was the favorite summer residence of the kings of Media and Persia, who had here a magnificent palace and a citadel of immense strength. Alexander the Great captured it in 331 B. C., and obtained a very large booty. This city is called *Achmetha* in the book of Ezra. Some recent writers believe it to be the modern HAMADÂN (which see). Rawlinson attempts to identify it with the ruined *Takht-i-Soleimân*.

**Eccaleo'bion** [from the Gr. *ἐκκαλέω βίον*, "I call out life"], a mechanical contrivance for hatching eggs by artificial heat. It consists of an oven with shelves, on which the eggs are placed, ranged one above the other. The temperature is kept of uniform warmth by steam or hot water conveyed in pipes. A somewhat similar machine has long been employed in Egypt with success.

**Ec'ce Ho'mo** [Lat., meaning "Behold the Man!"], the words uttered by Pilate (John xix. 5) when he brought Jesus forth to the people. Monkish tradition points out the spot, now marked by an arch called *Ecce Homo*, only the piers of which appear to be ancient. It spans the *Via Dolorosa* at its highest point, and has "a narrow gallery or chamber on the top." "Ecce Homo" is the name given to pictures of Christ crowned with thorns. Correggio's, in the National Gallery, London, is generally considered the best.

In 1864, Prof. Seeley, then of London, now of Cambridge, England, published a book entitled "Ecce Homo," which made a great stir.

**Eccentric** [from the Gr. *ἐκ*, "out of," and *κέντρον* (Lat. *centrum*), a "point," a "centre"], in machinery, a device by which circular motion gives rise to "to-and-fro" motion. In one of the forms of the eccentric a disk is made to revolve around a point not in its centre. The disk turns in a metallic collar, which is thrown back and forth by the revolutions, and to the collar a rod is attached which receives the required to-and-fro motion. This arrangement is often used to give motion to sliding valves in steam-engines.

**Eccheleensis.** See ECHELLENSIS.

**Ec'cles** (HENRY), Q. C., a Canadian barrister, born at Bath, England, in 1817, was educated by his father, an accomplished army officer, long resident in Canada. He was called to the bar in 1842, became queen's counsel in 1856, and attained the highest rank in his profession. Died at Toronto Nov. 22, 1863.

**Ec'clesfield**, a parish of England, in the West Riding of Yorkshire, 5 miles N. of Sheffield. It has manufactures of cutlery, linen, and nails. Coal mines are worked in the vicinity. Pop. in 1881, 21,156.

**Eccle'sia** [Gr. *ἐκκλησία*, an "assembly," from *ἐκ*, "out," and *καλέω*, to "call"], the Latin name for *ἐκκλησία* (which see).

**Ecclesia** [for etymology see above], the great assembly of the Athenians, in which every free citizen might vote. Although possessing supreme authority in the state from a very remote period, it was after a time seldom convened, so that the management of the state fell into the hands of the archons, who were elected from the nobles. Solon afterwards appointed it to meet four times every thirty-five days, besides extraordinary occasions on which it might be assembled. The subjects discussed in the ecclesia were restricted by Solon to such as had passed through the senate of five hundred, but this rule was not strictly observed. The magistrates who managed these assemblies were the *prytanes*, *prohedri*, and *epistates*; the first convened the people, the second proposed the subjects on which they were to decide, the third presided over the whole. The name *ecclesia* was afterwards given generally to any public assembly regularly convoked.

**Ecclesiastes** [Septuagint Gr. *Ἐκκλησιαστής*, the "preacher," from *ἐκκλησία*, an "assembly"; Hebrew *Kohēleh*, a noun feminine in form, meaning "preacher" or "gatherer"], a canonical book of the Old Testament. Its author is called a "Kohēleh" (i. e. the "preacher"), and he is described as king in Jerusalem and son of David—i. e. Solomon. Since the time of Grotius (1644) the Solomonian origin of the book has been denied by continental critics generally, even by orthodox writers like Hengstenberg, Keil, and Delitzsch, the dates assigned ranging from 536 to 150 B. C. Its post-Solomonic origin has been argued (1) from the Aramaic and other foreign words which occur in it; (2) from the sentiments expressed. On the other hand, the old traditional ascription of the book to Solomon has been defended by such scholars as Schelling, Van Essen, Hahn, Pusey, Wordsworth, and Taylor Lewis. The two leading ideas of the Preacher are the vanity of earthly good and the certainty of judgment. The alleged epicureanism of several passages, so much emphasized by some critics, is thought by others to be simply ironical.

**Ecclesiastical Commissioners**, in England and Wales, are the archbishops, bishops, the principal deans, several of the principal judges, the chief baron of the exchequer, the master of the rolls, and twelve lay members, all churchmen, who are appointed for the purpose of examining the state of dioceses and the episcopal revenues, of uniting or dividing parishes (when expedient), and of carrying out other measures for the benefit of the Established Church. Much popular indignation has been excited by their large expenditures of money in renewing and improving the bishops' palaces; and it is evident, whatever may be the good or evil they have accomplished, that there is a large possibility that their powers may be misused. The commission was established in 1835.

**Ecclesiastical Courts**, in England and Wales, until 1857, had important jurisdiction not only in marriage and divorce cases, and the probate of wills, but in some cases they could exercise the discipline of the Church for heresy, incontinence, defamation, and other faults, though in more recent times the latter duties were exercised only in cases where clergymen were accused. It is said that the publication of Dickens's novel "David Copperfield" hastened the transfer of non-ecclesiastical business from these courts to those of the civil law. There are (1) "peculiar courts" of many grades, from the royal to the parochial; (2) archdeacons' courts; (3) commissaries' courts; (4) diocesan courts; and (5) provincial courts at

London and York. (See ARCHES, COURT OF; DELEGATES, COURT OF; and DOCTORS' COMMONS.) In civil causes their jurisdiction is virtually at an end.

**Ecclesiastical History.** I. *Nature and Object.*—Ecclesiastical history or church history is one of the four divisions of theological science—viz., exegetical (or biblical), historical, systematic (or philosophical), and practical (homiletical and pastoral) theology. Of these divisions the historical is the most extensive in bulk, and furnishes material to all the rest. In importance it yields only to exegetical theology, which has to do with the interpretation of the Holy Scriptures. Historical theology begins with the creation of man in the image, and for the glory, of God, and comes down to the present as its relative goal, but will go on till the general judgment or the final settlement of all the affairs of men. It embraces within these limits all that belongs to the religious development of the race within the line of revelation—the origin, progress, and fortunes of the kingdom of God, and its relations to the kingdoms of this world. Since the fall of man it has assumed the character of a history of redemption (and is so represented, for instance, by Jonathan Edwards in his well-known popular book). In a narrower sense, church history is the history of Christianity from the birth of Christ, or, according to others, from the day of Pentecost (A. D. 30), when Christianity first assumed an organized form distinct from Judaism, down to the present time.

II. *Church History and Secular History.*—They differ as Church and State, as Christianity and humanity, as the order of grace and the order of nature. Yet they are inseparably connected and interwoven, and the one cannot be understood without the other. Among the Jews the spiritual and secular history together form one history of theocracy. Both currents intermingle in the old Byzantine empire, in the European states and the Latin Church during the Middle Ages, in the period of the Reformation, during the colonial period of America, and in all countries where Church and State are united. Gibbon's "History of the Decline and Fall of the Roman Empire" is in great part also a "History of the Rise and Progress of Christianity," which survived the fall of the Old and New Rome, and went forth to conquer the barbarian conquerors by Christianizing and civilizing them. Every history of the papacy is also a history of the German empire, and *vice versa*. No history of the sixteenth century can be written without constant reference to the Protestant Reformation and the Roman Catholic reaction. (Compare, e. g., Hume, Macaulay, and Burnet for England; Ranke for Germany; Motley for Holland.) The Puritan settlements of New England are the beginning alike of the ecclesiastical and secular history of North America. In modern times the tendency is more and more towards separation of the spiritual and temporal, the ecclesiastical and civil powers; nevertheless, the Church will always be more or less influenced by the surrounding state of civil society, and must adapt itself to the wants of the age and progress of events; while, on the other hand, the world will always feel the moral influence, the restraining, ennobling, stimulating, purifying, and sanctifying power of Christianity, which works like a leaven from within upon all ramifications of society.

III. *Periods and Epochs.*—These represent the different stages in the religious development of the race, and must not be arbitrarily made according to a mechanical scheme (such as the centurial division adhered to by Mosheim), but taken from the actual stops or starting-points (*ἐποχῆς*) and circuits (*περίοδος*) of the history itself. The following are the natural divisions:

A. *Sacred or Biblical History*, the history of the Divine revelation from the creation to the close of the apostolic age, running parallel with the Scriptures from Genesis to Revelation. Here we must distinguish the dispensation of the Law and the dispensation of the Gospel, or the history of the Old Testament religion and of that of the New Testament religion.

(a) Under the *Old Dispensation*, from the creation down to John the Baptist. Subdivisions: The antediluvian period; the patriarchal period; the Mosaic period (the establishment of the Jewish theocracy); the period of the Jewish monarchy and prophecy; the period of the Babylonian exile; the period of the restoration, the Maccabees, the Roman rule till Herod the Great (or down to the destruction of Jerusalem).

(b) Under the *New Dispensation*. Christ and the apostles, or primitive and normative Christianity in its divine-human founder and inspired organs. Subdivisions: The preparatory mission of John the Baptist; the life of Christ; the founding of the Church by the apostles; the labors of Peter, Paul, and John.

B. *Christian History*, or *Church History* proper, from the close of the apostolic age to modern times. Subdivisions:

(a) History of *Ancient Christianity*, embracing the first six centuries to Gregory I. (590): Græco-Latin, patristic, Catholic, the common stock from which the Greek, the Roman, and the Protestant churches have sprung. Subdivisions: (1) The apostolic age (see A b); (2) the age of persecution to Constantine the Great and the Council of Nicea (325); (3) the age of patriarchs, Christian emperors, and oecumenical councils (to 590). Some historians carry the age of ancient Christianity down to Charlemagne, A.D. 800 (so as to include John of Damascus, the last of the Greek Fathers), and the beginning of the German Roman empire and the temporal power of the papacy. In this case we have a fourth subdivision, from Gregory I. to Charlemagne (A.D. 590 to 800).

(b) History of *Medieval Christianity*, from the close of the sixth to the beginning of the sixteenth century, or from Gregory I. (A.D. 590), the first medieval pope, to Luther (A.D. 1517). Character: The Greek and Roman churches, divided, pursue their independent course; the Latin Church extending west among the Celtic and Germanic races, the Greek north-east among the Slavonians (in Russia); conversion of the barbarians; conflicts with Mohammedanism; the Crusades; rise and progress of the papacy, scholasticism, mysticism; the reformatory councils of Pisa, Constance, and Bâle; revival of letters; invention of printing; discovery of America; biblical theology; forerunners of Protestantism (Wycliffe in England, Huss in Bohemia, Savonarola in Italy, Wessel in Holland, etc.). Subdivisions: (1) The missionary period of the Middle Ages, from Gregory I. to Hildebrand or Gregory VII. (590 to 1049); (2) the palmy period of the papacy, from Gregory VII. to Boniface VIII. (1049 to 1294); (3) the decay of the mediæval papacy and scholasticism, and the preparation for the Reformation, from Boniface VIII. to Leo X. or Martin Luther (1294-1517).

(c) History of *Modern Christianity*, from the Reformation of the sixteenth century to the present time. Protestantism and Romanism; founding of the various evangelical churches, the Lutheran, Calvinistic, Anglican, etc.; progress of Christianity among the Teutonic races; restoration of Romanism; Jesuitism; Jansenism; Puritanism and Methodism in England; Pietism and the Moravians in Germany; settlements in North America; growth of the Greek Church in Russia, and of the Protestant in the United States; revival and triumph of ultramontane Romanism; conflict of faith with modern rationalism and infidelity; immense activity in theology, literature, missions, and all forms of Christian philanthropy. Subdivisions: (1) The age of the Protestant Reformation and the Roman Catholic counter-reformation or reaction (from 1517 to 1600, perhaps better to 1648); (2) the age of scholastic and polemic confessionism in conflict with non-conformity and subjective piety (from the middle of the seventeenth to the middle of the eighteenth century); (3) the age of revolution and revival, and conflict between Christianity and various forms of skepticism and secularism (from deism in England and the French Revolution to our time).

IV. *Sources*.—They are mostly written, in part unwritten. The written sources include (a) the official documents of ecclesiastical and civil authorities, such as acts of councils, creeds, liturgies, hymn-books, church laws, papal bulls and encyclicals; (b) the writings of the personal actors in the history, and contemporary observers and reporters, such as the Fathers for ancient Christianity, the Schoolmen for mediæval, the Reformers and their opponents for the Reformation period; (c) inscriptions on walls, pictures, churches, tombstones, and other monuments.

The unwritten sources are works of Christian art, as churches, chapels, pictures, sculptures, crosses, crucifixes, relics, and other remains which symbolize and embody the spirit of Christianity in different epochs and phases. Thus, the Roman catacombs, with their vast extent, their solemn darkness, their labyrinthine mystery, their rude epitaphs and sculptures, their symbols of faith and their relics of martyrdom, give us a lifelike idea of the Church in the period of persecution, its trials and sufferings, its faith and hope, its simple worship and devoted piety. "He who is thoroughly steeped in the imagery of the catacombs will be nearer to the thoughts of the early Church than he who has learned by heart the most elaborate treatises of Tertullian or Origen." The basilicas are characteristic of the Nicene, the Byzantine churches of the Byzantine age, the Gothic cathedrals of the palmy days of the Middle Ages, the Renaissance style of the revival of letters. Even now most churches and sects can be best appreciated in the localities and in view of the monuments and the people where they originated or have their centre of life and action.

V. *Duty of the Historian*.—He must (1) master the sources in the original languages in which they were written (Greek, Latin, and the modern languages of Europe); separating the genuine from the spurious, the original from corrup-

tions and interpolations; sifting the truth from falsehood, the facts from fiction and partisan judgment; comparing the accounts of all actors, friend and foe, narrator, eulogist, advocate, and antagonist, whether orthodox or heretic, whether Christian, Jew, or Gentile; aiming in all this laborious investigation at "the truth, the whole truth, and nothing but the truth." (2) He must then reproduce the clearly ascertained facts and results of his investigation in a faithful and lifelike narrative, so as to present the objective course of history itself as it were in a miniature photograph. The genuine writer of history differs as much from the dry chronicler of isolated facts and dates as from the novelist; history has a body and a living soul, and its facts are animated by thoughts and principles. The historian must exhibit both; he must be able to particularize and to generalize, to descend into minute details, and to take a comprehensive bird's-eye view of whole ages and periods. He must have a judicial mind, which deals impartially with all persons and events coming before his tribunal, and is swayed by no consideration but that of strict justice. This aim should be constantly kept in view, although in the limited and imperfect state of our information, and the inability to emancipate one's self from all the influences of education and prevailing opinions and prejudices, we can expect no more than an approximate solution of the difficult task. It is the exclusive privilege of the Divine Mind to view all things *sub specie eternitatis*, to see the end from the beginning. We can only know things consecutively and in fragments. But history is its own best interpreter, and the farther it advances the more we are able to understand and appreciate the past.

VI. *Value*.—The study of history enables us to understand the present, which is the fruit of the past and the germ of the future. It is the richest storehouse of wisdom and experience. It is the best commentary of Christianity. It is full of comfort and encouragement. It verifies on every page the promise of the Saviour to be with his people always, and to build his Church on a rock against which the gates of hell cannot prevail. It exhibits the life and power of Christ in all its forms and phases, and the triumphant march of his kingdom from land to land and generation to generation. Earthly empires, systems of philosophy have their day, human institutions decay, all things of this world bloom and fade away like the grass of the field; but the Christian religion has the dew of perennial youth, survives all changes, makes steady progress from age to age, overcomes all persecution from without and corruption from within, is now stronger and more widely spread than ever before, directs the course of civilization, and bears the hopes of the human race. The history of the world is governed in the interest and for the ultimate triumph of Christianity. The experience of the past is a sure guarantee of the future.

VII. *Literature*.—(1) Works on *General Church History*: EUSEBIUS (died 340), "Church History," from the birth of Christ to Constantine the Great (324). His successors in the Greek Church: SOCRATES, SOZOMEN, THEODORET. The "Magdeburg Centuries," by MATTHIAS FLACIUS (died 1575) and other Lutheran divines of Germany (Bâle, 1559-74), covering thirteen Christian centuries in as many volumes, the first history from a Protestant point of view in opposition to the claims of Romanism. The "Ecclesiastical Annals" of CÆSAR BARONIUS (died 1607), in 12 folio volumes, published at Rome, 1588 *sqq.*, to which were added the continuations of Raynaldus, Spondanus, and others—a work of astounding learning and industry, but altogether in the interest of the papacy. TILLEMONT (died 1698), in his invaluable "Mémoires" (Paris, 1693-1712, 16 vols.), wrote the history of the first six centuries from the sources, in biographical style and in the spirit of the more liberal Gallican Catholicism. GOTTFRIED ARNOLD (died 1714), of the Pietistic school of Spener, in his "Impartial History of the Church and of Heretics" (Frankfort, 1699 *sqq.*, 4 vols. fol., to A.D. 1688), advocated the interests of practical piety and the claims of heretics and schismatics and all who suffered persecution from an intolerant hierarchy and orthodoxy. J. L. MOSHEIM (died 1755) wrote his "Institutes of Ecclesiastical History" (in Latin, Helmstädt, 1755, and often since in several translations) in the spirit of a moderate Lutheran orthodoxy, with solid learning and impartiality, in clear style, after the centennial arrangement of Flacius, and furnished a convenient text-book which (especially in Murdock's translation) has continued in use in England and America even to this day. СМЯСЛОВИЧЪ'S "Christian Church History" (Leipsic, 1768-1810, in 45 vols.) is a far more extensive and far less readable work, but invaluable for reference, full of reliable information from the sources; it forsakes the mechanical centennial division, and substitutes for it the periodic arrangement. HENKE (died 1809) followed with a thoroughly rationalistic work in 9 vols. (1788-1810). NEANDER (professor of church history in Berlin, died 1850) marks an epoch in this branch of theological literature, and

by his truly Christian, conscientious, impartial, truth-loving, just, liberal, and withal thoroughly learned and profound spirit and method, he earned the title of "father of church history." His "General History of the Christian Religion and Church" (Hamburg, 1825-52, 11 vols.), though incomplete (it stops with the Council of Bâle, 1430) and somewhat diffuse and monotonous in style, is an immortal monument of genius and learning; it pays special attention to the development of Christian life and doctrine, and is edifying as well as instructive. It has been naturalized in England and America by the translation of Prof. Torrey (Boston, 1847-52, 5 vols.; 12th ed. 1872), and will long be studied with profit. Equally valuable, though of an altogether different plan and spirit, is the "Church History" of GIESELER (Bonn, 1824-56), translated from the German first by Cunningham in Philadelphia (1846), then by Davidson and Hull in England, and revised by H. B. Smith of New York (1857-80, 5 vols.). The text is merely a meagre skeleton of facts and dates, but the body of the work consists in carefully selected extracts and proof-texts from the sources, which furnish the data for an independent judgment. BAUR's "Church History" (partly published after his death, Tübingen, 1861, in 5 vols.) is distinguished for philosophic grasp, critical combinations, and bold conjectures, especially in the treatment of the ancient heresies and systems of doctrine. HAGENBACH's "Church History" (now completed in 7 vols., Leipsic, 1873) is an admirable digest of the vast material for the lay reader. SCHAFF's "History of the Christian Church" (New York, 1859-67, in 3 vols.; German ed. Leipsic, 1868) is the first general church history prepared on American soil, but not yet completed (two more volumes are in course of preparation). Of English church historians, WADDINGTON represents the general history in six volumes to the Reformation, inclusive (1835 *sqq.*); ROBERTSON in three (1834 *sqq.*) to the close of the Middle Ages. The older work of MILNER (died 1797) is written in popular style for edification. Of the numerous compends of church history in one or more volumes, we mention those of DÖLLINGER, MÖHLER, RITTER, ALZOG, HERGENRÖTHER, among Roman Catholics; HASE, NIEDNER, GUERICKE, KURTZ, EBBARD, HERZOG, among Protestants.

(2) Works on special departments of church history. On Old Testament history: MILAN ("History of the Jews"), EWALD ("History of Israel," 7 vols., translated by Russell Martineau), STANLEY ("History of the Jewish Church"). Life of Christ: NEANDER (German and English), LANGE (German and English, 6 vols.), PRESSENSÉ (French and English), ELLICOTT, ANDREWS, EWALD, STRAUSS (mythical theory), RENAN (legendary theory), KEIM, WEISS, FARRAR, GEIKIE, EBERSHEIM. History of the Apostolic Church from A.D. 30 to 100: NEANDER, LANGE, THIERSCH, SCHAFF, REUSS, CONYBEARE, HOWSON, and FARRAR (on St. Paul). History of Christian Doctrines, or Dogmatic History: PETAVIUS (R. C.), MÜNSCHER, BAUMGARTEN CRUSIUS (2 vols.), HAGENBACH (translated by Buch, revised by H. B. Smith, New York, 1861, 2 vols.), NEANDER (1 vol., posthumous), BAUR (Leipsic, 1867, posthumous, 3 vols.; also a compend in 1 vol.), SHEDD (New York, 1863, 2 vols.), BECK, SCHWANE (R. C.); "History of Protestant Theology," by DORNER (Munich, 1867; also in English, Edinburgh, 1871); "History of Roman Catholic Theology," by WERNER (Munich, 1866). History of special doctrines: BAUR on the "Trinity and Incarnation" (3 vols.), on the "Atonement" (1 vol.); DORNER on "Christology" (2 vols.; also in English); EBBARD on the "Lord's Supper." History of Councils: MANSI, HARDUIN, WALCH, FUCHS, HEFELE. History of Church Polity: PLANCK, RITSCHL, SUGENHEIM, GREENWOOD. History of Missions: BLUMHARDT, WIGGERS, and numerous monographs. Patrology and Patristics: the Benedictine editions, and large collections of the works of the Fathers by GALLANDI, MIGNÉ, etc. The biographical and literary works on the Fathers, by TILLEMONT, DU PIN, CEILLIER, CAVE, LUMPER, MÖHLER, FESSLER, ALZOG, BÖHRINGER. Separate biographies of Tertullian and Chrysostom, by NEANDER; Justin Martyr, by SEMISCH; Origen, by REDEPENING and THOMASJUS; Augustine, by BINDEMANN; Jerome, by ZÖCKLER. Ecclesiastical Antiquities, by BINGHAM, AUGUSTI, SIEGEL, SMITH, and CHEETHAM. On Ancient Christianity: MOSHEIM, MILMAN, SCHAFF, PRESSENSÉ; "History of the Greek (Eastern) Church," by DEAN STANLEY (London and New York, 1862); "History of Latin Christianity," by DEAN MILMAN (to the Pontificate of Nicholas V., London and New York, 1860 *sqq.*); "History of the Crusades," by MICHAUD, WILKIN, SPITTLER. The Papacy: WALCH, PLANCK, SPITTLER, GREENWOOD ("Cathedra Petri"), RIDDLE, BAUER, WYLLIE; also many monographs on single popes, as VOIGT on Gregory VII., HURTER on Innocent III. (4 vols.), REUTER on Alexander III. (3 vols.). Scholasticism and Mysticism of the Middle Ages: SRÖCKL ("History of the Philosophy of the Middle Ages," Mayence, 1864 *sqq.*, 3 vols.); GÖRRES ("History of Christian Mysticism," 1836-42, 4 vols.); and

the monographs of HASSE on Anselm of Canterbury, WERNER and VAUGHAN on Thomas Aquinas, NEANDER and MORISON on St. Bernard, CHRISTLIEB on Scotus Erigena, LIEBNER on Hugo of St. Victor. History of Monasticism: SPITTLER, MÜNCH, DÖRING, MONTALEMBERT, and especially the colossal biographical work of the Jesuits, "Acta Sanctorum" (for every day in the year, not yet completed). Revival of Letters and Forerunners of the Reformation: ULLMANN on the "Reformers before the Reformation" (2 vols., Hamburg, 1841); VAUGHAN on John Wycliffe (London, 1854); LECHLER on Wycliffe (Leipsic, 1873, 2 vols.); HELFERT and GILETTE on Huss and Jerome of Prague; MEIER, RUDELBACH, PERRINS, MADDEN on Savonarola; MÜLLER on Erasmus; STRAUSS on Ulrich von Hutten; SEEBOHM on "The Oxford Reformers, John Colet, Erasmus, and Thomas More" (London, 1869). "History of the Reformation," by MARHEINEKE, NEUDECKER, RANKE, MERLE D'AUBIGNÉ, DÖLLINGER (R. C.), FISHER (just published, New York, 1873), KAHNIS (1873); not to mention the numerous monographs on the Reformers and the Luther and Zwingli literature of 1833. On the English Reformation in particular: STRYPE ("Ecclesiastical Memorials and Annals of the Reformation"; also his "Memorials of Cranmer, Parker, Grindal, Whitgift," etc.); BURNET, COLLIER (non-juror), DODD (R. C.), CARDWELL, FULLER, SOAMES, FROUDE (from the fall of Wolsey to the death of Elizabeth), PERRY, GEIKIE, etc. On the Reformation in Scotland: BUCHANAN ("Rerum Scoticarum Historia"), J. KNOX (till 1567), CALDERWOOD, ROBERTSON, M'CRIE ("Life of John Knox"), HETHERINGTON, RUDLOFF, STANLEY, CUNNINGHAM.

PHILIP SCHAFF.

#### Ecclesiastical Law. See CANON LAW.

**Ecclesiasticus** [Gr. *ἐκκλησιαστικός*, probably meaning the "church-book," because anciently read in "church" (*ἐκκλησία*)], or the **Wisdom of Jesus the Son of Sirach**, a book considered apocryphal by Jews and Protestants, and received as canonical by the Roman Catholic and Greek churches. By the Anglican Articles it is recommended to be read for edification. It appears to have been written in Hebrew by one Jesus (Joshua), the son of Sirach, at Jerusalem, at an uncertain date.

**Ecclesiology** [Gr. *ἐκκλησία*, "church," and *λόγος*, "treatise"], a word denoting properly the doctrine of the Church and its government, but commonly applied to the building and furnishing of church edifices. The subject has attracted much attention in Great Britain of late years. A journal ("The Ecclesiologist") is published, and there is "A Handbook of English Ecclesiology" (1847).

#### Eccleston (JAMES HOUSTON). See APPENDIX.

**Echellen'sis** (ABRAHAM), a learned Maronite, born at Ekel in Syria. He was professor of Arabic and Syriac at Rome, and removed about 1630 to Paris, where he assisted in the edition of Le Jay's polyglot Bible. He was the author of an "Oriental Chronicle." Died in Italy in 1664.

**Échelon** [a French word signifying the "round" of a ladder], a military term applied to a certain arrangement of troops when several divisions are drawn up in parallel lines, each to the right or the left of the one preceding it, like "steps" or the rounds of a ladder, so that no two are on the same alignment. Each division by marching directly forward can form a line with that which is in advance of it.

#### Echeneididæ. See APPENDIX.

**Échevin** [Lat. *scabini*] in France from the time of Charlemagne to the Revolution (1789), a royal officer of justice and of finance, whose duties were various in different periods. For the last six hundred years of the duration of the office it was chiefly exercised in the cities. The échevins of Paris were assessors, and had authority as magistrates in some kinds of civil business.

**Echid'na** [Gr. *Ἐχίδνα*], in Greek mythology, a monster, half serpent and half woman, supposed to be the daughter of Tartarus, and the mother of Cerberus and the Chimæra.

**Echidna**, a genus of Australian quadrupeds belonging to the order Monotremata. The *Echidna* is covered with spines, and is nearly as large as a hedgehog. It deviates in a remarkable manner from the typical structure of the Mammalia in the organization of the generative and osseous systems. The muzzle is elongated and slender, and the mouth destitute of teeth. The feet are armed with claws, which enable the *Echidna* to burrow with great rapidity. It feeds on ants, which it catches by means of a long adhesive tongue.

**Echi'mys** [from the Gr. *ἐχίος*, a "hedgehog," and *μῦς*, a "mouse"], a South American genus of rodent mammals called "spiny rats." They are about the size of large rats, and have numerous spines scattered through their hair. They are of six or eight species, and are a kind of link between the rats and the true porcupines.

**Echin'ades** [Gr. *ἔχινάδες*, from *ἔχινος*, a "hedgehog," alluding to their irregular, sharp outlines], the ancient Greek name of a group of islands of the Ionian Sea, off the mouth of the Achelous. Some of the ancient islands have been joined to the mainland by alluvial deposits. The islands are small, rocky, and unimportant. Seventeen of these islands have names, but only nine are cultivated. They are now called Kurtzelari Islands, and the largest is named Petalá; but Oxiá, Makrí, and Vrómona are the most important. Lat. of the S. end of Oxiá, 38° 17' N., lon. 21° 6' E.

**Ech'inate** [from the Gr. *ἔχινος*, a "hedgehog"], in botany, furnished with rigid hairs or prickles, as the husk of the chestnut.

**Echin'ida** [named from *Echin'us*, one of the genera], called also **Ech'inoids** or **Sea Ur'chins** (urchin being the old English for hedgehog), an order of echinoderms with calcareous shells more or less globular, and composed of symmetrically-arranged plates, bearing tubercles armed with movable spines. They have no arms like star fishes, but the five radiations are distinctly marked by holes, through which the ambulacra are protruded. These holes occur in the alternate plates. These animals are divided into regular sea urchins (*Cidaridæ*), often spherical or oval, and irregular sea urchins, of which there are several families. Many species of echinoids occur in the American seas.

**Echinoder'mata** (plu.), or **Ech'inoderms** [from the Gr. *ἔχινος*, a "hedgehog," and *δέρμα*, a "skin"], the highest class of animals of the Cuvierian sub-kingdom Radiata, having a tough covering, containing more or less calcareous matter, or composed of pieces which are either movable or bound together and covered with spines (whence the name); the body divided into two parts, the actinal (or oral) and the abactinal portion. Along certain of the rays are regular rows of tube-like suckers (ambulacra) used in locomotion. The muscular system is well developed. The internal vessels, etc. have walls of their own. The principal nerve-centre is a peri-oesophageal ring; all are oviparous. Echinoderms have their parts in multiples of five. The living species are all marine. They are divided into five orders—the holothurians, the sea urchins (echinoids), the star fishes (asteroids), the ophiuroids, and the crinoids. To these some append the sipunculoids as a sixth order.

**Echi'nus** [Gr. *ἔχινος*, a "hedgehog," a name applied to

ber of European sea-urchins, several species of which are used as food. Forbes counted on one of these animals more than 300 polygonal plates, over 4000 spines, and nearly 1900 suckers.

**Echinus**, in architecture, a moulding consisting of a series of egg-shaped or alternately egg- and anchor-shaped ornaments. It especially appears as an ornament of the Doric capital or cushion, and is one of the characteristic decorations of early Greek art. It is said to have taken its original form and its name from the chestnut and its spiny burr.

**Echmiedzin'**, or **Eschmiazin**, a celebrated Armenian monastery in the province of Erivan, in Asiatic Russia, 15 miles W. of Erivan. It is the residence of the catholicoi or head of the entire Armenian Church. Twelve archbishops and bishops, four vartabeds, about sixty clerical and five hundred lay monks live in the monastery, the archbishops, bishops, and vartabeds constituting the synod of the catholicoi, which must be consulted on all important occasions. The monastery was founded in 524.

**Ech'o** [Gr. *Ἠχώ*], in classic mythology, was a nymph who aided Jupiter in escaping the watchfulness of Juno, by detaining the latter with her amusing talkativeness; but that goddess, discovering the deception, ordained that she should not be able to speak until some person had spoken to her, nor to be silent after any one had spoken to her. Cherishing for Narcissus a passion which was not requited, she pined away until nothing remained of her but her voice.

**Echo** [for etymology see preceding article], the reflection of sound from a distant surface. Several conditions must be fulfilled before an echo can be produced. The ear must be situated in the line of the reflection; and in order that the person who emits the sound may himself hear the echo, this line must be perpendicular to the reflecting surface, but if there are several such surfaces the sound may be brought back by a series of successive reflections. The opposing surface must be at a certain distance from the ear, for if the direct and reflected sounds succeed each other with great rapidity, they are confounded. Thus, vaulted caves and large rooms have a strong resonance, but produce no echo.

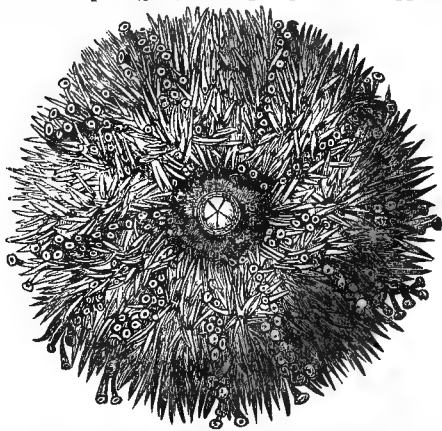
Sound passes through the atmosphere at the rate of about 1125 feet in a second; hence, a person placed at half that distance would hear the echo exactly one second after the sound was emitted by him. The least distance of the reflecting surface from the point whence the sound is emitted must be about fifty feet.

Unless the surface reflecting the sound is of considerable extent, the echo will be too feeble to be heard. Some concavity in the surface by which diverging rays of sound are concentrated at the point where the echo is audible, is favorable, if not absolutely essential, to the production of echoes. It is a property of the ellipse that every sound proceeding from one of its foci and impinging against the curve is reflected into the other focus; whence two persons placed in the two foci of an elliptic chamber may converse with each other in a whisper, and not be heard by those who are in the other parts of the room. Thus, walls or buildings approaching the elliptic form return sounds with great force and distinctness. The faintest sound is conveyed from one side of the "whispering gallery" of St. Paul's, London, to the other, but is not heard at any intermediate point. Some echoes are remarkable for their frequency of repetition. An echo in the Simonetta palace, near Milan, is said to repeat the report of a pistol sixty times. To the same kind of multiple, or repeating, echo belongs that of Killarney. The phenomenon is caused either by the occurrence of several reflecting surfaces at different distances in the direction of the sound, and with sufficient interval between them, or by two surfaces being inclined to each other in such a way as to give repeated reflections of the sound from the one to the other, like the mirrors of the kaleidoscope. The number of syllables that any particular echo will repeat depends upon the distance the sound has to traverse: an echo in Woodstock Park, England, repeats seventeen syllables.

Echo is the repetition of a musical phrase. When written for the organ, it can be produced with facility by the different stops.

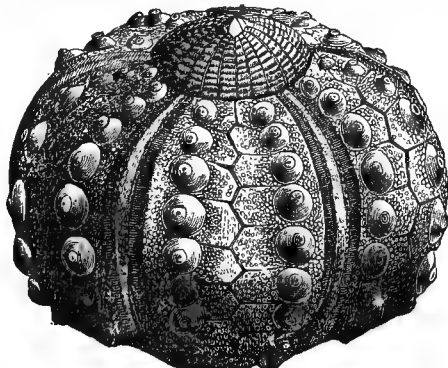
**Ech'o Cañ'on**, Utah Territory, is a remarkable ravine or defile visible to passengers on the Union Pacific R. R., 975 miles from Omaha. It is in Summit co., and is enclosed between high vertical walls of rock of an almost overwhelming impressiveness. The scenery is of surprising grandeur and beauty.

**Ecija**, &th'e-há (anc. *As'tigi*), a city of Spain, in Andalusia, on the river Genil, about 50 miles E. N. E. of Seville. It is well built, and has numerous churches, convents, and hospitals; also manufactures of linens and coarse woollen



Shell of Sea Urchin (*Echinus*), with the spines.

this genus on account of its spines], a genus of Echinodermata, of the family Cidaridæ, comprising a large num-



*Echinus*, divested of its spines.



fabrics. On the border of the river is an *alameda* (promenade) adorned with statues and fountains. Many Roman remains are found here. The climate is so hot that Ecija is called "the frying-pan of Andalusia." The ancient *Astigi* was one of the chief towns of Hispania Bætica. Pop. 27,216.

**Eck, von** (JOHANN MAYR), [Lat. *Eck'ius*, or *Ec'cius*], D. D., a German theologian and able adversary of Luther, was born at Eck, in Suabia, Nov. 13, 1486. He was a professor in the University of Ingolstadt, and was noted for his skill in disputation. He went to Rome in 1520, and instigated the pope to persecute Luther. At the Diet of Augsburg held in 1530 he controverted the Lutheran confession of faith. Among his works is a "Manual of Controversy." Died Feb. 10, 1543.

**Eck'ert** (THOMAS THOMPSON), born in St. Clairsville, O., April 23, 1824. In 1849 he was appointed postmaster at Wooster, and placed in charge of the telegraph-office there; in 1852 he was appointed superintendent of telegraph, which position he held till 1859, when he accepted the management of a gold-mining company in North Carolina, which he retained till the spring of 1861, when on the outbreak of war he was compelled to abandon all he possessed. He reached Cincinnati nearly destitute. His information of the condition of affairs in the South was valuable, and he was invited to Washington by the authorities for consultation. He was at once placed in charge of the military telegraph-office at the head-quarters of Gen. McClellan. In 1862 he accompanied the Army of the Potomac as superintendent of military telegraph, with the rank of captain and acting quartermaster. In Sept., 1862, he was called to Washington to establish the head-quarters of the military telegraph at the war department, with the rank of major. His service in organizing and conducting the immense system was freely acknowledged, and he enjoyed the confidence of both President Lincoln and Secretary Stanton. In the latter part of 1864 he was made assistant secretary of war, which office he retained till Aug., 1866. (Brevet lieutenant-colonel 1864, brevet brigadier-general 1865.) Immediately after his retirement from the war department he accepted the general superintendence of the Western Union Telegraph in the East, securing valuable results both to the public and the telegraph service, and to himself a high reputation as a telegraph manager; in 1874 became president of the Atlantic and Pacific Telegraph Company. In 1880 he became president of the American Union Telegraph Company and president of the American Telegraph and Cable Company, the latter company being organized to lay two Transatlantic telegraph-cables between White-sand Bay, Cornwall, England, and Dover Bay, Nova Scotia, which undertaking was completed in the spring of 1882. In 1881 he was made vice-president and general manager of Western Union Telegraph Company, after the Atlantic and Pacific and American Union Telegraph Companies were consolidated with that company. G. C. SIMMONS.

**Eckford** (HENRY), born in Scotland Mar. 12, 1775, removed to the city of New York in 1796. During the war of 1812-14 he was employed by the U. S. to build fleets for the lakes. He also built ships of war for foreign nations. His ships were remarkable for strength and speed. In 1831 he entered the service of the Turks as naval constructor. Died at Constantinople Nov. 12, 1832.

**Eck'hart, Meister** (Master), the greatest of the German mystics, born in Strassburg about 1260, was vicar of the Dominican order in Erfurt, then vicar-general in Bohemia, and in 1327 provincial in Cologne. He introduced many reforms into the monasteries, attracted great attention by his sermons, and was connected with the Brethren of the Free Spirit. A papal bull issued soon after his death condemned twenty-eight sentences in his sermons. He has been called the "father of modern pantheism," and is regarded as one of the greatest men of the German race, and one of the deepest thinkers of all ages. Died in 1329, near the beginning of the year. A collection of his writings, as far as they have been preserved, has been published by Pfeiffer in the second volume of "Deutsche Mystiker" (1857). Among the many monographs on his system and character are those by H. MARTENSEN ("Meister Eckhart," Copenhagen, 1840) and "Meister Eckhardt," von ADOLPH LASSON (1868).

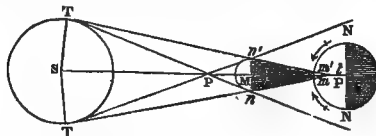
**Eck'mühl** [Ger. *Eggmühl*], a village of Bavaria, 13 miles S. E. of Ratisbon. Here on the 22d of April, 1809, Napoleon defeated the Austrian archduke Charles, who lost 5000, killed and wounded, besides 7000 prisoners. Davoust received the title of prince of Eckmühl for his conduct in this battle.

**Eclectic** [Gr. *ἐκλεκτικός*, from *ἐκ*, "out," and *λέγω*, to "choose;" Lat. *eclecticus*; Fr. *eclectique*], selected or chosen from several others. This term was applied to

philosophers who endeavored to select from the systems of various schools the true or most probable doctrines, and to combine these into a harmonious system. An eclectic spirit, it is evident, can only exist or prevail at a period of some maturity in philosophical speculation. In one sense of the word, Plato and Aristotle may be regarded as eclectics, for they both availed themselves largely of the doctrines of preceding philosophers. But in the hands of these great thinkers the *discerpta membra* are endued with a principle of vitality, and reunited as coherent parts of a harmonious system. The term eclectic is especially applied to philosophers of a later age and inferior order. Among these may be classed Epictetus, Potamon, Plutarch, and Plotinus. Among the most eminent modern eclectics Victor Cousin, the brilliant expounder of the history of philosophy, affords a favorable specimen of the eclectic spirit.

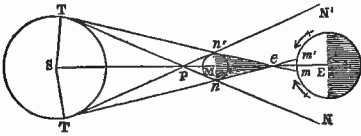
**Eclipse** [Gr. *ἐκλείψις*, from *ἐκλείπω*, "to fail;" Lat. *defectus*], in astronomy, the obscuration of a celestial body by another. Eclipses are divisible into three classes, viz.: 1, the obscuration of the sun by the moon, which is called a *solar eclipse*; 2, the obscuration of the moon by the shadow of the earth, which is a *lunar eclipse*; and 3, the obscuration of a satellite of a planet by the shadow of the primary, which is called the *eclipse of a satellite*, as distinguished from an occultation of the satellite, by which is to be understood the disappearance of the satellite behind the body of the primary. The most interesting of these phenomena are the eclipses of the sun and moon. The earth and the moon cast their shadows in a direction opposite to the sun; and as the earth and moon are nearly spherical, and the sun is larger than either, it is evident that these shadows must be nearly conical in form. The moon is eclipsed when it enters the shadow of the earth; in other words, when the earth is interposed between it and the sun. This can occur only at the time of full moon, or when the moon is in opposition to the sun, and when both bodies are at the same time near one of the moon's nodes; that is to say, near to the points in which her orbit intersects the plane of the ecliptic. When at the time of mean full moon the difference of the mean longitude of the moon and of her node is greater than  $13^{\circ} 21'$ , there cannot be an eclipse; when less than this, there may be; and when less than  $7^{\circ} 41'$ , there must be. These distances are called the *lunar ecliptic limits*. If only part of the moon's disk enters the earth's shadow, the eclipse is called partial; but if the whole disk is involved in the shadow, it is total. The orbit of the moon is inclined about  $5^{\circ}$  to the plane of the ecliptic, and this is the reason why eclipses do not happen every full moon. The moon cannot be eclipsed more than twice during the year, and it may escape eclipse for an entire year altogether. Lunar eclipses are visible to all parts of the earth at which the body is above the horizon at the time of their occurrence.

Solar eclipses occur at the time of new moon, or when the moon is between the sun and the earth. If at the time of mean new moon the difference between the mean longitudes of the sun or moon and the node is greater than  $19^{\circ} 44'$ , there cannot be an eclipse; if less than this, there may be; and if less than  $13^{\circ} 35'$ , there must be. These distances are called the *solar ecliptic limits*. They are greater than the lunar ecliptic limits; and hence eclipses of the sun are more frequent than those of the moon. To all parts of the earth on which the moon's true shadow or *umbra* falls, the eclipse is total; to those from which only a portion of the solar disk is concealed, it is partial; and the diminution of the sun's light over these regions defines what is called the *penumbra* or partial shadow. The greatest breadth of the moon's true shadow on the earth's surface never exceeds 127 miles; the breadth of the penumbra may reach 4900 miles. At the time of new moon, or when the moon is between the sun and the earth, her shadow or penumbra may fall on a part of the disk of the earth, and produce the phenomenon of a total or partial eclipse of the sun, which is limited to the portions of the earth on which the moon's shadow or penumbra happens to fall. The shadow of the moon does not always extend so far as the earth. In the two following diagrams the former represents the case in which the shadow does reach, and the latter illustrates the case in which it does not reach, the surface of the earth.



The shadow of the moon in the first diagram falls upon a portion of the earth between *m* and *m'*, and the inhabitants of that portion will witness a *total eclipse of the sun*. But in the second diagram, where the shadow of the moon does

not reach the earth, if we suppose the dark conical shadow  $n n'$  to be produced into the small opposite cone  $m m'$ ,



meeting the surface of the earth, it will be obvious that to any spectator within this latter cone, or any inhabitant of the portion  $m m'$  of the earth, the central part of the sun's disk will be covered or obscured by the moon, and the unobscured part of the sun will present the appearance of a beautiful luminous ring or *annulus*. This phenomenon is an *annular eclipse* of the sun. In other cases, the moon's penumbra  $N N'$  is projected against a portion of the earth's surface, so as to cause a partial eclipse. The diagram, owing to the disproportion between the relative distances and magnitudes of the bodies, exaggerates the extent of the penumbra, which is never large enough to cover the entire disk of the earth.

The largest number of eclipses of both sun and moon which can occur in any one year is seven, of which five will be of the sun and two of the moon. The smallest number possible in one year is two, both of which will be of the sun. The sun passes each of the moon's nodes once only in a year, unless the first passage occurs near the first of January, in which case, owing to the retrogradation of the nodal points, it may pass one node twice and the other once. Two solar eclipses may then occur in January, two in midsummer, and one in December, making five in all. But owing to the limited extent of the earth's surface to which solar eclipses are visible, they are less frequently observed at the same place than lunar. The eclipses of Jupiter's satellites, which can be calculated long beforehand, afford a convenient method of determining longitude.

The *duration* of an eclipse is the time between the immersion and the emersion. Immersion signifies the moment when the luminary begins to be obscured, and emersion is the reappearance of the luminary from behind the body by which it has been obscured. The term *digit* is used to denote one-twelfth part of the diameter of the sun's disk, and the eclipse is said to be of ten digits if ten out of twelve parts of its diameter are obscured when the phase is maximum. A total eclipse of the sun is an impressive phenomenon, and was regarded by the ancients as a very portentous, supernatural, and alarming event. The Christians of the Dark Ages offered formal prayers in order to avert the recurrence of eclipses. Even brute animals are filled with dismay by the lurid gloom or peculiar twilight of a total eclipse, during which the temperature of the air sinks rapidly. The duration of such an eclipse is usually only about three or four minutes, but may extend to eight. A total eclipse of the sun was visible in some parts of the U. S. Aug. 7, 1869, when the duration of totality was two minutes and forty-two seconds. The corona of this eclipse is thus described by a person who observed it: "On looking up, one of the grandest spectacles met the eye of which it is possible to conceive. Surrounding the dark body of the moon was a crown of light, with rays shooting out in five great sheaths to a distance equal to the sun's diameter, or nearly a million of miles. We gazed for eight or ten seconds with astonishment at this magnificent spectacle. No painting can represent it, and no pen can describe it." "The peculiar phenomena which have attracted so much attention in solar eclipses are only visible during the brief period of totality. The difficulty of observing them lies in this exceeding brevity, and in the fact that however much the observer may have studied the experiences of others, the phenomena come upon him as a complete surprise. The moment that the last ray of light disappears with the extinguishment of Bailey's beads there bursts upon him a vision so marvelously beautiful, so startling by its novelty, that his self-possession and self-control desert him." "No one," he adds, "who has not seen a total eclipse can fully appreciate the grandeur of the occasion. As the light, ray by ray, is cut off, a strange and ghastly darkness comes down upon us; not like the darkness of night, but a violet-colored darkness, which makes the faces of our neighbors turn ashy pale, and gives to the landscape the hues which it takes in a stereoscopic picture." (*Annual of Scientific Discovery for 1870*.) A total eclipse occurs very infrequently at any one place. J. P. Nichol states that no total eclipse was visible at London for a period of 575 years (1140-1715). The occurrence of eclipses at the exact time predicted by astronomers is a signal demonstration of the constancy of the laws of Nature, and of the undeviating punctuality with which her grand operations are performed.

Great importance has heretofore been attached to spec-

troscopic and polariscope observations of the sun's envelopes and coronal appendages during solar eclipses. Recently, however, it has been found practicable to make such observations quite as satisfactorily when the body is entirely unobscured. These observations have already added much to our knowledge of the physical condition and chemical constitution of our great central luminary; and there is reason to expect that in coming years they will be still more fruitful in interesting discovery. (See SUN and CORONA.)

F. A. P. BARNARD.

**Ecliptic** [so called because eclipses can only occur when the moon is on or very near its plane], in astronomy, the great circle of the heavens which the sun appears to describe in his annual revolution. It is the circle to which longitudes and latitudes in the heavens are referred. From time immemorial the ecliptic has been divided into twelve equal parts, called signs of the zodiac—Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces. These signs, however, do not coincide with the constellations of the same names, but are merely arcs of thirty degrees reckoned from the intersection of the ecliptic and equator, which is not a fixed point, so that they are carried backward by the precession of the equinoxes. The sign Aries is now in the constellation Pisces. The angle which the plane of the ecliptic makes with the plane of the equator is called the obliquity of the ecliptic, which is a variable quantity—about  $23^{\circ} 27' 30''$ . The change of seasons is the result of this angle.

**Ecoloue**, êk'log [Lat. *ec'loga*; Gr. *ἐκλογή*, a "selection"], originally the select pieces of an author. The word usually signifies a pastoral poem, the main and proper subjects of which are the loves of shepherds or their adventures. These shepherds, however, are mostly imaginary personages, whose sentiments and circumstances belong rather to an ideal golden age than to the realities of common life. The "Bucolics" of Virgil are often called *eclogues*, but they have not all the true pastoral character, some of them being occasional poems on events of the day, only slightly enveloped in the pastoral costume. Spenser and Phillips are among the eminent English pastoral poets. It is worthy of notice that this species of composition is now nearly obsolete.

**École Polytechnique.** See POLYTECHNIC SCHOOL.

**Econom'ic Geol'ogy**, also called **Practical Geology**, is that branch of the science which relates to the distribution, modes of occurrence, properties, and uses of minerals employed by man. The applications of geology are—1, to agriculture, in the knowledge it conveys of the composition, structure, and origin of soils, the distribution and properties of mineral fertilizers, etc.; 2, to architecture, in materials for construction; 3, to engineering, in drainage, excavations, and construction; 4, to manufactures, in its revelations of the distribution, properties, and uses of ores, fuels, clays, oils, asphalts, gems, and other minerals employed in the arts. It also includes the theory and practice of mining. By its investigations into the structure and resources of the earth, economic geology may have an important bearing upon the health, wealth, occupations, and history of every community and nation.

**Econ'omy** [Lat. *œconom'ia*; Fr. *économie*, from the Gr. *oikos*, a "house," and *nomos*, "law" or "regulation"], the regulation and government of a household or family; a frugal and prudent use of money or commodities; prudent management of affairs; sometimes the regular operations of nature in the reproduction, nutrition, and preservation of animals and plants. Rural economy is nearly synonymous with agriculture and the pursuits of farmers.

**Economy, Political.** See POLITICAL ECONOMY.

**Écorché**, á'kor'shâ' [a French word, past part. of *écorcher*, to "flay" to "skin"], is a figure used as a model by artists, in which the muscles are represented deprived of the skin. In a portion of the figure the upper muscles are also removed, so that those lying below them may be seen. The *écorché* is sometimes represented in action. This was first done by the French artist and anatomist Salvage.

**Écoutes**, á'koot' [a French word from *écouter*, to "listen"], in military engineering, are small galleries excavated at regular intervals beyond the glacis and towards the enemy's works, whose mining operations may by this means be heard and estimated.

**Écraseur**, ä-krä'zür [Fr., signifying "crusher," from *écraser*, to "crush"], a surgical instrument for performing amputation, invented by Chassaignac of Paris. The cutting is done by a small but very strong steel chain, a loop of which is passed around the tumor or other part to be removed. The two ends of the chain run through a steel tube, and in operation are drawn through the tube by an endless screw with a lever handle, which puts the ends of the chain into tension, diminishing the size of the loop and very slowly

but irresistibly tearing away the enclosed substance. Its use is always to be preceded by an anæsthetic. Its advantages are that the hæmorrhage following its judicious use is usually slight, and that healing takes place rapidly, with comparatively little suppuration. The shock is also comparatively slight; but it can never be used where nice dissection and skillful operation are required; and it is also somewhat unmanageable in its effects. Its use is becoming limited to a small and peculiar class of operations, chiefly upon mucous surfaces; in these cases its value is great.

**Ecstasy** [from a Greek word meaning "alteration," "alienation," "being put completely out of order and place"] denotes a morbid mental state which, without amounting to insanity, on account of the temporary character of the affection, diminishes or alters consciousness and destroys the power of self-control. The history of religion furnishes numerous examples of this kind of mental aberration—the dancing epidemics in Germany and Italy in the Middle Ages, the Jansenist convulsionist in Paris in the earlier part of the last century, etc.

**Ectozo'on** (plu. **Ectozo'a**), [from the Gr. *ἐκτός*, "without," "outside," and *ζῷον*, an "animal"], a term used in contradistinction to *Entozoa* [*ἐντός*, "within," and *ζῷον*, an "animal"] to indicate parasitic animals which live upon the outside of other animals, such as lice and ticks, and the crustaceans found upon fishes and whales. A more common name for these creatures is *EPIZOA* (which see.)

**Ecuador**, ek-wah-dör' [Fr. *L'Équateur*; Port. *Equador*] (i. e. "equator"), a South American republic, so called because it is situated under the equator. It is between lat. 1° 50' N. and 4° 50' S., and 70° and 81° W. lon.; area, including Galapagos or Tortoise Islands, which belong to it, 251,322 square miles; bounded N. by Colombia, E. by Brazil, S. by Peru, from which the Amazon River separates it, and W. by the Pacific Ocean.

**Topography, Mountains, Rivers, etc.**—Ecuador is traversed by two *cordilleras*, or ranges, of the Andes, the E. and W. Between these is the long valley or table-land of Quito, more than 9500 feet above the sea, and, though directly under the equator, enjoying a temperate and very equable climate. On the W., toward the ocean, the land is low and intensely hot; E. of the E. range there are elevated plateaus, without mountain-summits, called *llanos*; these have a temperate but dry climate. Some of the loftiest of the Andean peaks are in Ecuador, many of them volcanoes, and crowned even in that latitude with perpetual snow. There are sixteen active volcanoes, among them the symmetrical truncated cone Cotopaxi, 19,498 feet high. In the same W. range is Chimborazo, 21,414 feet, the highest peak in Ecuador. In the E. range are Cayambe, 19,386 feet, and Antisana, 19,140 feet. Ecuador is subject to frequent and disastrous earthquakes. It is drained by the Amazon, or Marañon, and its tributaries, the Napo, Tigre, Pastaza, and Putumayo, or Iça. The last named is the N. E. boundary of the republic. These rivers are all navigable, the Putumayo and Napo for 500 miles.

**Climate.**—All the elevated valleys have a delightful and healthful climate, a perpetual spring. There is a copious rainfall W. of the E. range, but less on the *llanos*; the heaviest rains are from September to May. Guayaquil and the coast are generally very hot, often above 100° F.

**Minerals.**—The principal rocks of Ecuador are granite, syenite, trachyte, and porphyry; its minerals, gold, silver, quicksilver, copper, antimony, lead, iron, zinc, and salt; emeralds of great value occur on the coast, and sulphur abounds near Chimborazo and Cotopaxi.

**Animals.**—The cougar, or panther, the jaguar, or American tiger, the ounce, and other members of the cat tribe, the bear, tapir, armadillo, monkeys (lemurs) of many species, the sloth, vicuña, guanaco, llama, and the antelope are the principal denizens of the forests; immense herds of wild horses and cattle roam over the *llanos*; noxious and dangerous reptiles and insects are numerous and troublesome in some parts; the turtles of the Amazon ascend the rivers.

**Vegetation and Soil.**—There are extensive forests on the mountain-slopes and along the rivers; the timber is the finest in the world. The cinchona, whose bark forms so important an article of medicine, abounds here. The caoutchouc or India-rubber tree is found in large numbers, as are many other very valuable woods for fine work. Among the other trees and shrubs are the cacao, orange, cherimoya, *Croton tiglium* (which produces croton oil), the tolu-balsam tree, cocoa-palm, Brazil-nut, vegetable ivory, vanilla, pineapple, plantain, banana, and many other tropical fruits and nuts. The principal products are cotton, sugar-cane, rice, pepper, coffee, bananas, etc. in the lowlands, and maize, wheat, and barley in the higher valleys and table-lands. There are produced and gathered, mainly for export, cocoa, vegetable ivory, Brazil-nuts, cotton, cof-

fee, caoutchouc and gutta-percha, orchilla wood, cinchona bark, yams, tobacco, tropical fruits, sarsaparilla, wheat, and the straw hats known as Guayaquil hats, hides and skins, and the hair of the guanaco and alpaca.

**Industries.**—These are few and rude. Leather is made, and saddles with trappings of silver and gold are produced; some cotton and wool are spun and woven; flour is ground to a limited extent, and jewelry and precious stones are manufactured after a rude style; the straw hats of Guayaquil are well known; crude India rubber, cinchona-bark, and sarsaparilla packed in mats; other medicinal barks, gums, and resins; cocoa and vanilla beans, pepper and coffee, gathered and packed for shipping, and the preparation of rice, cotton, and brown sugar for exportation, constitute the greater part of the industries of the people.

**Finances, Commerce, etc.**—The public debt in 1880 was \$12,322,500, a reduction of nearly \$7,000,000 since 1877; the public revenue is about \$2,845,000, and the expenditure nearly \$2,585,000; total exports in 1880, \$5,752,505, and were increasing; in 1880 the exports to Great Britain were \$3,236,655, to France over \$800,000, to the U. S. \$107,000, and probably half a million to other South American states. The largest exports are Peruvian bark, cocoa and vanilla, and India rubber. The imports are much less than the exports, not much exceeding \$2,300,000, of which \$1,838,275 are from Great Britain; they are mostly of cotton goods, oils, and provisions. Guayaquil is the only considerable port, and the mercantile marine is small.

**Religion, Education, etc.**—The established religion is Roman Catholic, and no other religion is tolerated; there are 1 archbishopric and 6 bishoprics; all the people except the uncivilized Indians belong to the Roman Catholic Church. There is a university at Quito (established 1684), 4 colleges, 11 high schools, several seminaries, and nearly 300 primary schools, of which only 30 are for girls; the instruction is in the hands of the Jesuits; the Indians and many of the whites are entirely illiterate.

**Railway** from Guayaquil to Sebambe, 76 miles, and a similar telegraphic connection, were completed in 1882.

**Population.**—The latest census (1875) gives a population of 1,066,137; of these, about 200,000 are uncivilized Indians, 40,000 mestizos, 10,000 negroes, and the remainder of Spanish descent, though largely mingled with Indian blood. Ecuador is divided into three departments—Quito, Guayaquil, and Assuay, also called Cuenca. There are twelve, or, including the Galapagos Islands, thirteen, provinces—viz. Chimborazo, Los Rios, Esmeraldas, Guayas, Imbabura, Leon and Assuay, Loja, Manavi, Oriente, Pichincha, and the E. territory of the Indian tribes. Quito, the capital, has from 75,000 to 80,000 inhabitants, Guayaquil about 25,000; Cuenca, Riobamba, and Loja are the only other considerable towns.

**History.**—According to tradition, Ecuador was anciently a mighty kingdom, consisting of fifty provinces, and probably much larger than it is at present. The name of the kingdom was Quito, and that of its inhabitants Quitoos or Quichooos. About the tenth century a strange people called Cara, who had come from the coast, conquered the Quitoos, and reigned for about 500 years. In 1475 the nation was conquered by the inca Huayana-Capac, called the "Great," who divided his dominions between his two sons, Huascar and Atahualpa. Huascar became inca of Peru, and Atahualpa king of Quito. Dissensions between the two brothers ultimately led to war, and in 1530 Huascar was conquered and kept a prisoner in his own capital. Atahualpa thus became ruler of the whole empire of the incas, but in the war against the Spaniards he lost his throne and his life. (See PERU.) The Spaniards, after subduing the entire country, made Quito a presidency in the vice-kingdom of New Spain, which for nearly three centuries yielded to Spain large quantities of gold and silver, and was at one time its richest and most profitable colony. In some of its districts, however, the mines were utterly destroyed by the Indians, who by Spanish despotism were driven to desperation.

The first attempt to establish their independence was made by the colonists in 1809, but it was unsuccessful. A second attempt in 1812 had the same fate. More successful was the revolution which in 1820 began at Guayaquil under the leadership of Bolivar. Two years later, Ecuador joined the republic of Colombia, which had been formed by New Granada and Venezuela, and in Dec., 1824, the battle of Ayacucho for ever overthrew the Spanish rule. In 1831, Ecuador separated from Colombia and became an independent republic, of which General Juan José de Flores, the companion of Bolivar, was the first president. Since then the history of Ecuador has been an almost uninterrupted series of revolutions and wars with neighboring republics. Flores remained at the head of the republic, either

as president or as general-in-chief, until 1845, when he was forced to sign an agreement that he would leave the country. An insurrection attempted by the party of Flores in Oct., 1846, against the new president, Vicente Roca, was unsuccessful. In 1850 the candidate of the clerical party, Noboa, was elected president, but as early as July, 1851, he was deposed and exiled. President Urbina (1851-56) was a representative of the ultra-democratic party. During the administration of his successor, General Francisco Robles (1856-59), the French decimal system of currency, weights, and measures was adopted. A war with Peru led to the blockade of the port of Guayaquil, and was terminated by a convention concluded between Gen. Guillermo Franco, the commander of Guayaquil, and the commander of the Peruvian squadron. President Robles refused to ratify the convention, resigned, and went to Chili. In Jan., 1861, a national convention elected Dr. García Moreno, the leader of the conservative and clerical party, president, while Flores was appointed governor of Guayaquil. Two wars with New Granada, which were carried on during the administration of Moreno, ended unfortunately for Ecuador. Moreno resigned in 1865; a defensive and offensive alliance which he had arranged with Chili was rejected by congress during the administration of his successor, Geronimo Carrion, but on Jan. 30, 1866, Ecuador joined the alliance of Chili, Peru, and Bolivia against Spain. Carrion, who resigned in Nov., 1867, was succeeded by Dr. Espinosa. In Aug., 1868, the country severely suffered from a terrible earthquake, by which more than 3000 persons perished. In Jan., 1869, a revolution, headed by Moreno, overthrew the administration of Espinosa. Moreno was for a short time dictator, until in May a national convention elected Dr. Carvajal provisional president. At the new presidential election Moreno was again elected president. In 1872 an insurrection of the Indians took place, which was not suppressed until many farms had been laid waste. In June, 1872, a large college, embracing schools of art, a polytechnic school, and an astronomical observatory, was opened at Quito under the direction of European professors.

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**Ecumenical** [Lat. *œcumenicus*; Fr. *œcumenique* or *œcumenique*, from the Gr. *οἰκουμένη*, the "habitable world"], a term signifying universal, applied to councils of the Christian Church in which all parts of the world are represented. (See COUNCIL, ECUMENICAL.) The latest of the councils called ecumenical (the Roman Catholic Council of the Vatican, 1869-70) proclaimed the infallibility of the pope.

**Eczusson.** See ESCUTCHERON.

**Eczema** [Gr. *ἐκζεμα*, an "eruption," from *ἐκ*, "out," and *ζωω*, to "boil"], commonly called **Salt Rheum**, a vesicular disease of the skin, characterized by watery blisters smaller than those of herpes and larger than ordinary sudamina, such as are sometimes seen in the difficulty known as "prickly heat." Eczema is often accompanied by intense itching, and is frequently transformed into a pustular or scabbing disease. It is generally chronic. Its treatment is both local and general. The local treatment, when the epidermis is thickened, is by alkaline applications with or without tarry or astringent admixtures. The "benzoated ointment of oxide of zinc" is an excellent application. If the system has received a specific taint, the iodides, with mercury judiciously used, are indispensable, and produce the happiest results. Arsenic in small doses is an extremely useful tonic in many cases. Change of air and visits to thermal and other springs and baths, though not strictly curative, often appear to be wonderfully palliative.

**Edam'** [Lat. *Eda'mum*], a town of Holland, province of North Holland, has a port on the Zuyder Zee, 12 miles N. N. E. of Amsterdam. It derives its prosperity from ship-building and a trade in cheese and wood. Pop. in 1881, 5600.

**Ed'da** [Norse for "great-grandmother," so named by Bishop Sveinsson, either on account of its great age, or, according to some, as being a compilation of "grandmothers' tales"], a collection of ancient Scandinavian poems and tales illustrating the mythology of the Northern nations. It consists of two parts—(1) the poetic, old, or Sæmundic Edda, named from its compiler, Sæmund Sigfusson Frodi (1054-1133), who was a priest in Iceland: this was first published by Sveinsson in 1643. The only manuscripts of this Edda older than the seventeenth century are that found by Bishop Sveinsson, the so-called "Codex Regius," consisting of forty-six leaves and preserved in the Royal Library of Copenhagen, and a fragment consisting of six leaves and preserved in the Arne-Magnæan collection of the University Library in Copenhagen. (2) The prose, or New Edda, called also "Snorro's Edda," which is the work of several writers, though ascribed to Snorro

Sturleson (1178-1241). Editions of the older Edda are those of Rask (1818), Munch (1847), Möbius (1859), and Sophus Bagge, "Norraen Fornkvæði," the standard edition (Christiania, 1867). The poetic Edda was translated into English verse by Amos Cottle in 1797, but the standard translation is that published by Benjamin Thorpe in 1866.

**Eddy** (SAMUEL), LL.D., jurist, was born at Johnston, R. I., Mar. 31, 1769, and graduated at Brown University in 1787, became a lawyer, was clerk of the supreme court of Rhode Island (1790-93), secretary of state (1798-1819), member of Congress (1819-25), and chief-justice of the supreme court of Rhode Island (1827-35). Died at Providence Feb. 2, 1839. He published a volume of "Antiquities" and valuable historical papers.

**Eddy** (THOMAS M.), D. D., an eloquent Methodist divine, was born Sept. 7, 1823, in Hamilton co., O., studied in the classical seminary of Greensboro', Ind., joined the Indiana conference in 1842, was editor of the "North-western Christian Advocate" from 1856 to 1868, served as pastor in Baltimore three years, was appointed to the Metropolitan church, Washington, D. C., in 1872, and elected the same year corresponding secretary of the Methodist Missionary Society. He was pre-eminent as a journalist, and was author of a "History of Illinois during the Civil War," 2 vols. 8vo. Died in New York Oct. 7, 1874.

**Eddy** (ZACHARY), D. D., son of the Rev. Isaac Eddy, and the seventh in descent from the Rev. William Eddy, vicar of Cranbrook, Kent, England, was born at Stockbridge, Vt., Dec. 19, 1815, was ordained by the (Cumberland Presbyterian) presbytery of Pennsylvania in 1835, was for several years a home missionary in Western New York and Wisconsin, was pastor of the Congregational church at Warsaw, N. Y., from 1850 to 1855, of the First church at Northampton, Mass., from 1857 to 1867, of the Church on the Heights in Brooklyn, N. Y., from 1867 to 1871, of a Congregational church in Chelsea, Mass., and then in Detroit, Mich. He has published "Immanuel, or the Life of Jesus Christ," etc., and was the principal compiler of "Hymns of the Church" (Reformed).

**Ed'dystone Lighthouse** is in the English Channel, 14 miles S. S. W. of Plymouth Breakwater, and 9 miles from the coast of Cornwall; lat. 50° 10' 54" N., lon. 4° 15' 53" E. It stands on the Eddystone Rocks, which are daily submerged by the tide, and it rises about eighty-five feet above the high-water mark in the form of a circular tower, which gradually decreases in diameter, with a curved outline resembling the trunk of a tree, from the bottom to the top. It has a fixed light visible at a distance of 13 miles. It was erected in 1757-59 by Mr. Smeaton. The material employed was Portland limestone. Steps were cut in the rock, to make the foundation as solid as possible. The stones of each course of masonry were ingeniously dovetailed, and each course was dovetailed to the one below it. The result was an edifice of surpassing strength. (See LIGHTHOUSE CONSTRUCTION and LIGHTHOUSE ILLUMINATION.) There had, however, been so many failures in placing a permanent lighthouse on the Eddystone rocks that for a considerable time after Smeaton had completed his building people used to ask, when a terrific storm had passed away, "Does the Eddystone still stand?" The first lighthouse here (1699-1703) was destroyed by a storm; the second was burned in 1755. But the Smeaton building stood the storms so well that at last none even dreamed that it should ever fail. Nor can it, properly speaking, be said to have done so; it was the rock, not the building, which failed. The waves of the Atlantic began to wash away the very foundation on which the building stood, and it was finally found necessary to erect a new building. Another of the Eddystone rocks, which promised to afford a perfectly safe foundation, was selected, and a new lighthouse—to all intents and purposes the same as the old, only provided with several new appliances—was built, and formally opened in the spring of 1882.

**Eddyville**, capital of Lyon co., Ky. (see map of Kentucky, ref. 4-D, for location of county), on R. R. and the Cumberland River, 83 miles E. by S. from Paducah. Pop. in 1870, 386; in 1880, 390.

**Ed'elinck** (GERARD), an excellent Flemish engraver, born at Antwerp in 1649. He worked for many years in Paris, and was patronized by the French court and Louis XIV. He engraved portraits of many eminent persons, the "Holy Family," after Raphael, the "Virgin," after Guido, and several works of Lebrun. His engravings are commended for fidelity of design, freedom of touch, and harmony. He carried what is called color in engraving to greater perfection than any artist before his time. He is ranked among engravers of the first order. Died April 2, 1707.

**E'den** [a Hebrew term signifying "delight"], the name given in Genesis to the region including the garden where at first dwelt Adam and Eve, the first parents of mankind, and from which they were expelled in consequence of disobedience. Much discussion has prevailed among critics as to the country where this early paradise was situated. Ceylon, the Vale of Cashmere, the lower, middle, and upper regions of the Euphrates, the Caucasus, Toorkistan, and other regions, have been named. At present our choice appears to lie between Armenia and Babylonia, with a preponderance of argument and authority in favor of the latter. The difficulty consists in identifying the four rivers mentioned in the biblical narrative.

Those who hold the theory that Eden was situated in Armenia take the starting-point from the known sources of the Tigris and the Euphrates and seek two other rivers rising in the same region. Thus, Pison is identified with Phasis, Havilah with Colchis, Gihon with Araxes, and Cush with Kossaiol. Among the representatives of this theory are Reland, Calmet, Leclerc, Keil, and others. The objections to it are that the Kossaiol can be found on neither the eastern nor the western shore of the Caspian Sea, and the four rivers can by no show of probability be supposed to be the branches of one parent-stream. The hypothesis that the Hebrew word *nahar* does not mean a "stream," but "a river-system," is not supported by the usage of the language, and the hypothesis of Luther and others that the flood so altered the physical features of Asia that the present courses of the streams are different from the original ones is not supported by the biblical account of the Flood.

Those who hold the theory that Eden was situated in Babylonia fall into two groups. The first group, represented by Calvin, Scaliger, Huet, Bochart, and others, places Eden on the Satt-el-Arab, considering the Euphrates and the Tigris as the two branches of the river of Gen. ii. 10, reckoning up the stream, and identifying the Pison and the Gihon with the two main arms through which the Satt-el-Arab empties itself into the Persian Gulf. Classical history, however, the cuneiform inscriptions, the very nature of the soil, and the present rate of physical change in that region, compel us to acknowledge that at one time the sea extended more than one hundred miles farther to the N., thus covering the supposed site of Eden. The second group, represented by Delitzsch and others, places Eden in Northern Babylonia, immediately about the site of Babylon. At that point the Euphrates and the Tigris approached very near to each other, and the country was intersected by a great number of watercourses, whose current, on account of the difference of the level, was always from the Euphrates toward the Tigris. The effect thereby produced was that of an extremely wide river flowing in numberless channels. The objection to this theory is its vagueness, its incapacity for definite physical identification. (See the able article by Francis Brown in *SCHAFF'S "Religious Cyclopædia."*)

**E'denkoben**, a town of Bavaria, in the circle of Pfalz, is on a railway, 7 miles N. of Landau. It has mineral springs and manufactures of firearms. Pop. 5103.

**Edenta'ta** (plu.), [from the Lat. *e*, privative, and *dens*, *dentis*, a "tooth"], an order of mammals named by Cuvier from the fact that they are either without teeth, or in other cases without incisors. Wagner and others extend the order so as to include the *MONOTREMATA* (which see), but the arrangement which places the latter animals below the marsupials is the more philosophical. Indeed, the *Monotremata* among non-placental appear to represent the *Edentata* among placental mammals. The order includes the sloths, the armadillos, the true ant-eaters, etc., mostly natives of the warm parts of the southern hemisphere. The fossil bones of the *Megatherium*, *Glyptodon*, etc., which are found in Brazil and other countries, show that animals of this order were once large and numerous.

**E'denton**, on R. R., a port of entry and the capital of Chowan co., N. C. (see map of North Carolina, ref. 2-J, for location of county), is on Edenton Bay, which opens into Albemarle Sound, and about 150 miles E. of Raleigh. Pop. in 1870, 1243; in 1880, 1382.

**Edes** (BENJAMIN), a Revolutionary journalist, was born at Charlestown, Mass., Oct. 14, 1732. With John Gill he began in 1755 to publish the "Boston Gazette and Country Journal," a newspaper zealously advocating the cause of liberty, and which he continued to edit for forty-three years. Died Dec. 11, 1803.

**Edes'sa** [Fr. *Edesse*], or **Callirrhoe**, an ancient city of Mesopotamia, supposed to be on or near the site of Ur of the Chaldees, mentioned in Genesis xi., though by others identified with Erech, one of the principal cities of the Babylonian empire. The extreme antiquity of its origin is undoubted, but nothing is known with certainty of its his-

tory until after the Macedonian conquest of Persia, when a Græco-Macedonian colony was settled there. It was 78 miles S. W. of Diarbekir. It became the capital of an independent kingdom in 137 B. C., and was tributary to Rome in the reign of Trajan. In 216 A. D. it became a Roman military colony. It was an important place in the early history of the Christian Church, contained numerous monasteries, and was the residence of Ephraem Syrus. Christianity was early introduced in the city, though the legend about the correspondence between Christ and King Abgarus appears to have no historical foundation whatever. In the third century the city became the seat of a Christian bishop. For many years it was the principal centre of Oriental learning. Baldwin, a leader of the crusaders, and afterward king of Jerusalem, became prince or count of Edessa in 1097 A. D., and made it the capital of a Latin principality. This city was captured about 1144 by the Saracen chief Noor-ed-Deen, who massacred the inhabitants. It was afterwards possessed successively by the Byzantine emperors, the Mongols, Persians, and Turks. The site is occupied by the modern town of ORFA (which see).

**Edessa**, the ancient capital of Macedonia, about 46 miles N. W. of Salonica (*Thessalonica*). It continued to be the burial-place of the Macedonian kings after the court was removed to Pella. Philip, father of Alexander the Great, was killed here. This site is occupied by *Vodina*.

**Ed'foo**, or **Edsou** [anc. *Apollinopolis Magna*; Coptic, *Atbol*], a small town of Upper Egypt, on the W. bank of the Nile, about 60 miles above Thebes. It has two temples, the larger one of which, recently cleared out by Mariette, is on a grand scale, and being in excellent preservation gives a good idea of the Egyptian temples in their glory. It was built chiefly by Ptolemy Philometor (181-145 B. C.), the last king of Egypt who is noticed in sacred history. Its entire length (including court and temple) is 405 feet. On each side of the entrance is a pyramidal tower 108 feet 2½ inches high, adorned with gigantic sculptures. Through this entrance the court is reached, 161 feet long, 140 feet wide, and enclosed by a splendid colonnade, each of whose pillars shows a design of its own. The impression of this magnificent architectural structure is spoiled, however, as the court is filled with rubbish and occupied by wretched dwellings. To the Egyptologist, however, the place is of extreme interest as furnishing the most perfect specimen of an ancient Egyptian temple, and the great fame which it enjoyed among the Greeks and Romans cannot but seem to be fully deserved. Within the temple is the chamber, 33 feet by 17, which contained the image of the deity. The town has manufactures of blue cotton cloth and a kind of earthenware which finds ready sale in all Egypt on account of its striking resemblance to the pottery found on the monuments. The city is noted for the impurity and insolence of its beggars. Pop. 2000.

**Edgar**, Neb. See APPENDIX.

**Ed'gard**, capital of the parish of St. John the Baptist, La. (see map of Louisiana, ref. 10-F, for location of parish), is situated on the W. bank of the Mississippi River. It has a court-house, sugar-mills, and one steam rice-mill. Pop. not in census of 1880.

**Ed'gartown**, a port of entry and the capital of Dukes co., Mass. (see map of Massachusetts, ref. 6-J, for location of county), is on the E. shore of the island of Martha's Vineyard, 30 miles from New Bedford. It has a small but safe harbor, and a pier on which is a fixed light 37 feet high, in lat. 41° 23' 25" N., lon. 70° 29' 51" W. This place formerly sent out many whaling-ships, but the whale-fishery has of late declined. Edgartown has communication by steamboat with the mainland. Cottage City, including the camp-meeting grounds of Oak Bluffs, has been set off from this tp. since 1870. Pop. of Edgartown township in 1870, 1516; in 1880, 1303; in 1885, 1165.

**Edgefield Court-house**, capital of Edgefield co., S. C. (see map of South Carolina, ref. 6-C, for location of county), is about 24 miles N. of Augusta, Ga. Pop. in 1870, 846; in 1880, 808.

**Edgehill**, a ridge in England, in Warwickshire, 7 miles N. W. of Banbury, was the scene of the first great battle of the civil war, which occurred Oct. 23, 1642. The royalist army was commanded by Charles I., and that of the Parliament by the earl of Essex. Prince Rupert, by a charge of cavalry, broke the left wing of the Parliamentarians, whom he pursued to Keinton, while the right wing of Essex's army defeated the royalists. Thus the battle proved disastrous to both armies, and the loss was, indeed, so nearly equal on both sides that neither party could claim the victory. Clarendon estimated the total number of killed at 5000. Among the slain was the earl of Lindsay, who had led the king's infantry.



**Edgerton, Wis.** See APPENDIX.

**Edgeworth** (MARIA), born near Reading, Eng., Jan. 1, 1767; removed with her father to Edgeworthstown, in Ireland, in 1782. In 1801 she produced "Castle Rackrent," the first of a series of novels, among the best of which are "Belinda" (1803), "Leonora" (1806), "Patronage" (1814), "Ormond" (1817), and "Helen" (1834). She also published "Popular Tales" (1804) and "Tales of Fashionable Life" (1809-12). Died May 21, 1849.

**Edgeworth** (RICHARD LOVELL), F. R. S., the father of the preceding, was born at Bath in 1744. He inherited from his father an estate at Edgeworthstown, in county Longford, Ireland. He married a Miss Elers about 1764. Among his works are "Professional Education," a "Treatise on Practical Education" (1798), and autobiographic memoirs. He was the reviver of telegraphy in modern times. (See his "On the Art of Conveying Swift and Secret Intelligence.") Died June 13, 1817.

**Edhem Pasha**, grand vizier of Turkey in 1877, a native of Scio and of Greek family, was born in 1823; was purchased as a slave, in his boyhood, by the well-known Khosrû Pasha, and was sent by his master to Paris, where he entered the École des Mines, and distinguished himself in engineering studies; made professional tours through France, Germany, and Switzerland; in 1839 returned to Constantinople; was placed on the general staff, and rose to the rank of colonel; was also French tutor to the present sultan; in 1849 was aide-de-camp to Abd-ul-Medjid and captain-general of the imperial guard. He was also chamberlain of the imperial palace and councillor of state. In 1867 he was minister of foreign affairs, and for the next eight years ambassador at different European courts. In Dec., 1876, he represented Turkey in part at the general conference of the powers. In Feb., 1877, he succeeded Midhat Pasha as grand vizier. He belongs to the "Young Turkish," "anti-Softa," party. L. P. BROCKETT.

**Edict** [Lat. *edictum*; Fr. *édit*], a public decree or proclamation issued by a sovereign or other potentate; an instrument signed and sealed as a law. In ancient Rome the power of making edicts was principally exercised by the *prætor urbanus* and the *prætor peregrinus*, who on coming to office published rules for regulating the practice of their courts, etc. The edicts of a prætor were not binding on his successor, but if confirmed by the latter they were called *edicta vetera* (old edicts), as distinguished from the *edicta nova* (new edicts) framed by himself. A digest of the best decisions of the prætors was made under the emperor Hadrian by Sylvius Julianus. It was called "Edictum Perpetuum," and made the invariable standard of civil jurisprudence. The "Edict of Milan" was issued, after the conquest of Italy, by Constantine (June 13, 313 A. D.), to secure to Christians their civil and religious rights.

**Edict of Nantes**, one of the most famous edicts of history, was issued by Henry IV. of France Apr. 13, 1598, to secure to the Protestants a legal existence within the French monarchy. They obtained permission to celebrate service wherever they already had formed communities, and to establish new churches wherever such were needed, with the exception of Paris and the royal residences. They were also permitted to found universities or theological seminaries, and the schools of Montpellier, Montaubon, Saumur, and Sedan soon became prominent centres of learning. Nor should their faith be any impediment to their promotion to any civil or military office, etc. The restrictions imposed upon them were few and lenient. This act was revoked by Louis XIV. Oct. 17, 1685, and its revocation led to a renewal of the bloody scenes which before the issuing of this edict had been enacted among the Huguenots. Though the act was solemnly confirmed by Mary of Medici, regent after the assassination of Henry IV., by Louis XIII., and even by Louis XIV., it was never fully carried out. The Huguenots were always more or less exposed to vexations, especially after the fall of La Rochelle, in 1628, when they lost all, or nearly all, political importance. Nevertheless, it was not until the latter part of the seventeenth century, under the reign of Louis XIV., that the vexations assumed the character of open persecution and the revocation of the edict began to loom up over the horizon. The dragonnades laid whole districts waste, and depopulation caused by the sword was also increased by emigration. About half a million of her most useful and industrious subjects deserted France, and exported, together with immense sums of money, those arts and manufactures which had chiefly tended to enrich the kingdom. About 50,000 refugees passed over into England, and many more into Germany and America; and there can be little doubt that the cruelties perpetrated by the king of France tended to excite the suspicion of the English against their own Roman Catholic sovereign, and accelerated the revolution of 1688.

**Edi'na**, on R. R., capital of Knox co., Mo., 40 miles N. W. of Quincy, Ill. (see map of Missouri, ref. 1-H, for location of county). It has a public school building completed at a cost of \$10,000. Pop. in 1870, 807; in 1880, 1156.

**Edinburg**, Johnson co., Ind. (see map of Indiana, ref. 7-E, for location of county), on R. R. and the Blue River, 29 miles S. of Indianapolis. It has a high school, hominy-mills, starch-factory, and good water-power. Pop. in 1870, 1799; in 1880, 1814.

**Ed'inburgh**, capital of Scotland and of Edinburghshire or Mid-Lothian, is picturesquely situated about 1 mile S. of the Frith of Forth, 399 miles by railway N. N. W. of London; lat. 55° 57' N., lon. 3° 12' W. It is divided into the Old and New Town, the former of which occupies the middle and highest of three ridges extending E. and W. The Old Town is separated by a narrow hollow or ravine from the New Town, which is built on a broader ridge with more gently sloping sides. Edinburgh is remarkable for the elegance and solidity of its buildings, which are all of stone. The adjacent country is pleasantly diversified with hills and plains. On the south-eastern border of the city a hill called Arthur's Seat rises to the height of 822 feet, and about 4 miles S. W. of Edinburgh is the range of the Pentland Hills.

The principal street of the Old Town is that which extends along the crest of the ridge, bearing in different parts the names of Canongate, High street, Lawn Market, and Castle Hill. It is more than a mile long, and rises with a regular but rather steep acclivity from the palace of Holyrood, which is at its eastern end, to the huge rock on which stands Edinburgh Castle, 443 feet above the level of the sea. This street is lined with lofty and antique residences, many of which have seven or more stories. The houses of the New Town are built of a fine white freestone quarried in the vicinity, and are remarkably handsome. Here are three parallel avenues called Queen street, George street, and Prince's street, the last of which extends along the S. side of the New Town, close to the hollow which separates it from the Old. Prince's street is the most agreeable promenade in the city, and as it is lined with houses only along its northern side, it commands a fine view of the Old Town with its lordly castle and of the intervening valley adorned with public gardens. At the eastern end of this street is a rocky eminence called Calton Hill, the broad verdant summit of which commands a beautiful view of the Frith of Forth, here about 6 miles wide. Arthur's Hill and another high hill called Salisbury Crags afford prospects of almost unrivalled beauty and magnificence.

The most remarkable public edifices and monuments are the castle, which is a large fortress capable of accommodating 2000 men, and is one of the oldest structures in the city; the royal palace of Holyrood, or Holyrood House, the oldest part of which was built about 1528; this palace is quadrangular in form, with a central court 94 feet square, and is famous as the residence of Mary queen of Scots; the cathedral of St. Giles, a large and ancient edifice of unknown date, in the later Gothic style; Victoria Hall, or Assembly Hall, a magnificent structure, which stands at the head of High street, has a spire 241 feet high, and is the place where the General Assembly of the Church of Scotland annually meets; the Parliament House, now a hall connected with the courts of law; and the admirable monument erected to Sir Walter Scott, which stands on Prince's street, is 200 feet high, and is unequalled among the monuments of this metropolis for artistic beauty. Among the other objects of interest are the old Tron church; the Free St. George's church; the Free High church; the university buildings; the observatory; the National Gallery of Art; the Royal Institution, a beautiful Grecian edifice containing the apartments of the Royal Society; a chapel belonging to the ruined abbey of Holyrood, founded by David I. about 1128; the theatre; and the National Monument (an imitation of the Parthenon) on Calton Hill.

Edinburgh contains over one hundred churches and chapels belonging to various denominations—the Free Church, Church of Scotland, United Presbyterian, other Presbyterian, Episcopal, Baptist, Congregational, Roman Catholic, Methodist and Evangelical, Unitarian, etc. It is the seat of a bishop of the Episcopal Church and of a Roman Catholic vicar-apostolic. It has numerous large and richly endowed hospitals and charitable institutions, among which is Heriot's Hospital, founded for the education and maintenance of poor boys. This city is important as a centre of learning, and is distinguished for the number and excellence of its literary, scientific, and educational institutions. The aristocracy, the literati, and professional men form an unusually large proportion of its population, which is extensively engaged in the business of printing and publishing books. Edinburgh is the head-quarters of the book-

trade in Scotland, and as a literary mart is second only to London among British cities. Here is the celebrated University of Edinburgh, founded by James VI. in 1582, which has a library of about 140,000 volumes. (See separate article.) The other chief educational institutions are the High School, which occupies a handsome Doric edifice 270 feet long; the New Academy (or college) of the Free Church; the Royal College of Surgeons; the medical school; the Royal Academy of Fine Arts, and the Royal Society. The Advocates' Library has the largest and most valuable collection of books in Scotland—265,000 volumes.

Edinburgh is the seat of the supreme courts of Scotland, the principal of which is the court of session, composed of thirteen judges. This court tries all civil causes, and decides not only on the law of the case, but also in questions of equity. This city returns two members to Parliament. By virtue of ancient charters and modern acts of Parliament it is a royal burgh, governed by a town council elected by popular vote, and by a lord provost, who is elected by this town council. It is the terminus of important railways—viz., the North British, the Edinburgh and Glasgow, and the Caledonian Railway. This city has two ports on the Frith of Forth—Leith and Granton, the former of which is 2 miles from the Cross of Edinburgh. Pop. in 1881, 228,190.

*History.*—This place was recognized as a burgh by David I. in 1128, and a Parliament was held here in 1215. David I., who before his accession to the throne of Scotland had been earl of Huntingdon, and was well acquainted with the military and ecclesiastical architecture of the Anglo-Norman kings, built the abbey of Holyrood, which often received the Scottish court as guests. Edinburgh became the capital of Scotland about 1436, when its castle was selected as the only place of safety for the royal household and the Parliament. It was enclosed by walls in the fifteenth century, and for a long period was confined to the central ridge. The hollow between this and the northern ridge was filled with water, called the North Loch. The New Town originated about 1765, when a bridge was erected across that loch to connect the Old Town with the New. Here occurred in May, 1843, the disruption of the Established Church, from the General Assembly of which 203 members seceded and organized the Free Church. Sir Walter Scott and Lord Brougham were born here.

**Edinburgh** (ALFRED ERNEST ALBERT), DUKE OF, second son of Victoria, queen of Great Britain, was born at Windsor Castle Aug. 6, 1844. He was educated chiefly by private tutors. He entered the British navy in 1858, and served chiefly on foreign stations. In 1862 he declined the crown of Greece, which was offered him, and in 1866 took a seat in the House of Peers by his present title. In 1867 he set sail in command of the frigate *Galatea*, visiting Australia, Japan, China, India, etc. At a picnic at Clontarf, New South Wales, Mar. 12, 1868, he was slightly wounded by a pistol-shot fired by a Fenian named O'Farrell. The latter was soon afterwards executed. The full title of this prince is, "His Royal Highness Prince Alfred Ernest Albert, Duke of Edinburgh, Earl of Kent, and Earl of Ulster, K. G., K. P." He is also a duke of Saxony and prince of Saxe-Coburg-Gotha.

**Edinburgh Review**, a celebrated critical journal founded at Edinburgh in 1802, is the oldest of the great British quarterly reviews. Francis Jeffrey, Sydney Smith, Henry Brougham, and Francis Horner were the founders and first contributors of this review, which was a strenuous advocate of Whig principles. Sydney Smith edited the first number, of which 750 copies were printed. Mr. Constable was the original publisher. Lord Jeffrey became its editor in 1803, and conducted it with great ability and success for twenty-six years. The brilliant wit, the critical keenness, the eloquent style, and the extensive knowledge displayed by the contributors produced a great sensation in the literary world. Its circulation had risen to 9000 in 1808, and 12,000 or more in 1813. Among the eminent men who contributed largely to this review were Macaulay, Carlyle, Lord Brougham, Sir J. Mackintosh, and Henry Rogers. Macvey Napier succeeded Lord Jeffrey as editor in 1829. The price paid to contributors was at first ten guineas a sheet, but it was soon raised to sixteen guineas.

**Edinburghshire**, or **Mid-Lothian**, a county in the S. E. part of Scotland, has an area of 397 square miles. It is bounded on the N. by the Frith of Forth. The surface is diversified by plains and high ridges, among which are the Moorfoot Hills and the Pentland Hills, composed of porphyry. The highest point of the Pentland Hills rises 1839 feet. The rocks of this county belong mostly to the carboniferous and Silurian formations. Valuable coal mines are worked in the valley of the Esk. The soil is generally fertile and well cultivated. Near the metropolis are many nurseries, dairy pastures and vegetable gardens. It is trav-

ersed by five great railways. Pop. in 1881, 389,164. Capital, Edinburgh.

**Edinburgh, University of**, was founded by James VI. of Scotland in 1582. In 1600 the *senatus academicus* consisted of a principal and four regents. The first chair of theology was founded in 1642, and the first professor of medicine was appointed in 1685. In 1760 the *senatus academicus* consisted of a principal and eighteen professors. Since that date ten chairs have been added. In 1858 its constitution was changed by an act of Parliament, which took the government out of the hands of the lord provost and town council of Edinburgh, and gave it to the *senatus academicus* and a university court. The patronage of the chairs was then transferred to seven curators, three of whom are nominated by the university court and four by the town council. The university consists of the faculties of arts, medicine, theology, and law. The faculty of arts comprises the chairs of humanity, Greek, mathematics, logic and metaphysics, moral philosophy, natural philosophy, rhetoric and belles-lettres, universal history, astronomy, agriculture, and music. Connected with this university are a large library, a museum of natural history, and a botanic garden.

**Edison** (THOMAS ALVA), PH. D. See APPENDIX.

**Edisto**, a river of South Carolina, is formed by the North and South Edisto, which unite at Edisto, a station on the South Carolina R. R. The North Edisto is the boundary between Barnwell and Orangeburg counties. The main stream flows south-eastward and southward through Colleton county, and enters the Atlantic Ocean by two channels, called the North and South Edisto Inlets, between which is Edisto Island.

**Edisto Island**, one of the most important of the Sea Island group, is in S. C., between the North and South Edisto Inlets. It produces sea-island cotton. It has a post-office of the same name in Berkeley county.

**Edmonds** (FRANCIS W.), an American painter, born at Hudson, N. Y., Nov. 22, 1806. He visited Rome in 1840, before which date he had exhibited, besides other works, "The City and Country Beaux" and "Dominie Sampson." Died about 1860.

**Edmonds** (JOHN WORTH), an eminent American jurist, was born at Hudson, N. Y., Mar. 13, 1799, and graduated at Union College (now Union University) at Schenectady, N. Y., in 1816. In 1819 he was admitted to the bar, and in 1820 commenced the successful practice of law in his native town. In 1831 he entered the New York legislature as a member of the Assembly, and in 1832 became a State senator. In 1836 he was appointed a U. S. Indian agent. He retained the position for two years, and became familiar with several Indian languages. In 1841 he re-entered upon the practice of law, and opened an office in New York City, which was from that time his home. In 1843 he was appointed one of the State prison inspectors, and labored with zeal and success in introducing reforms in prison discipline. In 1845 he was appointed a circuit judge, and in 1847 became one of the judges of the supreme court, New York. In 1852 he was appointed to the bench of the court of appeals, from which in 1853 he retired to the private practice of law, in which he was after a time a partner with Hon. William H. Field. In 1851, Judge Edmonds became a convert to the doctrines of Spiritualism, and in 1853 openly avowed and defended his belief of that unpopular faith by the publication of a work entitled "Spiritualism." He subsequently published many other writings in favor of his belief, of which he became one of the leading champions. He also became an active medium, and believed himself to be in almost constant communication with departed spirits. There can be no doubt that his advocacy of Spiritualism cost him his place on the bench. Judge Edmonds was a man of cultivated mind and of singularly pure and amiable character. In public and private life alike he was honorable and universally respected. As a lawyer he was able and learned. As a judge he was sound, wise, and above any suspicion of wrong-doing. He avowed his peculiar religious views with the greatest courage and persistency, and there can be no question that he was fully convinced of the truth of what he professed. During the latter part of his life he suffered much from a severe chronic disease, but his legal advice was much sought in difficult cases to the last. He died April 5, 1874, an unwavering believer in the truth of Spiritualism.

**Edmonstone Island**, situated at the mouth of the Hugli, the westernmost outlet of the Ganges into the Bay of Bengal, is, indeed, the result of the continuous conflict between the fluvial currents and the oceanic tides, and forms part of the delta. A few decades ago it was a mere sand-bank; then it became covered with reeds, shrubs, trees, and even yielded a supply of fresh water; finally it became a naval station. But the station has been given

up, as the ocean is about to transform the island back into a sandbank.

**Ed'monton**, capital of Metcalfe co., Ky. (see map of Kentucky, ref. 4-G, for location of county), about 50 miles E. of Bowling Green. Pop. in 1870, 146; in 1880, 215.

**Edmore**, Mich. See APPENDIX.

**Ed'mund I.**, king of the Anglo-Saxons, born about 922 A. D., was a son of Edward the Elder and a grandson of Alfred the Great. He became king in 941, and conquered the Britons of Cumbria. He was assassinated by Liof May 26, 946, and was succeeded by his brother Edred.

**Edmund II.**, surnamed IRONSIDE, king of England, born in 989 A. D., was a son of Ethelred II. At the death of the latter, in 1016, the Danes possessed the greater part of England. Edmund, who was renowned for courage, waged war against Canute the Dane, and gained several victories, but was defeated at Assandun. The two rivals then agreed to divide the kingdom, of which Edmund received the southern part. He died Nov. 30, 1016, and Canute then became sole king.

**Ed'munds** (GEORGE F.), an American lawyer and Senator, born at Richmond, Vt., Feb. 1, 1828. He was chosen in 1854 a member of the legislature of Vermont, which in 1865 elected him to the Senate of the U. S. He was re-elected as a Republican for 1869-75. In Dec., 1872, he was appointed chairman of the committee on the judiciary. He was re-elected U. S. Senator for 1875-81 and 1881-87. Elected president *pro tem.* of U. S. Senate Mar. 3, 1883. He declined the offer of an appointment of associate justice of U. S. supreme court Mar. 11, 1882.

**Edom**, a name of ESAU (which see).

**Edom**, a country of Asia. See IDUMÆA.

**Ed'red**, king of the Anglo-Saxons, was a son of Edward the Elder. He succeeded his elder brother, Edmund I., in 946 A. D. Saint Dunstan acquired an ascendancy over Edred, and was his most powerful minister. Edred died Nov. 23, 955, and was succeeded by his nephew Edwy.

**Ed'riophthal'ma** [from the Gr. *ἑδραῖος*, "fixed," and *ὀφθαλμός*, "eye"] are a group of crustaceans called the sessile-eyed Crustacea, because their eyes are placed directly upon the shell, instead of being mounted upon footstalks. They have the organs of respiration connected with the organs of locomotion. None of the Edriophthalma attain more than an inch and a half in length. They are generally marine, though some of them of the order Amphipoda inhabit fresh water, and a few, belonging to the Isopoda, such as the wood-louse, are terrestrial, but inhabit damp places. To the Amphipoda belong the common sandhoppers, which are found in myriads along sandy shores. Some of the Edriophthalma are parasitic on other marine animals.

**Edri'si**, or **Edree'see**, an eminent Arabian geographer, was born at Ceuta, in Africa, about 1100. He was descended from the royal family of Edrisites. He travelled extensively in Europe and Asia, and passed many years at the court of Roger II., king of Sicily, by whom he was liberally patronized. Edrisi made for this prince a silver terrestrial globe, and wrote a large book on geography, which was long a standard work. M. Jaubert published a French translation of it in 1836. Died about 1175.

**Education**, ed-yu-ka'shun [Lat. *educatio*], regarded as an historical fact, is well described by J. S. Mill as "the culture which each generation purposely gives to those who are to be its successors, in order to qualify them for at least keeping up, and if possible for raising, the level of improvement which has been attained." The kind and degree of this culture depends on the state of civilization. As the earliest education is that of the family, so originally education was confined to the family, the children being taught the arts known to their parents. The first schools were ecclesiastical, to give the training and knowledge required for religious ceremonies. In the countries where the priesthood did not exist as a separate body education became secular. The Greeks were the first to develop a science of education distinct from ecclesiastical training. They divided their subjects of study into music and gymnastics, the former comprising all mental and the latter all physical training. Plato is the author of the first systematic treatise on education. He proposes to entrust education to the state, and lays great stress on the influence of race and blood, holding that strong and worthy children are likely to spring from strong and worthy parents. At Rome, in the days of the republic, the child was trained for public service in the forum, the senate-house, and the camp. The Romans knew little of systematic training except in oratory, but the great work of Quintilian on the subject contains incidentally a complete sketch of a theoretical education. His object is to show how to form a man of practice. To form the perfect

orator he would form the perfect man. The culture of the earliest generations of Christians was obtained in the pagan schools. The education of the Middle Ages was either that of the cloister or that of the castle. The object of the one was to form the young monk; of the other, to form the young knight. The discipline of the cloister was severe, the rod ruling all with impartial cruelty, and the instruction was made repulsive and distasteful. The seven arts of this training were grammar, dialectics, rhetoric, music, arithmetic, geometry, and astronomy, the first three forming the *trivium*, and the last four the *quadrivium*, of the seven years' course. The seven knightly accomplishments were to ride, to swim, to shoot with the bow, to box, to hawk, to play chess, and to make verses. The young knight was trained to hardship in sharing the dangers of a chief whose valor he emulated, and to obedience in the service of a mistress whom he loved.

These mediæval forms of education, so extreme and diverse, were replaced by that of the Renaissance represented by Erasmus, and that of the Reformation represented by Luther. The former taught how to mould the child by wise methods into a good Greek and Latin scholar and a pious man. Latin is to be taught so as to be of practical use; obedience must be strict, but not too severe; individual peculiarities must be regarded. The education of girls is as necessary and important as that of boys. This Reformed system was well adapted for the favored few. Luther gave the first great impulse to popular education; he opened the schoolhouse to the masses, and foreshadowed the great principle that it is the right and duty of the state to provide for the education of all youth.

The educational reformers who have since most powerfully influenced education are the following, named in chronological order: Sturm of Strasbourg, Ratich of Germany, Comenius of Moravia, Montaigne of France, Locke and Milton of England, Franke of Germany, Rousseau of France, Basedow and Salzmann of Germany, Pestalozzi of Switzerland, Richter and Goethe of Germany, Jacotot of France, Herbert Spencer of England, and Bain of Scotland, the author of "Education as a Science," a recent work of rare merit. Comenius and Rousseau were the representatives respectively of the *information* and *training* types of education. By a synthesis of the truth contained in these extreme types, Pestalozzi evolved a better ideal, characterized by completeness and symmetry, which has had a widespread and enduring influence. Thus, by the contributions of philosophers and educators, the science of education—or pedagogy as we call it—came into existence in Germany, which is the classic land of the science. This made possible the normal school, which in its universality and multifactor development appears to be destined to become the most potent of all instrumentality for the practical improvement of education.

An integral education must include at least five branches—physical, moral, intellectual, æsthetic, and religious. 1. Physical education is the rearing of a healthy human being by good nursing, feeding, clothing, exercising, and general regimen. This must be shared by the parents and recognized teachers. The school should aim, by its hygienic conditions, gymnastics, and avoidance of overtasking, to preserve and increase the pupil's bodily health and strength, and to give sound instruction in practical hygiene. 2. Moral education is designed to increase a conscientious and steadfast devotion to duty. The foundation of all virtue is in self-control. The cardinal virtues to be inculcated are prudence, probity or justice, and benevolence. The school is only one of the means of this education; it is imbibed from innumerable sources. The most effectual moral training of the school is indirect and incidental, resulting from its operations and the unconscious tuition of the teacher. Perhaps the greatest pedagogical question of the day is the question whether morality, totally separate and distinct from the Bible and religious dogma, can be effectively taught in schools. Bain maintains the practicability and expediency of the separation. The principal means of moral teaching are (a) living examples—parents and teachers, etc.; (b) reading of examples in history and fiction; (c) the inculcation of moral precepts; (d) instruction in systematic treatises on the subject of duty. 3. Intellectual education, the branch about which schools and teachers must be chiefly occupied, is composed of two elements—the element of knowledge, and the element of discipline. Discipline is the result of mental activity in acquisition and expression. Extremists are apt to sacrifice one of these elements to the other. The tendency of modern pedagogy is to condemn and discard all studies and exercises which have little or no value as knowledge (hence the abolition of Latin verse-making), on the assumption that the requisite discipline will result from the teaching of useful knowledge in the shortest and most efficient way. The most general division of the

branches of instruction is into the scientific and literary. Both are deemed necessary to a liberal education. The Latin language has hitherto occupied the largest space in the curriculum of liberal learning, and is perhaps the most indispensable branch. 4. Education, whether viewed as aiming at complete development or as a means of human happiness, cannot omit the culture of taste, or susceptibility in regarding beauty. Art-cultivation means the calling forth, intensifying, guiding, purifying, the æsthetic sense. Art has been defined to be the endeavor after perfection in execution. One of the results of art-cultivation is to render us intolerant of the faults in anything we do. Plato regarded beauty and goodness as inseparable, and Goethe says, "The beautiful is greater than the good, for it includes the good and adds something to it; it is the good made perfect." Among the recognized branches of common education coming within the scope of art are drawing, music, elocution, good-breeding, and literature. 5. There is doubtless an intellectual element in religion, but the essence of religion is regarded as something emotional. The intellectual element may be taught in schools, not mixed as to confession, by means of Bible lessons and a doctrinal catechism; but emotional culture cannot well be carried out in ordinary school-teaching. The tendency is to remove all purely religious teaching from all institutions of public instruction, leaving it to the family and the Church. Hence the great development of the Sunday-school.

The whole education of a nation consists of two great classes: 1. That which trains and matures the man, which forms cultivated and capable human beings without regard to the special occupation for which they are destined; this we call general education. 2. That which is required to fit men for some special mode of gaining a livelihood, or of fulfilling the specific duties which the subdivision of labor imposes on the individual as his contribution to the commonwealth; this is professional or technical education. General education should precede technical; and the more solid and complete the former, the more successful will be the latter. The former develops the requisite mental activity—i. e. aptitude and capacity; the latter gives requisite special knowledge and skill. Systems of education are organized in three grades—primary or elementary, secondary, and superior. The first is either complete as a whole or preparatory to a higher instruction; the second is the first stage in liberal education; and the third includes all education above the secondary, whether general or technical. The rapid development of technical schools in all their variety is a striking characteristic of modern society. In industrial pursuits it is realized as never before that knowledge is power. The future of nations largely depends upon the degree of instruction they shall attain. The highest, and consequently the most powerful, nation of the future is to be that which shall put the most knowledge into its labor. The multiplication of the *kinds* of institutions of instruction is at once an effect and a cause of social progress. Few kinds denote low civilization. The development is from the homogeneous to the heterogeneous. Differentiation and specialization is the law of educational progress. The simplification of function, in respect to both teacher and institution, with certain limitations in the early stages, is the movement of progress. Democracy and popular education had a common origin, and they are indispensable to each other. In the development and advancement of public instruction the chief opposing forces have been religious bigotry, aristocratic influence, and ignorant sufrage.

JOHN D. PHILBRICK.

**Education, Commissioner of.** See NATIONAL BUREAU OF EDUCATION.

**Edward**, surnamed **THE CONFESSOR**, an Anglo-Saxon king of England, was born at Islip in 1004. He was a son of Ethelred II. After the death of Ethelred, in 1016, Canute the Dane became master of the kingdom, and married Emma, the mother of Edward. The latter succeeded his half-brother, Harthacanute, in 1042. He married Editha, a daughter of Earl Godwin, but did not permit her to share his bed, and for this ascetic virtue was surnamed "the Confessor." He died Jan. 5, 1066, and was succeeded by his wife's brother, Harold. Edward the Confessor is honored as a saint in the Roman Catholic Church.

**Edward I.**, surnamed **LONGSHANKS**, king of England, the eldest son of Henry III. and his wife Eleanor, was born at Westminster in 1239. He fought for his father against the barons in the war which began in 1263. In 1265 he gained a decisive victory at Evesham. He took part in a crusade to Palestine in 1271, and returned to England and took his deceased father's throne in 1274. The conquest of Wales he completed in 1282, after a war of several years. In 1291 several competitors for the crown

of Scotland recognized Edward as lord-paramount, and chose him as umpire. He decided in favor of John Baliol, who took the oath of fealty to the English king. The Scots took arms to maintain their independence. In 1296, Edward invaded Scotland, dethroned Baliol, and made himself master of the kingdom. The national cause was bravely defended by Sir William Wallace, who gained a victory at Stirling in 1297. Edward invaded Scotland in 1303, and captured Wallace, who was hanged as a traitor in 1305. The English king was marching against Robert Bruce, who had renewed the contest, when he died near Carlisle July 7, 1307. Edward was an ambitious and able ruler, having great political talents as well as military genius. He greatly promoted the improvement of law and the reformation of civil abuses. Among the important events of his reign was the institution of the House of Commons. He was succeeded by his son, Edward II. (1284-1327), a feeble prince.

**Edward II.**, king of England, fourth son of Edward I. and Eleanor, was born at Carnarvon April 25, 1284, became heir-apparent in 1285, was created prince of Wales in 1301, and succeeded his father in 1307. He was weak and indolent and utterly incompetent. Immediately after his accession to the throne he recalled Piers Gaveston, made him guardian of the kingdom while he himself went to France, and loaded him with so many honors and presents that the nobles demanded securities before consenting to the coronation of the king. In 1312 the nobles revolted and executed Gaveston, but he was followed by Despenser. In 1327 he was deposed by Parliament, and shortly after assassinated.

**Edward III.**, king of England, the eldest son of Edward II., was born at Windsor Nov. 13, 1312. He ascended the throne Jan. 24, 1327, but during his minority the royal power was exercised by the queen-mother and Roger de Mortimer. Edward married Philippa of Hainault in 1328. In 1330, Mortimer was arrested, tried, and executed by the order of the young king, who then assumed the royal power. To support Edward Baliol, who claimed the Scottish throne at the death of Robert Bruce, Edward invaded Scotland, and defeated the Scotch at Halidon Hill in 1333. The Scottish people generally refused to recognize Baliol, and although the English army ravaged their country in several campaigns, they again and again rallied and fought resolutely for independence. When his uncle, Charles IV. of France, died without male issue, Edward claimed the throne of France, but Philip of Valois was recognized by the French people. The English king began war in 1339, but hostilities were several times suspended by truce. In 1346, Edward, with his son, the Black Prince, invaded France, marched to the gates of Paris, and gained a complete victory at Crécy (Aug. 26). He took Calais after a siege of several months in 1347, and a long truce was then concluded between the two powers. The war having been renewed in 1356, the Black Prince defeated the French at the great battle of Poitiers, Sept. 19th of that year, and took King John prisoner. In 1360 the war was suspended by a treaty, in accordance with which Edward retained the French provinces which he had conquered. King John's successor, Charles V., renewed the war in 1370, gained a series of victories, and recovered nearly all the French territory which the English had occupied. Edward died June 21, 1377, and was succeeded by his grandson, Richard II. He was popular, and left a high reputation for ability.

**Edward IV.**, king of England, born at Rouen in 1441, was a son of Richard, duke of York. After the death of his father, in 1460, Edward was the head of the house of York, then waging a civil war against the Lancastrians, who fought for Henry VI. Edward gained a victory at Mortimer's Cross, near Hereford, entered London in February, and was proclaimed king Mar. 4, 1461. His courage, handsome person, and other popular qualities rendered him a favorite of the people of London. The cause of the Lancastrians was supported by Margaret of Anjou, the ambitious queen of Henry VI., whose army was defeated at Towton in Mar., 1461. Edward gained another victory at Hexham in 1464, and took Henry VI. a prisoner. By his marriage with Elizabeth Woodville (1464), Edward offended the earl of Warwick, the most powerful of his subjects. Warwick expelled Edward from the country in 1470; but the latter returned in 1471, defeated Warwick at Barnet (April 14), and recovered the throne. On May 4, 1471, he gained a decisive victory at Tewkesbury, which ended the War of the Roses. He died April 9, 1483.

**Edward V.**, king of England, born in Westminster Nov. 4, 1470, was the eldest son of Edward IV., whom he succeeded April 9, 1483. His uncle Richard, duke of Gloucester, then became protector of the kingdom, and obtained possession of the person of Edward V. The young king

and his brother disappeared in June, 1483, and were probably murdered in the Tower by the order of Richard, who then usurped the throne.

**Edward VI.**, king of England, a son of Henry VIII. and Jane Seymour, was born at Hampton Court Oct. 12, 1537, and succeeded his father Jan. 28, 1547. His uncle, Edward Seymour, earl of Hertford (afterwards duke of Somerset), acted as regent with the title of lord protector. The latter promoted the Protestant cause. During this reign the images were removed from the churches, the articles known as the "Bloody Statute" were repealed, and the Reformation made great progress in England. Somerset invaded Scotland, because the Scottish government refused to form a matrimonial alliance between Mary Stuart and Edward VI. He defeated the Scots at Pinkie in 1547. Somerset's enemy, John Dudley, earl of Warwick, obtained the ascendancy in 1550, and caused him to be executed. Dudley persuaded the young king to exclude the princesses Mary and Elizabeth from the throne, and to appoint Lady Jane Grey as his successor. Edward died July 6, 1553. (See SHARON TURNER, "History of the Reigns of Edward VI., Mary, and Elizabeth," 1829.)

**Edward**, prince of Wales, called the **Black Prince** (from the color of his armor), born June 15, 1330, was the eldest son of Edward III. of England and Philippa, and was created duke of Cornwall in 1337 and prince of Wales in 1343. He commanded a part of his father's army at the battle of Crécy (1346), and then adopted the crest of ostrich feathers and the motto *Ich dien* ("I serve"). This crest and motto had been borne by John, king of Bohemia, who was slain at that battle. Ever since, it has been borne by the princes of Wales. In 1355, Edward commanded the principal of the 3 armies raised by the English for the invasion of France. He landed at Bordeaux, which he captured. He gained in 1356 a brilliant victory over the French at Poitiers, and took their king, John, a prisoner. In 1361 he married his cousin Joanna, a daughter of the earl of Kent, and received from his father the title of prince of Aquitaine. In his new possessions he lived for a long time a quiet life, until drawn into Spanish politics. He defeated Henry de Transtamare in battle, and in 1367 restored Henry's rival, Peter the Cruel, to the throne of Castile. The heavy taxes caused by the Spanish campaign brought about rebellion in Aquitaine, and Limoges fell into the hands of the French by treason. Edward retook it and ordered every living being in the city to be killed, closing his military career with this act of unparalleled cruelty. He shortly after returned to England utterly broken in health. He died June 8, 1376, leaving a son, who became king as Richard II. The Black Prince was a splendid example of the virtues and qualities fostered by the spirit of chivalry. (See CRIGHTON, "Edward the Black Prince" (Lond., 1869.)

**Edwardes** (SIR HERBERT BENJAMIN), K. C. B., an English officer, born in Shropshire Jan. 17, 1820. He entered the army of the East India Company in 1840, and defeated the Dewan Moolraj near Chenab in 1848. In 1851 he published "A Year on the Punjab Frontier, 1848-49." He was appointed commissioner of Peshawur in 1853. Died Dec. 23, 1868.

**Edwards** (ARTHUR), an able Methodist journalist, was born in Ohio in 1834, graduated at Ohio Wesleyan University in 1858, entered the ministry in the Detroit conference in 1858, during the civil war was chaplain in the army for two years and a half, and served for some years as assistant editor of the "North-western Christian Advocate," the official organ of his denomination in that part of the country. His superior editorial ability led, in 1872, to his election as editor-in-chief of that journal.

**Edwards** (BELA BATES), D. D., an American theologian, born in Southampton, Mass., July 4, 1802, graduated at Amherst College in 1824. In 1833 he founded the "American Quarterly Observer." He became editor of the "Biblical Repository" in 1835, professor of Hebrew at Andover in 1837, and editor of the "Bibliotheca Sacra" in 1844. In 1848 he obtained the chair of biblical literature at Andover Seminary. He was equally distinguished for the exactness of his scholarship and for the modesty and beauty of his character. He published a "Life of Elias Cornelius" (1842), a work on the Epistle to the Galatians, and other works. Two volumes of his sermons, addresses, etc., with a memoir of his life by Prof. E. A. Park, were published in 1853. Died April 20, 1852.

**Edwards** (BRYAN), an English writer, born at Westbury May 21, 1743, passed many years in Jamaica, where he became a wealthy planter. He wrote an interesting "History of the British Colonies in the West Indies" (1793), which was highly esteemed, and an "Historical Survey of St. Domingo" (1797). He died in England July 15, 1800.

**Edwards** (GEORGE), F. R. S., an English naturalist,

born in Essex April 3, 1694. He travelled on the Continent, and acquired skill in drawing and coloring figures of animals. He published a good "Natural History of Birds," with colored plates (1743), and "Gleanings of Natural History" (1763). Died July 23, 1773.

**Edwards** (HENRI MILNE). See MILNE-EDWARDS.

**Edwards** (HENRY WAGGAMAN), LL.D., born in New Haven, Conn., in 1779, was a grandson of Jonathan Edwards. He graduated at Princeton in 1797, and studied at Litchfield law-school, was a member of Congress from Connecticut (1819-23), U. S. Senator (1823-27), Speaker of the House in the State legislature (1830), and governor (1833 and 1835-38), besides holding other important offices. Died at New Haven July 22, 1847.

**Edwards** (JONATHAN), a celebrated divine and metaphysician, born at East Windsor, Conn., Oct. 5, 1703. His father, Timothy Edwards, a man of talents and of uncommon learning for those times, was settled as minister at East Windsor. Jonathan is said to have commenced the study of Latin when only six years old. When he was ten years of age he composed an essay in which he ridiculed the idea, which some one had recently put forth, of the materiality of the human soul. In 1716 he entered Yale College, and graduated in 1720. Strong religious impressions appear to have been made on his mind in early childhood, but he dated his "conversion" from about his seventeenth year, after which all nature seemed changed in his view, everything revealing to his purified understanding the wisdom, glory, and love of God. In 1723 he took at Yale the degree of master of arts. He was tutor at Yale two years (1724-26). In the early part of 1727 he was settled as pastor of a church at Northampton. He was soon after married to Miss Sarah Pierrepont of New Haven, who in the sweetness and purity of her spirit, in the elevation of her character, and in her entire devotion to duty, may be said to have greatly resembled him. After some years of comparative peace and happiness, a difficulty arose in his congregation which put his firmness and conscientiousness to a severe test. It had become a custom in the church to admit to the communion-table all who professed with the congregation, without any inquiry as to whether they had been truly converted, or whether their spirit and life were consistent with their external profession. Jonathan Edwards believed that it was his duty to adopt a higher and purer standard. But his attempted reform caused great dissatisfaction, and he was at length driven forth from his congregation, not knowing whither to go and without any means of support for his family. Not long afterwards, however, he was offered the situation of missionary at Stockbridge, among the Housatonic Indians. About this time he wrote out his celebrated treatise on the "Freedom of the Will," the plan of which had been matured, it is said, while he was still a student at college. In 1757 he was appointed president of Princeton College in New Jersey, where he died March 22, 1758.

As a close and subtle reasoner Edwards has no superior, perhaps no equal, among those who have written in the English language. But he has a still higher claim to our respect and admiration—the spotless purity of his character and the faultless consistency of his Christian life.

Among his various writings are a "Treatise concerning the Religious Affections" (1746), and "An Inquiry into the Qualifications for Full Communion in the Church" (1749); his great work, "An Inquiry into the Modern Prevailing Notions respecting that Freedom of the Will which is supposed to be Essential to Moral Agency" (1754); "The Great Christian Doctrine of Original Sin Defended" (1757); "The History of Redemption," etc. His works were published at Worcester, Mass., in 1809, in eight volumes; and again, including much new material, in 1829, in ten volumes. A work of his, entitled "Charity and its Fruits," was published in 1852 for the first time. (See S. EDWARDS DWIGHT, "Life of Jonathan Edwards," 1830; SAMUEL HOPKINS, "Life of Jonathan Edwards," and his life in SPARKS'S "American Biography," written by SAMUEL MILLER; also THOMAS'S "Dictionary of Biography and Mythology.")

**Edwards** (JONATHAN), D. D., a son of the preceding, was born at Northampton, Mass., May 26, 1745, and graduated at Princeton in 1765. He was minister of a church at White Haven, near New Haven, Conn., from 1769 to 1795, and was dismissed for his religious opinions. He became president of Union College, Schenectady, in 1799, and published several sermons and theological treatises. He is commonly known as "the younger Edwards." Died Aug. 1, 1801.

**Edwards** (JONATHAN W.), a lawyer, a son of the preceding, was born at New Haven, Conn., Jan. 5, 1772, and graduated at Yale with distinction in 1789. He practised law at Hartford. Died April 3, 1831.



**Edwards** (JUSTIN), D. D., an American clergyman and writer, born at Westhampton, Mass., April 25, 1787. He graduated at Williams College in 1810, and for fifteen years was pastor of a Congregational church at Andover. He removed to Boston, where he preached for two years more. He resigned on account of failing health, and became secretary of the American Temperance Society, of which he was the originator. While in this office he prepared the "Temperance Manual," of which nearly 200,000 copies have been printed. He was one of the founders of the Tract Society at Boston. Of his "Sabbath Manual" over 500,000 copies have been printed. Died at Virginia Springs July 23, 1853.

**Edwards** (NINIAN), an American lawyer and Senator, born in Montgomery co., Md., in Mar., 1775. In 1808 he became chief-justice of the State of Kentucky, and in 1809 governor of Illinois. He was U. S. Senator from Illinois (1818-24), and governor (1826-30). Died July 20, 1833. His wife was a sister of Mrs. Abraham Lincoln.

**Edwards** (OGDEN), a son of Pierrepont Edwards, was born in Connecticut in 1781. He became a prominent member of the New York bar, and, besides holding other public offices, was a circuit judge (1821-41) of the first judicial district. Died at Staten Island April 1, 1862.

**Edwards** (PIERREPONT), a lawyer, and son of Jonathan Edwards, born April 8, 1750. He commenced practice in New Haven in 1771. He served in the Revolutionary army, and was a member of the old Congress (1787-88). At the time of his death he was judge of the U. S. district court of Connecticut. Died April 14, 1826.

**Edwards** (TRYON), D. D., great-grandson of Jonathan Edwards, was born at Hartford, Conn., Aug. 7, 1809, and graduated at Yale in 1828. He has been pastor of churches at Rochester, N. Y., and at New London, Conn. He has published memoirs of Bellamy and of the younger Jonathan Edwards, "The World's Laconics" (1852), "Wonders of the World" (1853), and numerous other works, chiefly of a religious character.

**Edwards** (WILLIAM), an American inventor, born Nov. 11, 1770, at Elizabethtown, N. J. His father was a son of Rev. Jonathan Edwards, president of the college at Princeton, N. J., in 1755, and his mother was a sister of Aaron Ogden, a governor of New Jersey. William Edwards introduced the system now employed in nearly all American tanneries by which leather is made in about one-fourth of the time required by the old European process. His first tannery was built at Northampton, Mass., and the first leather made in it was sent to Boston in 1794. The supply of hemlock bark having failed in the valley of the Connecticut, he turned his eyes towards the vast hemlock forests on the Catskill Mountains; and in 1817 he removed to Hunter, Greene co., N. Y., and erected on the Schoharie Creek his model tannery, which was capable of converting imported hides into sole leather with marvelous rapidity. From this establishment about 10,000 sides of sole leather were sent to the city of New York annually. He not only invented several machines, but he adapted many devices previously used for other purposes to the art of tanning, and thus he was enabled to make water-power take the place of manual labor to a great extent. The success which has attended the manufacture of leather in the U. S. must be ascribed not only to the plentiful supply of tanning material, but also to the improved methods first employed by Edwards. Died Dec. 1, 1851, at Brooklyn, N. Y. SAMUEL D. TILLMAN.

**Edwardsville**, on R. R., capital of Cleburne co., Ala. (see map of Alabama, ref. 3-E, for location of county), 77 miles W. of Atlanta, Ga. Pop. in 1880, 267.

**Edwardsville**, capital of Madison co., Ill. (see map of Illinois, ref. 8-D, for location of county), on R. R. and Cahokia Creek, 19 miles N. E. of St. Louis, Mo. Pop. in 1870, 2193; in 1880, 2887.

**Eeckhout, van den** (GERBRAND), an eminent Dutch painter, born at Amsterdam Aug. 19, 1621, was a pupil of Rembrandt, whom he imitated with success. Indeed, "The Resurrection of the Daughter of Jairus," in the Berlin Museum, and "The Presentation in the Temple," in the gallery of Dresden, have been mistaken for works of Rembrandt. He especially excelled in portraits, and was very skilful in the expression of character. Among his best known pieces is "Christ and the Doctors." Died July 22, 1674.

**Eeckhout** (JACOB JOSEPH), one of the most prominent Dutch painters of the nineteenth century, born in 1793, was first jeweller, then sculptor, and, after his twenty-eighth year, painter. He published in 1822 a lithographic collection of 60 portraits of Dutch masters.

**Ee'cloo**, or **Eccloo**, a town of Belgium, province of

East Flanders, 11 miles N. W. of Ghent. It has a town-hall, a convent, and several churches; also salt-refineries, oil-mills, and manufactures of cotton and woollen fabrics, hats, soap, tobacco, etc. Here is a large weekly market for grain. Pop. 10,200.

**Eel** [Lat. *anguilla*; Fr. *anguille*; Ger. *Aal*; Ang.-Sax. *ætl*], a name applied to many fishes of elongated and more or less serpentine shape, but properly belonging to the Anguillidæ, a family of apodal malacopterygians, of which the type is the common fresh and salt water eel (*Anguilla vulgaris*), having in Europe and America many varieties, which by most writers are considered distinct species. The CONGER (which see), the *Gymnotus* (see ELECTRICAL FISHES), and the *Murena* are among the most remarkable eels. The sand-eels, or launces (*Ammodytes*), have a very long dorsal, a long anal, and a forked caudal fin. They are all marine, and bury themselves in the sand. The *murena* was by the Romans considered one of the most delicious fishes. It was, therefore, kept in ponds, and, according to rumor, sometimes fed with slaves. Eels were generally held in great esteem by the Romans, while the Egyptians detested them, as there still are people—even whole nations; as, for instance, the Scotch—who have a prejudice against them. They are very sensitive to cold, and are not found beyond lat. 64° 30' N. In the winter-time they lose appetite and fall into a state of torpor. Very often they spend the cold season, having congregated in vast numbers, in some nook or sheltered corner, where they then are very easily caught, sometimes simply dug up. During severe frosts the conger is often found helplessly floating about on the surface of the sea. The action of the frost causes the air in its swimming-bladder to expand so much that the ordinary muscles cannot expel it at will. Under such circumstances it can readily move about on the surface in any direction it likes, but it cannot descend. In 1855 vast numbers of congers were found floating in this way along the coasts of England. No less than eighty tons were taken. Eels are said to be very long-lived. In one instance, at least, an eel is known to have become over thirty years old.

**Ee'lee, Ele, Ili, Goolja, or Kulja**, a town of the Chinese empire, on the river Ili. It was a place of banishment for Chinese criminals, was enclosed by a stone wall, and contained barracks, forts, granaries, many mosques and Chinese temples, etc., but was completely destroyed in 1863 by the insurgent Dungans, who massacred all the inhabitants and razed the buildings to the ground. It has not been rebuilt.

**Eelee**, a river of Central Asia, rises on the N. side of the Thian-shan Mountains, flows through a part of Chinese Tartary (the new Kushbegi empire), and empties itself, after a course of 600 miles, into Lake Balkash. At various times the valley of the Eelee has been the course of Oriental nations who have invaded Europe, while at present the Russians make it their course for approaching China.

**Eel River**, of Indiana, rises in Allen co., flows southwestward, and enters the Wabash at Logansport. It affords abundant water-power. Length, about 100 miles. Another Eel River rises in Boone co., Ind., and after a course of nearly 100 miles enters the West Fork of White River, in Greene co.

**Effect'** [Lat. *effectus*, from *efficio*, *effectum*, to "accomplish," "effect," or "bring to pass;" Fr. *effet*], that which is produced by a cause or agent; a result of causation; a consequence; validity, reality. Cause and effect are correlative terms in natural science. In the plural, effects signifies goods, chattels, or personal property. In the fine arts, effect is that quality whose tendency is to give particular efficacy to other qualities, so as to attract the eye of the spectator, or the impression which a picture produces when seen at a distance so great as to render the details invisible.

**Eff'en, van** (JUSTUS), a popular Dutch writer, born at Utrecht in 1684. He was the chief editor of an able review called "The Literary Journal," published in French at The Hague (1715-18). He published in Dutch the "Hollandsche Spectator" (1731-35), which was formed on the model of Addison's "Spectator," and obtained a durable popularity. He passed several years in London as secretary of embassy. Died in Bois-le-Duc Sept. 18, 1735.

**Efferves'cence** [from the Lat. *effervesco*, to "boil over"], the agitation caused by the sudden escape of gas when certain substances are mixed or combined; the escape of gaseous matter from liquids. An example of effervescence is seen when carbonate of lime is put into dilute muriatic acid. All liquids from which bubbles of gas escape rapidly are said to *effervesce*.

**Effervescing Powders**, in medicines, are of various kinds, usually put up in two papers—one containing an alkaline bicarbonate, and the other citric or tartaric acid.

After dissolving and mixing the solutions, carbonic acid escapes with effervescence. These powders are useful refrigerants, and are gently laxative. Rochelle salts are often added to increase the laxative effect, constituting what are called Seidlitz powders.

**Effingham**, R. R. junction and city, capital of Effingham co., Ill. (see map of Illinois, ref. 8-F. for location of county), 98 miles E. N. E. of St. Louis, and 199 miles S. by W. from Chicago. It has extensive manufactures of bricks. Pop. in 1870, 2383; in 1880, 3065.

**Efflorescence** [from the Lat. *effloresco* (*ef* (for *ex*), "out," and *floresco*, to "bloom"), to "flower" or "bloom"], in botany, the expansion of the flower-buds, or the time of flowering; in chemistry, the spontaneous conversion of transparent or saline crystals to powder, in consequence of the loss of their water of crystallization.

**Effluvium** (plu. *Effluvia*), a Latin word signifying a "flowing out" [from *effluo*, to "flow out"], is applied to vapors or exhalations arising from putrefying matter, especially to vapors of a morbid quality.

**Eft**, or **Ev'et**, the popular name of many small lizards and of several tailed batrachians. One of the best known is the common red salamander (*Salomandra rubra*), a batrachian of the U. S. There are numerous allied species, which are incorrectly believed by many to be venomous.

**Effusion** [Lat. *effusio*], the act of pouring out or shedding, as effusion of blood; the escape of any liquid out of its natural vessel or viscous into another cavity or into the cellular texture; also openness of heart or exuberance of sympathy.

**Égalité** [Fr. for "equality"], one of the popular watch-words of the first French revolution—"Liberté, égalité, fraternité" ("Liberty, equality, fraternity"). The duke of Orleans (1747-93) assumed in 1792 the name of "Citizen Égalité," but he was, nevertheless, guillotined. (See ORLEANS, LOUIS PHILIPPE JOSEPH, DUKE OF.) In the revolutions and revolutionary movements of the present century it has always been the "equality" which has been specially emphasized as that which was needed; a fair measure of "liberty" has, generally speaking, been obtained; the demand for "brotherhood" has quietly been dropped, except in extreme cases.

**Egan** (PIERCE), an author, artist, and journalist, born in London, of Irish descent, in 1815. He published more than twenty novels, among which are "Robin Hood," "The Flower of the Flock," and "The Poor Girl." He furnished many excellent designs on wood for the "Illustrated London News," and was long an editor in London. He contributed largely to English and American journals. D. July 6, 1880.

**Egbert**, king of the West Saxons, born about 775, was a descendant of Cerdic. He passed many of his early years at the court of Charlemagne, and began to reign in 800 A. D. At this date England was divided into three separate kingdoms, Mercia, Northumbria, and Wessex. He defeated the Mercians at Ellandune in 823, soon after which he completed the conquest of Mercia and Northumbria, ruled over all the states of the Heptarchy, and gave the name of England to the whole. In 835 he defeated an army of Danes who had invaded England. He died in 836 A. D., and was succeeded by his son Æthelwulf. (See LAPFENBERG'S "History of England under the Anglo-Saxon Kings," translated by Thorpe, 1845.)

**Egede** (HANS), a Danish missionary, born at Harstad, Norway, Jan. 31, 1686. He became pastor of the church of Vaagen in 1707, and went in 1721 to Greenland, where he founded a mission for the conversion of the natives. He labored in Greenland about fifteen years, and endured great privations. His wife, who had accompanied him, died in 1735, and he then returned to Copenhagen, where he was appointed a bishop in 1740. He wrote an account of his missionary labors (1738), and a "Description of Greenland" (1741-44). Died Nov. 5, 1758. (See RUDERBACH, "Christl. Biographie," part vi.) His son PAUL, born in 1708, went with his parents to Greenland in 1721. He assisted Hans in the work of converting and teaching the heathen, and remained there until 1740. He became bishop of Greenland in 1776. He published a valuable dictionary (1764) and grammar (1760) of the Esquimaux; and also "Information on Greenland" (1789), besides other works. Died June 3, 1789.

**Eger**, a river of Bohemia, rises near the town of Eger, and enters the Elbe 33 miles N. N. W. of Prague, after a course of about 125 miles.

**Eger**, a town of Bohemia, on the river Eger, 92 miles W. of Prague, was formerly fortified. It is situated at the junction of six railroad lines. It is built on a rock, and was an important fortress. Here are the ruins of a citadel

or castle formerly the residence of kings and emperors. Eger has seven churches, a fine town-hall, and two monasteries; also manufactures of broadcloth, cotton goods, chintz, and soap. Wallenstein was assassinated here in 1634. Near it is the watering-place Franzensbad, with five springs. Pop. in 1881, 16,045.

**Eger**, in Hungary. See ERLAU.

**Egeria** [Fr. *Egérie*], a nymph who, according to the Roman mythology, was one of the Camenæ, and was a prophetic divinity from whom Numa derived religious inspiration and directions respecting the forms of worship. The poets feigned that Numa had interviews with her in a grove, and that when he died she melted away in tears, which became a fountain.

**Egeria**, one of the asteroids of the solar system, was discovered at Naples in Nov., 1850, by De Gasparis.

**Egerton** (FRANCIS HENRY). See BRIDGEWATER, EARL OF.

**Égerton** (FRANCIS LEVESON GOWER), EARL OF ELLESMERE, an English author and patron of art, was born in London Jan. 1, 1800. He was the second son of the first duke of Sutherland, and his original name was Francis Leveson Gower, but he assumed the name of Egerton in 1833, when he inherited the estate of the last duke of Bridgewater. He entered the House of Commons in 1820, became chief secretary for Ireland in 1828, and was secretary at war for several months in 1830. Among his works is a poem called "The Camp of Wallenstein." He was created earl of Ellesmere in 1846. His gallery of paintings was one of the most valuable collections in England. Died Feb. 18, 1857.

**Egg** [Lat. *ovum*; Fr. *œuf*; Ger. *Ei*] is properly the name of the ovum of certain animals (birds, reptiles, fishes, insects, etc.) which discharge the embryo with its envelopes before the development of the organism. The name is frequently used in an extended sense to include all ova. The most perfect examples of the egg are those of birds and the higher reptiles. These eggs consist of a shell (*putamen*) consisting of carbonate of lime, a little animal matter, and traces of magnesia, phosphorus, iron, and sulphur. Lining the inside of the shell, we find the tough shell-membrane. The albumen, or white of egg, differs from the albumen of the blood in some of its chemical reactions, and is distinctively known as egg-albumen. It is of great importance in the arts, chiefly in the preparation of albumenized paper for photographers' use. In medicine it is used as an antidote for poisoning by corrosive sublimate and sulphate of copper, with which it forms insoluble compounds. The yolk (*vitellus*) is a highly nutritious substance, containing large proportions of nitrogenous and fatty matter. The structure and development of the different parts of the egg are described under EMBRYOLOGY (which see).

**Egg**, or **Eigg**, an island of Scotland, is 8 miles S. W. of Skye, and 12 miles from the W. coast of Inverness-shire. Length,  $4\frac{1}{2}$  miles. Here are some remarkable cliffs of trap or basalt, and columns of pitchstone nearly two feet in diameter.

**Egg** (AUGUSTUS), an English painter, born in London May 2, 1816. He was elected an associate of the Royal Academy in 1848. Among his works are illustrations of comic scenes in Shakespeare's plays, and "The Life and Death of Buckingham." Died at Algiers Mar. 26, 1863.

**Egga**, a populous town of Africa, in Guinea, on the right bank of the Niger, in lat. 8° 42' N. and lon. 6° 20' E. It extends nearly 2 miles along the river. The houses are mostly small huts of clay. Narrow cotton cloth is manufactured here in large quantities. Egga has an active trade in corn, yams, calabashes, dried fish, etc.

**Egg Bird**, or **Sooty Tern** (*Sterna fuliginosa*), the name of a bird belonging to the gull family, and having the back and wings sooty black and the under parts white. The wings and tail are long and pointed, the latter deeply forked. It abounds in the West Indian seas and in Florida. It lays its eggs in a small excavation in the sand. Its flesh is said to be very delicious, and is much sought after.

**Egger** (ÉMILE), DR. LIT., was born of German descent in Paris July 13, 1813, and received his degree in letters in 1833. He held various professorships of ancient languages in Paris, and was well known for his editions of the less known Latin writers. He was a member of the Institute and of the Academy, and an officer of the Legion of Honor. He published "Latini Sermones Veterustior Reliquiæ Selectæ" (1843), "Notions Élémentaires de Grammaire Comparée" (1852), "Mémoires d'Histoire Ancienne et de Philologie" (1863), and numerous other works. D. 1885.

**Eggers** (JACOB), born at Dorpat, in the present government of Livonia, Russia, Dec. 14, 1704, died at Dantzg Jan. 12, 1773. He received his first instruction at Arch-

angelsk, whither his parents had moved; but after the Peace of Nystad he was brought to Stockholm, entered the Swedish army, and devoted himself especially to the study of engineering and fortification. In 1728 he visited France and the Netherlands; in 1736, Italy, Hungary, and Serbia. In 1735 he was employed by King Stanislaus, in 1741 by the elector of Saxony, and in 1747 he joined the French army before Bergen-op-Zoom.

**Eggleston** (EDWARD), D. D., a distinguished Methodist divine and author, was born in Vevay, Ind., in 1837, joined the Methodist ministry in his nineteenth year, and preached during ten years in Minnesota. He began his literary career in 1866 as editor of "The Little Corporal," commenced in 1867 the "Sunday-School Teacher," in 1870 went to New York City and became editor of "The Independent," was some time editor of "Hearth and Home," and contributor to "Scribner's Monthly." His tales commanded immediate and general interest, and his success led him to retire from editorial life and devote his time to authorship. In 1871 appeared his "Hoosier Schoolmaster," which immediately determined his rank among the first of American novelists, and has been often translated. In 1872 was published "End of the World;" in 1873, "The Mystery of Metropolisville;" in 1878, "Roxy." In 1879 he began a series of American biographies: "Pocahontas," "Montezuma," etc. In 1884 he published "Queer Stories for Boys and Girls."

**Egg Plant** (*Solanum Melongena*), an annual herbaceous plant of the same genus as the potato and nightshade, is a native of India and Northern Africa. The fruit is a globose or egg-shaped berry about four inches in diameter, but the size varies much according to the quality of the soil and climate. It is cultivated for food in India, the U. S., and various warm climates, and is cooked before it is eaten. This plant flourishes in New Jersey, but not so well in the more northern States of the Union. The seeds should be sown in a hot-bed in April, and transplanted in May or June. There are several varieties of this plant, which produce respectively purple, white, and red fruits. In some countries it is called aubergine or aubergine.

**Egham**, a village of England, in Surrey, on the Thames, 18 miles W. of London and 3 miles E. of Windsor. Here is the field of Runnymede, where King John and the barons held a conference which resulted in the signing of Magna Charta in 1215.

**Egidistadt**. See NAGY ENYED.

**Egina**. See *ÆGINA*.

**Eginhard**, or **Eginard**, a French historian, was born in Austrasia, and was a pupil of Alcuin. He gained the confidence of Charlemagne, who appointed him his secretary. He accompanied that emperor in his journeys and military expeditions. After the death of Charlemagne he passed into the service of Louis le Débonnaire. According to a doubtful tradition, he married Emma, a daughter of Charlemagne. His chief works are a "Life of Charlemagne" (in Latin), which Parke Godwin characterizes as "a neat and lively specimen of biography," and "Annals of the French Kings from 741 to 829;" best edition of both in Pertz, "Monumenta Germaniæ Historica," vols. i. and ii. Died in 844 A. D.

**Eg'lantine** [Fr. *églantine*, probably akin to the Fr. *aiguille*, a "needle," so called on account of its prickles], a name of the *Rosa rubiginosa*, a species of rose sometimes called sweetbrier. It is a native of Europe, and is naturalized in the U. S. The flower is single and fragrant. The leaves also emit a peculiar fragrant odor from their russet-colored glands. This plant sometimes grows eight feet high, and is common in fields and roadsides.

**Egleston** (THOMAS), A. M. See APPENDIX.

**Eglington Castle**, in Ayrshire, Scotland, 2 miles N. of Irvine, is a magnificent Gothic structure, surrounded by a park of 1200 acres. (See next article.)

**Eglington and Winton** (ARCHIBALD WILLIAM MONTGOMERIE), EARL OF, a British peer, born Sept. 29, 1812. He succeeded the fourteenth earl of Eglington in 1819. In politics he was a conservative. He was appointed lord lieutenant of Ireland in 1852 and in 1858. A famous tournament occurred at his castle (above noticed) in 1839, and was attended by Louis Napoleon, afterwards emperor. Died in Oct., 1861.

**Eg'mont or Egmond** (LAMORAL), COUNT OF, and PRINCE DE GAVRE, an eminent Flemish nobleman and general, born in 1522. He was descended from the dukes of Gelderland, and married Sabina, duchess of Bavaria, about 1545. He served in the armies of Charles V., who created him a knight of the Golden Fleece in 1546. In 1557 he commanded the cavalry of the Spanish army, and defeated the French at Saint-Quentin. He gained a decisive victory at Gravelines in 1558, and acquired much popu-

larity. As an associate of William, prince of Orange, he opposed the intolerant and despotic policy of Philip II., but he constantly adhered to the Catholic Church. He was appointed a member of the council of state in 1559. He ceased to act with the popular party after they revolted against the Spanish king, but the latter regarded him with jealousy and hatred, and sent the duke of Alva to Flanders with viceregal power in 1567. Alva was a bitter enemy of Egmont, and is said to have brought his death-warrant from Philip. Egmont and Count Hout were arrested, tried for treason, and executed June 5, 1568, at Brussels. This cruel act provoked a general revolt against Philip II. The story of Egmont is the subject of a tragedy by Goethe. A statue was erected to Egmont in 1865. (See MOTLEY, "Rise of the Dutch Republic," chap. ii., part 3; BRUNELLE, "Eloge du Comte Egmont," 1820.)

**Eg'mont, Mount**, an active volcano of New Zealand, is in the northern island or New Ulster, 18 miles S. of New Plymouth. It rises 8840 feet above the level of the sea.

**Egmont, Port**, is on the N. coast of West Falkland Island, between Keppel and Saunders islands, in lat. 51° 21' S., and lon. 60° W. It affords good anchorage and fresh water, but it has very little wood and no provision of any other kind to offer.

**E'gret, or Aigret** [the diminutive of the provincial Fr. *égrenon* or *aigron*, a "heron"], a name applied to several species of heron. The egret is a handsome bird with soft flowing plumage, pure white excepting the train, which has a creamy tinge. The plumes are much used for ornamental purposes, particularly those of the little egret (*Ardea garzetta*). The egret frequents low, marshy grounds, and subsists on fish, frogs, snakes, lizards, etc.

**Egripo, or Egripes**, a town of Greece. See CHALCIS.

**Egypt** [Gr. *Αἴγυπτος*; Lat. *Ægyptus*; Heb. *Mizraim*; Fr. *Égypte*; Ger. *Ägypten*; Coptic, *Cham* or *Khem*; It. *Egitto*; Arab. *Misr* or *Misr*], a country in the N. E. part of Africa, is bounded on the N. by the Mediterranean Sea, on the E. by the Red Sea, on the S. by Nubia, and on the W. by the Great Desert. Being isolated on several sides by seas and sandy deserts, its limits have remained nearly the same in all the successive periods of its history. It extends from lat. 24° 2' to 31° 37' N., and is about 525 miles long N. and S. It comprises the lower portion of the valley of the Nile, from the cataract of Assuan to the mouth of the river. This region is unique in several respects, and is renowned as the home of the first civilized nation of the world—the foremost pioneers in the march of human progress. When Plato was born the monuments of Egypt had stood for many centuries, and they still exist. The area of Egypt proper is estimated at 210,000 square miles. But the rulers of Egypt also claim jurisdiction over all the Soodan, embracing all Nubia, Sennaar, Dongola, Taka, Fazogloo, Kordofan, the provinces of the White Nile, and Khartoom. The area of the annexed and conquered districts of Egypt, including Nubia, Kordofan, Darfour, the Soodan, and the equatorial provinces, is estimated at 1,026,250 square miles. The territory ruled by the sovereign of Egypt, embracing that in Central Africa and on the Upper Nile conquered in 1874-75, is roughly estimated to contain 1,406,250 English square miles.

Besides the Delta and several oases in the Desert, Egypt Proper is a valley about 500 miles long, confined between two ridges or continuous chains of barren limestone hills. Anciently, the desert east of the Nile supported a considerable population, chiefly pastoral. The altitude of the highest hills is not much over 1200 feet. The average breadth of the valley is about seven miles. The fertility and verdure of this narrow tract present a remarkable contrast to the aridity and desolation that prevail on either side. The most important physical feature of Egypt is its great and unique river, the Nile, which in the last 1300 miles of its course receives no tributary stream, and is the source of all the country's fertility. The periodical overflow of this once mysterious river is among the most remarkable instances of the stability of the laws of nature. For several thousand years the average height and duration of the inundation have continued nearly the same. The ordinary rise of the water at Thebes is about thirty-six feet, and at Cairo about twenty-five feet. The average rate of addition to the soil is about four and a half inches in a century. About 100 miles from the sea the Nile divides into several channels, and its narrow valley expands into the vast level and alluvial plain of the Delta. According to Herodotus, the Nile had seven mouths in ancient times, but at present there are only two large navigable channels—namely, the Damietta and the Rosetta mouths. This country is divided into three primary divisions—the Said or Upper Egypt, the Vostani or Middle Egypt, and the Delta or Lower Egypt. The term Delta, however, is some-

times restricted to the triangular tract enclosed between the two main channels of the Nile.

The great Libyan desert lying W. of the Nile is diversified by several fertile oases. The Great Oasis, situated near the W. border of Upper Egypt, is nearly 100 miles long. The oasis of Seewah (anc. *Ammonium*) is about 300 miles W. of Cairo. Here was the site of the famous temple of Jupiter Ammon. The date-palm, grapevine, and fig tree flourish in this oasis, but all the divisions of Egypt are destitute of forests and deficient in timber. But forests have been planted by the khedive in the Delta, and it is asserted that the annual rainfall has already been greatly increased thereby. It appears that all the ancient temples were built to shed rain. The climate is remarkably dry, serene, and equable. Rain seldom falls in Upper Egypt. In the Delta the mean temperature of winter is about 54° Fahrenheit, and that of summer 82°. A hot and pernicious south wind called khamseen or simoom prevails for nearly two months in spring. During eight months in the year the north wind blows, and favors those who wish to sail up the river. The Nile, replenished by the annual rains which fall on the highlands of Abyssinia, begins to overflow in July, and continues to rise until September. The inundation reaches its maximum near the autumnal equinox. The water, in which fertilizing mud and slime are suspended, is distributed over the valley by numerous canals, for the purpose of irrigating the land in summer. In October the country resembles a sea, in which the towns and villages appear as islands. After the inundation has subsided, grain and seeds are sown, and the earth is rapidly covered with verdure, so that nature here displays the brightest green in the winter months of December and January. The chief productions are wheat, barley, maize, cotton, tobacco, sugar, beans, millet, durrah (*Sorghum vulgare*), indigo, hemp, flax, onions, clover, oranges, figs, and grapes. Two crops are raised in a year on the same piece of land. The wheat harvest comes in April, or earlier in some parts of Egypt. The soil in the Delta is said to be fifteen feet deep.

*Minerals, Animals, etc.*—Limestone, sandstone, and red granite or syenite are abundant here. The last is found in the southern part, at Asswan, the ancient *Syene*, from the cliffs of which were obtained the material for the obelisks and other colossal monolithic monuments of ancient Egypt. Between Asswan and Esneh is an extensive sandstone formation, which supplied material for the great temples at Thebes and other ancient cities. The Pyramids are built of limestone quarried in their vicinity. In the Jebel Mokattam, between the Nile and Suez, is a tract covered with the silicified trunks of trees. A similar phenomenon of a petrified forest occurs also in the desert of the natron lakes near the western border of the Delta. The soil of Lower Egypt is an alluvium deposited by successive inundations, and consists of a dark-brown mould or argillaceous loam mixed with sand. This delta has increased enormously within the historic period. Among the minerals of Egypt are alabaster, porphyry, and emeralds. The principal wild animals are the wolf, hyæna, jackal, antelope, crocodile, and jerboa. The hippopotamus was formerly found here. The domestic animals of Egypt are camels, horses, horned cattle, asses, sheep, etc. Among the birds are the vulture and the ibis, the latter reputed sacred by the ancient Egyptians. The flora of Egypt abounds in dicotyledonous plants armed with thorns and bearing pale-green leaves, as the acacia. The principal trees are the date-palm (which is commonly cultivated), the doum-palm, the sycamore, the cypress, and the tamarisk. Among the indigenous plants are the papyrus, the lotus, a species of water-lily, and the *Acacia vera* (or *nilotica*), from which gum-arabic is obtained.

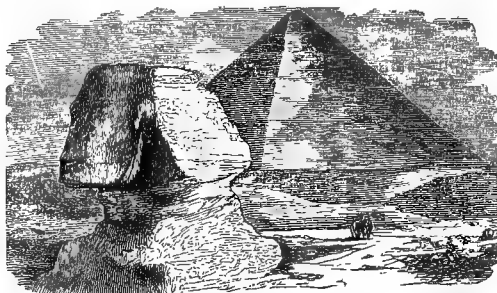
The Turks have been the ruling class in Egypt since they conquered the country, and they still occupy most of the high places in the civil administration as well as in the army. The ruling dynasty is descended from them, but of late has begun to favor the Arabic element of the population in preference to the Turkish. The Bedouins, whose number is officially estimated at about 400,000, are the unmixed descendants of the Arabs; while the Arabs of the towns and the Fellahs, the peasants and laborers, are believed to descend from a mixture of the ancient Arabs and the ancient Egyptians. The Courts (which see) are the unmixed descendants of the ancient Egyptians. Nominally, Egypt is still a pashalic of Turkey, but in 1841 a bashi-bashef made the rule over it hereditary in the family of Mehmet Alee, the oldest living male member of the family being entitled to succession in accordance with the law which also predominates at Constantinople. In 1866 the sultan, at the request of Ismael Pasha, changed the law of succession so as to make the pashalic hereditary in the direct male line of the ruling prince. At the head of the administration are a council of state, established in 1852, and consisting in 1872 of the eldest son of the khedive as

president, of a son-in-law of the khedive, and five of the most prominent statesmen; and of a state ministry, which in 1872 was divided into seven departments—namely, justice and grace, foreign affairs, finances, interior, public instruction and public works, war, and navy. An assembly of deputies was for the first time convoked by the khedive on Nov. 27, 1866, and has since met annually. It is to control the administration of the country and to fix the budget. For administrative purposes Egypt Proper is divided into fourteen provinces, at the head of each of which is a governor called moodeer. The cities of Cairo, Alexandria, Suez, Port Saeed, Damietta, Rosetta, and Cossaiier do not belong to any of the provinces, but have their special governors. The provinces are subdivided into districts, and these into cantons. Special governors have also been appointed at Massowah and Soakin, who are dependent upon the governor-general of the Soodan, who resides at Khartoom. A large majority of the inhabitants are Mohammedans of the Sunnite sect. The supreme authority for all matters of religious law is the council of ulemas at Cairo, consisting of the heads of each of the four orthodox rites of the Sunnites, of the head of the Cairo University, of the chief kadi of Cairo, and the nakes or chiefs of the descendants of the Prophet. Among the Mohammedan high schools, the one which is connected with the Mosque al Azhar at Cairo, often called the University of Cairo, is the most celebrated. It was formerly one of the chief seats of Arabic learning, and had sometimes as many as 20,000 students; and even at present it attracts students from all parts of the Mohammedan world. A great progress in the cause of education was made by the establishment in 1868 of government schools in the large towns of the countries. These schools numbered in 1870 about 4000 pupils, and embrace both primary and secondary instruction. In the latter department a number of special schools, as a polytechnic school, a law school, a philological school, an art school, a medical school, a naval academy, are included, and more recently Prof. Brugsch of the University of Göttingen has received and accepted a call from the Egyptian government to organize an academy of Egyptian archaeology. The periodical press is still in its infancy. In 1870 there was only one weekly newspaper published in the Arabic language; all the other papers appeared in the French, Italian, or Greek language.

The population of Egypt Proper was in Mar., 1881, officially estimated at 5,517,000, including Copts, Bedouin Arabs, Jews, Armenians, and Fellahs. The total number of Europeans residing in Egypt was 68,653—namely, 29,963 Greeks, 14,524 Italians, 14,310 Frenchmen, 3795 Englishmen, 2480 Austrians, 1003 Spaniards, and 879 Germans. The two largest cities are Cairo, the capital, and Alexandria. The revenue in the budget for the year Sept., 1880, to Sept., 1881, was estimated at \$42,808,110, the expenditures, at \$39,558,110. The public debt in Jan., 1881, amounted to \$459,765,600. The value of the imports of Alexandria is about 560,900,000 piastres, that of exports, 999,500,000; about 3000 vessels enter the port of that city, and a similar number are cleared. The army, which is recruited by conscription, numbers about 14,000 men, and the navy consists of twelve steamers. A ship canal connecting the Mediterranean with the Red Sea has been cut through the Isthmus of Suez under the direction of M. de Lesseps. It was opened on the 17th of Nov., 1869; it is about 100 miles long, 25 feet deep, and 71 feet wide at the bottom. The receipts during the year 1871 were 13,276,674 francs; the expenditures, 15,918,579 francs. In that year the canal was traversed by 765 vessels, of 761,467 tons. In 1882 no less than 3198 vessels, of 7,122,125 tons, passed through the canal, and the gross receipts of the company amounted to £2,536,343. Egypt has 711 English miles of railroad in operation; the aggregate length of telegraph lines is 3904 miles, and of telegraph wires 8292 miles.

*Ancient History and Monuments.*—"Egypt," says Bunsen, "is the monumental land of the earth, as the Egyptians are the monumental people of history." The same writer calls the Egyptians "the chronometers of universal history." The sacred history of the Hebrews informs us that the Egyptians were descendants of Ham. The other chief authorities in relation to the antiquities and chronology of Egypt are Bunsen, Champollion, Lepsius, Wilkinson, Sharpe, and Poole, who differ widely in their computations. The first mortal who is recorded to have reigned over all Egypt was Menes, the founder of the first of thirty dynasties. His epoch is fixed by Bunsen at 3643, by Lepsius at 3892, and by Poole at 2717 B. C. Before Menes, Egypt was perhaps divided into two or more independent kingdoms. Menes is said to have founded Memphis, but no contemporary monuments of his reign exist. The great pyramid of Cheops is supposed to have been built by a king of the fourth dynasty, and is among the oldest Egyptian monuments that are extant. According to a somewhat doubtful tradition,

Cheops, who reigned nearly 500 years after Menes, oppressed his subjects with forced labor in the construction of this



Sphinx and Pyramid.

pyramid. Memphis was the capital of many of the kings who reigned before the time of the eleventh dynasty. Each king appears to have founded a pyramid as a memorial of his reign or as a monument for himself. Among the oldest cities of Egypt was Thebes (*Diospolis*, called *No* or *No-Ammon* in the Bible), the temples and palaces of which are at this day the most magnificent ruins on the globe. Before the foundation of Carthage and Rome, Egypt was the central point of the civilization of the world. Among the famous kings of the twelfth dynasty was the warlike Osirtesen I., who is supposed to have been the Sesostris of the Greeks. An obelisk which he erected at Heliopolis is still standing. Amenemha, a king of the twelfth dynasty, excavated Lake Moeris, and constructed the famous Labyrinth, which Bunsen describes as "the most gorgeous edifice on the globe." It contained twelve palaces and 3000 saloons. (See LABYRINTH.) After the fourteenth dynasty the Hyksos or "shepherd kings," who were of foreign origin, ruled over Lower Egypt for several centuries. According to some writers, the Hyksos invaded Egypt about 2200 B. C. With the eighteenth dynasty, about 1525 B. C., commences the most brilliant period of Egyptian history and the greatness of Thebes. Among the most famous of the Theban kings were Amenoph I., Thothmes I., Thothmes III., Amenoph II. and III., and Horus, of the eighteenth dynasty, and Sethos and Rameses II. of the nineteenth. These kings builded the grand temples and palaces of Karnak and Luxor. Their conquests and victories over the Assyrians, Ethiopians, and other nations are recorded on obelisks, temples, and tombs with elaborate art and very copious details. "The most splendid period of the empire of Thebes," says Heeren, "must have occurred between 1800 B. C. and 1300 B. C." Probably no ancient nation has worked with such assiduity and ingenuity to perpetuate the record of its life and actions, and to eternize the memory of its ideas and institutions. In consequence of the peculiarly dry and equable climate and the solidity of Egyptian architecture, the monuments of this country have surpassed all others in durability. The permanence of the institutions of Egypt was doubtless promoted by the sight of public monuments which had defied the corroding power of time. "No people, ancient or modern," says Champollion, "has conceived the art of architecture on a scale so sublime, broad, and grandiose as the ancient Egyptians." "In ancient art," says the "Encyclopædia Britannica," "the Egyptian has the highest place with respect to intention, and equals that of Greece and Assyria in the excellence with which that intention has been carried out." According to Bunsen, the "Egyptians left imperishable monuments of deep ethical thought, of high artistic instincts, and of noble institutions."

A king of the twenty-second dynasty, called Shishak in the Bible, captured Jerusalem in the reign of Rehoboam, about 972 B. C. The Hebrew writers employ the name of Pharaoh as a general title of the kings of Egypt. Among the notable kings of the twenty-sixth dynasty was Psammetichus, who began to reign about 670 B. C., and favored the immigration of the Greeks into Egypt. A revival of art occurred in his long reign, which was an important epoch. His son and successor, Necho, defeated Josiah, king of Judah, at Megiddo. Egypt was conquered about 525 B. C. by Cambyzes, king of Persia, but regained its independence under Amyrtaeus, a king of the twenty-eighth dynasty. In the year 350 B. C., Egypt was again conquered, by the army of Darius Ochus, king of Persia, and Nectanebus II., the last king of the thirty dynasties, ceased to reign. The succession of Egyptian monarchs, embracing a period of 3553 years, is unexampled in history. In 332 B. C., Alexander the Great invaded Egypt, which became an easy conquest, as the natives refused to fight for their Persian masters. He founded Alexandria, and partially Hellenized the country, but the Egyptians continued to be governed by their own laws. The regulations which he made for the

government of Egypt were equally wise and popular. The privileges of the priests were secured to them, but the Greeks became the dominant class. Egypt continued to be a prosperous and powerful kingdom under several Grecian or Macedonian kings named Ptolemy. Under the rule of the Ptolemies, and of the Romans, who became masters of Egypt about 30 B. C., Alexandria was a famous centre of learning and philosophy, as well as a great commercial emporium. According to some Egyptologists, the first seventeen dynasties were not consecutive, but some of them were contemporaneous, and two kings reigned at the same time over different portions of the country. (Some notice of the ancient monuments of Egypt may be found under the heads of THEBES, EDFOO, KARNAK, PYRAMID, and ONE-LISK.)

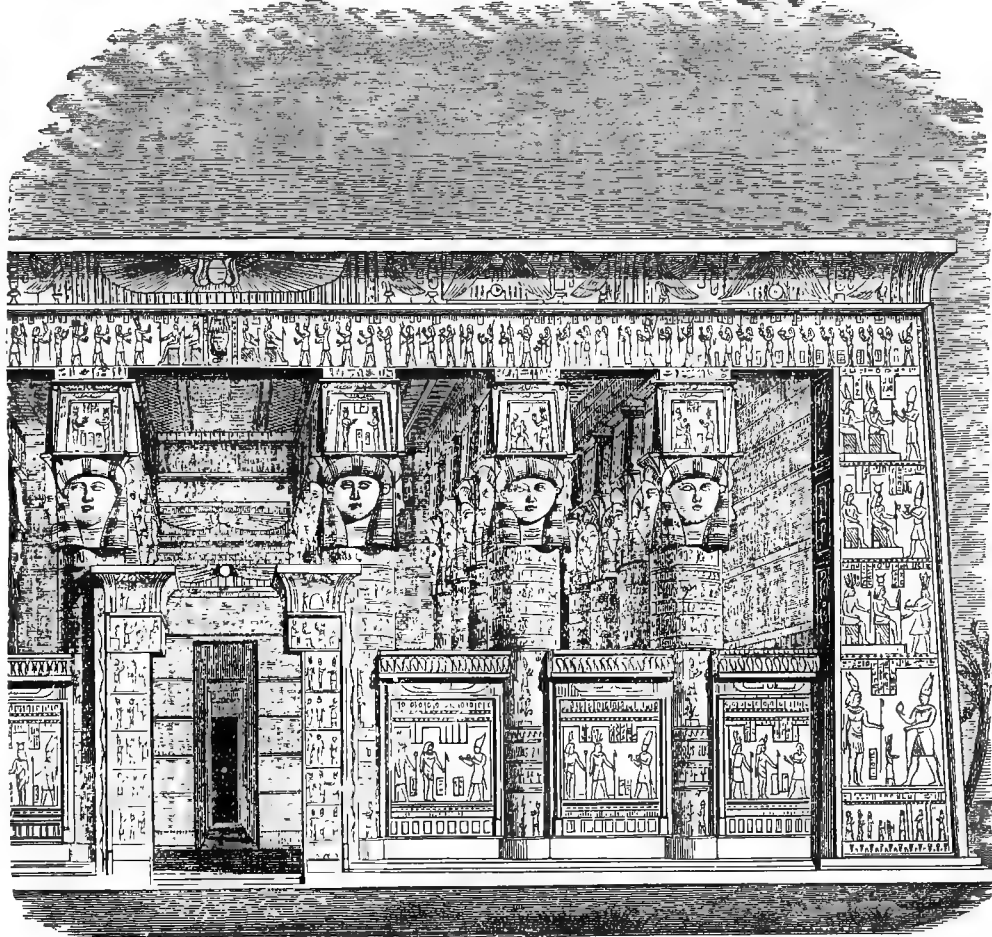
Among the peculiarities of this nation was the hieroglyphic mode of writing, and the practice of covering their obelisks and the outer and inner walls of temples and palaces with sculptured bas-reliefs and hieroglyphic symbols, which not only recorded historical events, but also represented in copious detail their social customs and private life. They lavished labor and expense on temples and tombs, while their private houses were plain and inexpensive. The priests were the ruling class, and were distinguished by their superior science, which they kept secret. The government was a limited hereditary monarchy. The priests were in ordinary times the real governing body. They were the sole depositaries of learning and science. The chief priests were the judges of the land, the councillors of the sovereign, the legislators, and the guardians of the great mysteries. The king himself was anciently a priest. Nowhere in the ancient world was the number of temples so great as in Egypt; nowhere was ordinary life so intimately blended with religion. The ancient Egyptians were people of a devout, serious, and contemplative disposition. They believed in the immortality of the soul, and apparently also in the resurrection of the body, but they worshipped beasts, reptiles, and even vegetables, probably as symbols. They were brave in war, and less cruel than the Assyrians. They excelled in magic arts, and had made much progress in various sciences before the time of Moses, who was "learned in all the wisdom of the Egyptians." They calculated solar and lunar eclipses, and carried astronomy to the highest point it could attain without the aid of modern instruments. They appear to have been well versed in geometry, arithmetic, mechanics, and hydraulics, and must have had a considerable knowledge of chemistry. Herodotus and Cicero concur in the opinion that they were the most learned and accurate of all nations in relation to their native annals. More than 1000 years before Phidias was born they had attained great proficiency in sculpture. Champollion, in a letter dated at Thebes, says: "I write these lines almost in the presence of bas-reliefs which the Egyptians executed with the most elegant delicacy of workmanship 1700 years before the Christian era." In their temples and palaces we see massive grandeur of form, noble taste in design, exquisite finish in decoration, and a pervading expression of repose which is one of the highest results of art. Among the arts in which they acquired skill was music, and it appears that they played on the harp, lyre, and sistrum during the twelfth dynasty or earlier. The Greeks attributed to them the invention of the lyre and flute. They also fabricated glass bottles and beads, some of which are marked with symbols indicating a date of 1500 B. C. Women enjoyed nearly equal rights, and were so well treated that their condition was more favorable in Egypt than in other ancient nations. Several women, among whom was Nitocris, a queen of the sixth dynasty, inherited the throne and exercised royal power. The soldiers, who were all landholders, constituted the highest class except the hereditary priesthood. According to Strabo, there were only three castes—priests, soldiers, and husbandmen (farmers). The stamp of caste was not indelible. The land was divided into three unequal portions, of which one belonged nominally to the king, and was held by tenants, who paid a low rent or one-fifth of the crop; another portion was possessed by the priests, who paid no rent or tax; the third part was held by the military class or order, who amounted to 410,000 men, and had six acres each, for which they paid no rent, but they were bound to serve in the army in time of war. They used many war-chariots, which appear to have been introduced about the time of the eighteenth dynasty. The ancient Egyptians carried on an extensive commerce, for which their position was very advantageous. The navigation of the Nile (the longest inland navigation known to the ancients) and the Red Sea enabled them to command the trade of several foreign countries. The rich products of India and Arabia have in almost all ages passed through Egypt on their way to Europe. Necho, the Nekao II. of Manetho, and the Pharaoh-Necho of Scripture (611-595 B. C.),



of the twenty-sixth dynasty, is said to have been the first of their kings who had a navy of war-vessels. His navy was built by Phœnicians in the Red Sea, and having sailed around Africa, entered through the Strait of Gibraltar into the Mediterranean. This statement is doubted by some

writers. Diodorus states that the population amounted to 7,000,000 in the Pharaonic era.

The style of architecture and decorative art which prevailed in ancient Egypt was one of the characteristic and almost unchangeable peculiarities of the race. For example,



Temple of Denderah.

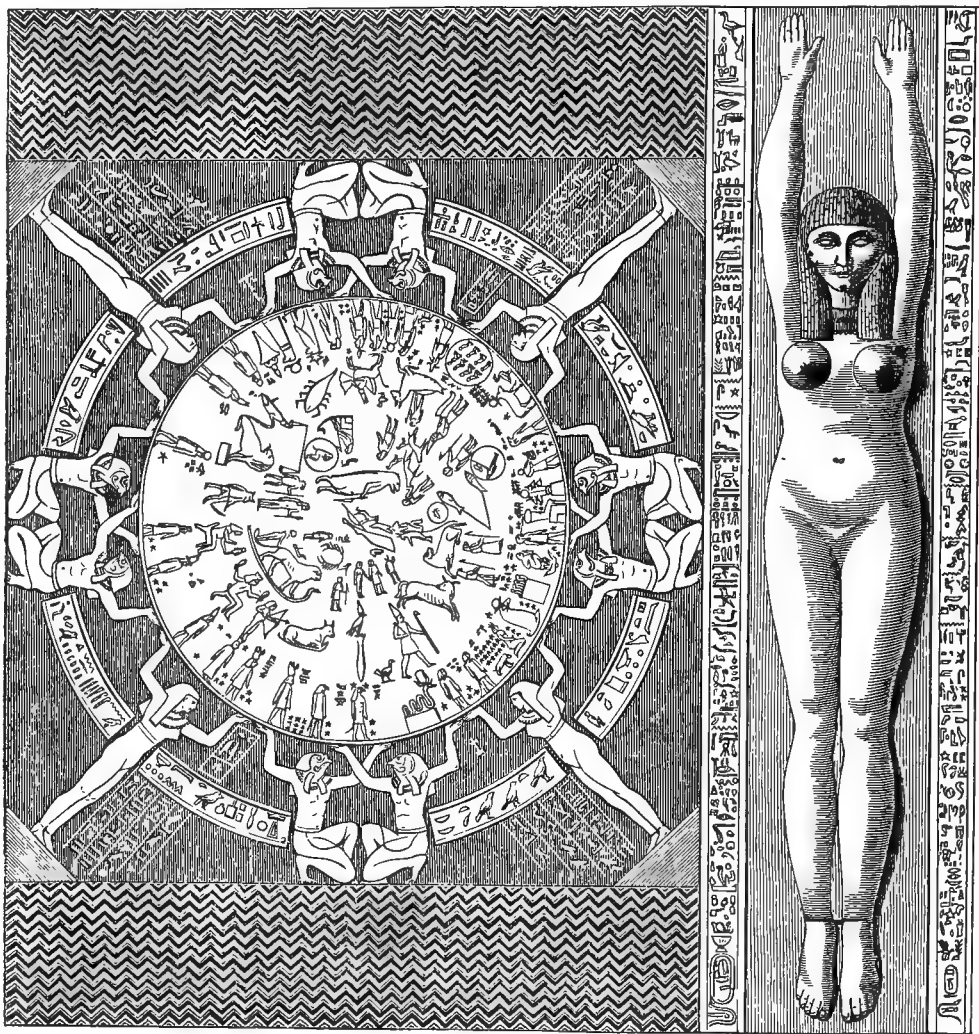
the celebrated temple of Denderah has been assigned to a date of the most extreme antiquity, though it is now generally referred to the early Roman period. The ceiling of this temple is adorned with figures arranged in the style of a zodiac, and well known as "the Zodiac of Denderah;" but some recent writers deny that it has any astronomical significance. The temple itself is believed to have been dedicated to the service of the goddess Athor, the Egyptian Venus.

**Modern History.**—When the Roman empire was divided, on the death of Theodosius in 395 A. D., Egypt became a part of the dominions of Arcadius, emperor of the East. For several centuries after the time of Constantine the Great (306-337 A. D.), Egypt was greatly disturbed by religious controversies and violent tumults between the different sects or parties of Christians, who were very numerous there. The Arians and orthodox shed torrents of blood in Egypt. In 640 A. D. the Arabs, led by Amroo, a general of the caliph Omar, invaded Egypt. The oppressed Egyptians, being disaffected to the emperor Heraclius, and having no strong motive to fight, offered little resistance, and the conquest of the country was easily effected in December, 640. Amroo wrote to Omar that "he had taken a city [Alexandria] which beggared all description, in which he found 4000 palaces, 400 theatres," etc. Greek civilization and literature, which had flourished in this country for 900 years, then came to an end, and Egypt became a part of the kingdom of the caliphs who reigned at Damascus and afterwards at Bagdad. About 970 A. D., Egypt was conquered by the Fatimite dynasty, under which Cairo was founded and became the capital. Saladin, the famous adversary of the crusaders, obtained the sovereign power as sultan of Egypt about 1170. He died in 1193, leaving several sons, among whom his extensive empire was

divided. Louis IX. of France conducted a crusade against Egypt in 1248, but was defeated and taken prisoner by the Saracens. In 1250 the government was revolutionized by the Mamelukes (slaves of Turkish or Caucasian origin), who deposed the sultan and usurped the chief power. This country was conquered in 1517 by the Ottoman sultan, Selim I., who reduced it to a Turkish province. The turbulent Mamelukes afterwards filled the country with disorder for more than two centuries, and it was under their domination when it was invaded by the French in 1798. A French army of about 35,000 men, commanded by Bonaparte, was conveyed to Egypt by a fleet, and arrived at Alexandria in July, 1798. This expedition was accompanied by a large number of savants and artists, among whom were Berthollet, Monge, and Denon. Bonaparte defeated the Mamelukes at the battle of the Pyramids, July 23d, and took Cairo on the 24th. The conquest of Egypt was soon completed. The French savants and artists explored the topography, natural history, and antiquities of Egypt, and obtained materials for a great descriptive work, which was published by the government under the title of "Description de l'Egypte, etc.," with more than 900 engravings (25 vols., 1826). In Aug., 1799, Bonaparte returned to France, leaving his army, under the command of Gen. Kleber, to contend against the combined forces of Great Britain and the Turkish sultan. After several battles at Heliopolis, Aboukeer, etc., the French were expelled from Egypt in 1801. Mehemet Ali was appointed pasha of Cairo in 1804, and massacred a large number of the Mamelukes in 1811. He founded colleges and schools, promoted commerce and manufactures, and introduced European civilization. As viceroy of Egypt he was nominally a vassal of the Turkish sultan, but his power was nearly absolute. In 1830 he invaded and conquered Syria. He afterwards revolted against the

sultan, whose army he defeated at Nizeeb in Syria in June, 1839, soon after which the great powers of Europe intervened to check his victorious progress. Peace was restored in 1841 by a treaty which made the vicereignty hereditary in the family of Mehemet Ali. When Mehemet Ali be-

came imbecile (he died Aug. 2, 1849) the Turkish government in July, 1848, appointed his adopted son Ibrahim, and after Ibrahim's death (Nov. 10, 1848) a grandson of Mehemet Ali, Abbas Pasha, regent of Egypt, who showed himself a fanatical Mohammedan, and repealed many of



Zodiac of Denderah.

the reforms which had been introduced by his predecessors. His successor was Said Pasha, a younger son of Mehemet Ali, who reigned from 1854 to Jan., 1863, and was succeeded by Ismael Pasha, a son of Ibrahim, who in 1867 received from the Turkish government the title of khedive. Ismail acquired great wealth by the cultivation of cotton, and was a zealous promoter of the Suez Canal project. But as great loans were contracted abroad, and every inch of Egypt was mortgaged to the bondholders, the tax-payers refused to pay, and the interest of the foreign loans could not be paid. Pressure was put on the khedive, and he was forced to abdicate Aug. 8, 1879. His son, Mohamed Tewfik (b. Nov. 19, 1852), succeeded him. But as, to the exclusion of natives, every source of revenue was handed over to foreigners, a revolution broke out in 1882. The English intervened, Alexandria was bombarded (July 11, 1882), and, after a short invasion under Sir Garnet Wolseley, Egypt was restored to order. (See BUNSEN, "Aegyptens Stelle in der Weltgeschichte;" LEPSIUS, "Denkmäler aus Aegypten und Aethiopien;" LANE, "Modern Egyptians.")

REVISED BY A. FLINCH.

**Egyptian Architecture** is characterized by an almost monotonous simplicity, and a wonderful solidity and heaviness of structure. It has been assumed that the sloping walls and ponderous, almost imperishable, structure of the Egyptian temples were an imitation of the caverns or of the excavations in which its inhabitants are assumed to have dwelt in primitive times.

The pyramid, though not peculiar to Egyptian architecture, seems to have lent its solidity to all the important

buildings, the walls of which generally incline inward, and are never more than one story high. The use of columns, often monolithic, far exceeded the requirements of safety or strength, the shafts being very large and short, and set very near each other. The form of many is suggestive of that of the date-palm with its crown of leaves. They are sometimes polygonal. Burnt or sun-dried brick, granite, limestone, marble, syenite, and a great variety of materials were employed. The roof of important buildings was of great masses of stone, requiring the use of numerous interior columns. The roofs, though flat, are said to be always inclined, so as to shed rain. All buildings, with scarcely an exception, were rectangular.

The decorations were chiefly of a hieroglyphic character; and those which were not hieroglyphic had to a great extent, it is believed, an emblematic purpose. Many other decorations were illustrative of the daily life and industries of the people. The vastness, darkness, and enduring character of these prodigious structures were well calculated to impress the mind with feelings of the mystery and dignity of the religious system which so completely pervaded the social life of ancient Egypt. The palm-branch, the lotus, the vulture's wings, the human head, and various emblems from animal and vegetable life, adorn the capitals of columns.

Whether the Egyptians invented the arch is not known, but it was used, it is said, as early as the eleventh dynasty, but at no period was it very freely employed. It is still a great mystery how the ancient Egyptian builders could have raised to position the prodigious blocks of stone which they employed in building.

**Egyptian** (or **Maltese**) **Vulture**, called also **Pharaoh's Hen** (*Neophron percnopterus*), a small vulture of Southern Europe, Northern Africa, and of Asia, having



Egyptian Vulture.

almost perfectly white plumage with black quill-feathers. These birds are protected by law and custom, and are valuable scavengers, and consequently are half domesticated.

**Ehninger** (JOHN WHETTON), an American artist, born in New York July 22, 1827. He graduated at Columbia College, and studied art in Europe, was a pupil of Couture in Paris, and was much in Düsseldorf and the great European capitals. His pictures have merit, but he is best known by his illustrative drawings and etchings, several series of which have been published and gained a wide popularity; as, for instance, his illustrations to Longfellow's "Miles Standish." He has devoted much time to perfecting a system of photographic etching.

**Eh'renberg** (CHRISTIAN GOTTFRIED), M. D., an eminent German naturalist and microscopist, born at Delitzsch, in Prussian Saxony, April 19, 1795. He studied medicine at Leipsic, and graduated as M. D. in 1818. Among his favorite studies was botany, on which he wrote several treatises in his youth. In company with Dr. Hemprich, he visited Egypt, Arabia, and Syria, and spent about six years (1820-26) in the exploration of the natural history of those countries. Having returned to Berlin, he obtained in 1826 a chair of medicine in the university of that city. He published in 1828 "Scientific Travels through Northern Africa and Western Asia," and "Physical Symbols of Birds, Insects, etc." (in Latin). In 1829, Humboldt and Ehrenberg performed together an excursion to the Ural and Altai mountains. Ehrenberg afterwards made interesting discoveries with the microscope, and published important works entitled "The Infusoria as Perfect Organisms" (1838) and "Mikro-Geologie" (1854-56). He discovered that cretaceous and other strata of great extent are composed of microscopic organisms. His reputation as an observer is justly great, while the conclusions he has drawn from his observations are frequently faulty. D. at Berlin June 27, 1876.

**Ehrenbreitstein**, ä'ren-brit'st'in (i. e. "honor's broad stone"), a fortified town of Rhenish Prussia, is picturesquely situated on the E. bank of the Rhine, opposite Coblenz, with which it is connected by a bridge of boats. It stands at the base of a rocky hill. On the summit of this hill stands the citadel of Ehrenbreitstein, situated on a rocky promontory which rises 400 feet above the water, inaccessible on three sides, and defended on the N. and only attackable front by a double intrenchment. It contains casemates for the whole garrison, artillery, and stores, and forms the key of the whole fortified position of Coblenz. It has been a fortress from time immemorial, the first origin of it dating from the time of Drusus, when the Romans erected various castles and strongholds on the Rhine, and a stone bridge over that river at Engers, between Coblenz and Neuwied, where Cæsar is also supposed to have constructed his first bridge. It was besieged without success in 1688 by the French, who took it after a long siege in 1799. The citadel was rebuilt in 1815 by the Prussian general

Aster, the projector of all the works at Coblenz. The present improved construction has been by some military writers regarded as impregnable except to famine, as the old castle sustained a siege of eleven months with a small garrison; but modern developments of artillery-power furnish new elements which may have some influence in forming a present judgment on this point. The artillery is mostly in casemates, of which there are 181, and the English colonel Humfrey states that "with sufficient artillery a battalion (say 1000 or 1200 in all) could hold the position" against an attack in force. Pop. in 1881 (without the garrison), 5692. J. G. BARNARD.

**Eibenstock**, i'ben-stock, a town of Saxony, 16 miles S. S. E. of Zwickau. It has manufactures of muslin, lace, chemical products, and tinware. Tin-mines have been opened in the vicinity. Pop. in 1881, 6706.

**Eibergen**, a town of the Netherlands, in Gelderland. It has calico-factories. Pop. 3324.

**Eich'berg** (JULIUS), a musical director, was born in Germany in 1825, and was educated at the Conservatory of Brussels, where he received several first prizes for excellence. He was afterwards musical director in Germany and Switzerland, and in 1856 established a conservatory of music at Boston, Mass., where for some years he was principal music-teacher in the public schools. He was one of the directors in the Peace Jubilee of 1872 at Boston, and is the author of successful operas, etc., such as "The Doctor of Alcantara," "The Rose of the Tyrol," etc.

**Eichhoff** (FREDERIC GUSTAVE), a philologist, born at Havre Aug. 17, 1799, was the son of a merchant formerly of Hamburg. He devoted himself at Paris to Oriental languages, and established his reputation by his "Parallèle des Langues" (1836). He has written on the Indic origin of the Slavic tongues, the mythology of the Edda, the roots of the German language, the poetry of the Hindoos, and a "Grammaire Générale Indo-Européenne" (1867).

**Eich'horn** (JOHANN GOTTFRIED), an eminent German scholar and biblical critic, was born at Dörenzimmern Oct. 16, 1752. He was educated at Göttingen, and became professor of Oriental languages at Jena in 1775. In 1788 he obtained the chair of Oriental and biblical literature at Göttingen, which he filled nearly thirty-eight years. He edited the "General Repository of Biblical Literature" (10 vols., 1787-1801), and wrote numerous works, which display an almost unequalled knowledge of Oriental and biblical antiquities. As a biblical critic he belongs to the rationalistic school. Among his principal works are an "Introduction to the Old Testament" (3 vols., 1783), an "Introduction to the New Testament" (2 vols., 1804-10), "Primitive History" ("Urgeschichte," 3 vols., 1790-93), a "Universal History" (5 vols., 1799), and a "History of Literature from its Origin to the Most Recent Times" (6 vols., 1806-12). Died June 25, 1827.

**Eichhorn** (KARL FRIEDRICH), a jurist and historian, a son of the preceding, was born at Jena Nov. 20, 1781. He was professor of German law at Göttingen from 1817 to 1828. He published, besides other works, a "German Political and Legal History" (4 vols., 1808-23; 5th ed. 1843-45). Died in July, 1854.

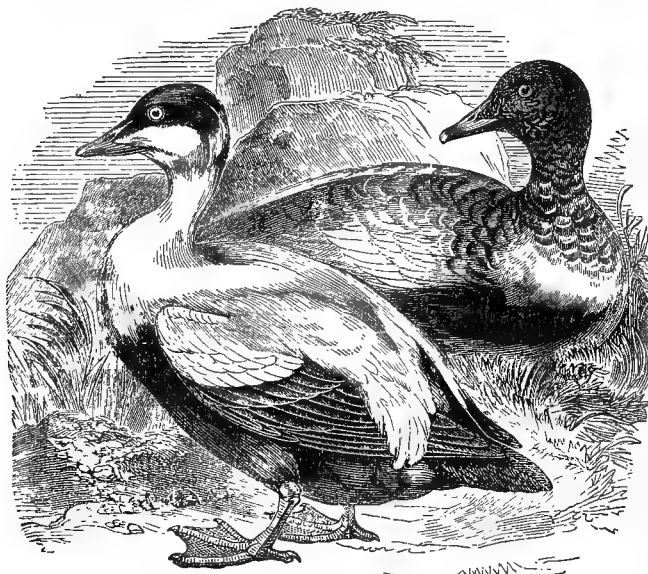
**Eichstädt**, ik'stët, or **Aichstädt** [Lat. *Aurea'tum* or *Dryop'olis*], a town of Bavaria, on the river Altmühl, about 42 miles W. S. W. of Ratisbon. It has a Gothic cathedral founded in 1259, a ducal palace once belonging to Eugene de Beauharnais, a public library, a museum, and the castle of St. Willibald, now used as a barrack; also manufactures of hardware, cotton and woollen fabrics, stoneware, etc. A bishopric was founded here about 745 A. D. Eichstädt was given to Prince Eugene de Beauharnais in 1817. Pop. in 1881, 7889.

**Eich'wald** (EDWARD), an eminent Russian naturalist of German extraction, was born at Mitau in 1795. He visited the Caspian Sea and Persia, and became professor of mineralogy and zoology at St. Petersburg in 1838, after which he made scientific excursions to several parts of Russia and Italy. Among his works are "Travels to the Caspian Sea and the Caucasus" (1834), "Fauna Caspio-Caucasia" (1841), "The Primitive World in Russia" ("Die Urwelt Russlands," 4 vols., 1840-47), and "The Palæontology of Russia" (1851). D. Nov., 1876.

**Eider**, i'der [Lat. *Eidera*], a river of Germany, forming the boundary between Sleswick and Holstein, rises about 10 miles S. W. of Kiel, flows nearly westward, and enters the German Ocean at Tönning. It is about 90 miles long, and is navigable from its mouth to Rendsburg. A

canal cut from Rendsburg to Kielford opens a communication from the Baltic to the North Sea.

**Ei'der Duck** [Old Icelandic *ædr*, the name of the bird



Eider Ducks.

in question; regarded as a primitive form], (*Somateria*), a genus of sea-ducks, natives of the northern parts of Europe and America. The *Somateria mollissima* is larger than the common duck, and the color of the plumage in the male varies with the changing seasons. The female is of a light reddish-brown color, transversely marked with darker shades. The male displays in spring a very conspicuous pied plumage of sable beneath and creamy-white above, with a patch of shining sea-green on the head. But he does not acquire this plumage until his third year; before that time it is exactly like that of the female. They construct their nests of fine mosses and sea-weeds, and their eggs, from five to seven in number, are about three inches long and two broad, and of a light green color. During incubation the female deposits in the nest the down which she plucks from her breast. When this is removed by the hunters she furnishes another supply, and if this is taken the male contributes down from his breast. This down is of the finest quality, and is an important article of commerce. The eggs also are highly prized as food. The northern range of the eider duck is not known. In Greenland, however, it has never been met with N. of the Danish settlements. The Farö Islands, off the coast of Northumberland, about indicate its southern range. It generally has its haunts on low rocky islets near the coast. In Iceland and Norway it is carefully protected. A fine is inflicted not only for killing it during the breeding season, but even for firing a gun near its breeding-place. The king eider (*Somateria spectabilis*) is found in great numbers on the coasts of Nova Zembla, Greenland, Spitzbergen, etc., but is rarely seen in Britain or the U. S.

**Ei'kon Basil'ike**, or **I'con Basil'ice** [Gr. εἰκὼν βασιλική, "the royal likeness"]; a famous book descriptive of the sufferings of King Charles I. of England, was long believed by the royalists to have been written by the king himself, but most critics now believe that it was composed by Bishop Gauden (1605-52). In his "History of Oliver Cromwell and the English Commonwealth" Guizot characterizes it as "a constant mingling of blind royal pride and sincere Christian humility; heart-impulses struggling against habits of obstinate and haughty self-consciousness; invincible, though somewhat inert, devotion to his faith, his honor, and his rank; and all these sentiments are expressed in a monotonous language which, though often emphatic, is always grave, tranquil, and even unctuous, full of serenity and sadness. It is not surprising that such a work should have profoundly affected all royalist hearts."

**Eilenburg**, I'en-boorg', a town of Prussian Saxony, on an island in the river Mulde, 27 miles E. N. E. of Merseburg. It is enclosed by walls, and has an old castle and two bridges; also manufactures of calico, woollen yarn, brandy, starch, and tobacco. Pop. in 1880, 10,654.

**Eim'beck**, or **Einbeck**, a town of Germany, in the

Prussian province of Hanover, is on the river Ilme, about 40 miles S. S. E. of the city of Hanover. It is enclosed by old ruinous walls, and is less important than it was in the fifteenth century. It has three churches; also manufactures of cotton and woollen goods and chemical products. Pop. in 1881, 6809.

**Ei'meo**, one of the Society Islands, in the Pacific Ocean, about 30 miles N. W. of Tahiti. Taloo Harbor is in lat. 17° 30' S., lon. 149° 47' W. Eimeo is 9 miles long and 5 miles wide. The surface is diversified by valleys and hills, which produce excellent timber. Here is a missionary station connected with the London Missionary Society.

**Einsiedeln**, in'see-deln, a town of Switzerland, in the canton of Schwytz, about 24 S. S. E. of Zurich. Here is a famous Benedictine abbey, containing a black image of the Virgin Mary, which is visited annually by about 150,000 pilgrims. An abbey was built here in the ninth century, but the present edifice was erected about the year 1720. It contains a library of 40,000 volumes, 1190 manuscripts, 1015 incunabula, and in connection with it are a priests' seminary, a gymnasium, a lyceum, etc. Rudolf of Hapsburg made the abbot a prince. Other emperors bestowed great and valuable gifts upon it, but it was plundered in 1798 by the French. The town principally consists of inns. Zwingle the Reformer was curate of Einsiedeln in 1516. Pop. in 1881, 8401.

**Eisenach**, i'ze-nāk, a town of Germany, in Saxe-Weimar, is finely situated amid wooded hills on the river Hürsel and on the railway from Leipsic to Cassel, about 48 miles W. of Weimar. It is well built, with wide and clean streets, is enclosed by walls, and has a handsome ducal palace, several churches, and a school of design. It is the chief town in the Thuringian Forest. Here are manufactures of cotton and woollen fabrics, carpets, soap, white lead, etc. In close proximity to this town is the castle of Wartburg, formerly a residence of the landgraves of Thuringia, and memorable as the place of refuge in which Luther remained secreted ten months (1521-22), having been carried thither for safety by his friend the elector of Saxony. Pop. in 1881, 18,624.

**Ei'senberg**, a town of Germany, in Saxe-Altenburg, is near the Saale, 26 miles E. of Weimar. It has a castle, an observatory, and a town-house; also manufactures of porcelain and woollen stuffs. Pop. in 1881, 6227.

**Ei'senburg** [Hun. *Vas*], a county of South-western Hungary, is bounded on the N. by Odenburg, on the E. by Veszprem, on the S. by Zala, and on the W. by Styria. Area, 1945 square miles. The soil is very fertile. The chief products are grain, tobacco, flax, wine, and fruit. Pop. 331,602.

**Eisenerz**, i'zen-erts' (i. e. "iron ore"), also called **Innerberg**, a town of Austria, in Styria, is at the base of the Erzberg, 20 miles W. N. W. of Bruck. The Erzberg, which is 2800 feet high, is a solid mass of iron ore of rich quality. Mines have been worked here for 1000 years. Eisenerz has twelve smelting-furnaces. Pop. 3038.

**Ei'senstadt** [Hung. *Kis Márton*], a market-town of Hungary, is near the W. bank of Lake Neusiedl, 12 miles N. N. W. of Odenburg. Here are a palace of Prince Esterhazy, having 200 chambers for guests, a hall in which 1000 persons can dine at a time, a library containing an invaluable collection of church-music, etc. Connected with this palace is a zoological garden, an orangery, and a conservatory containing 70,000 exotic plants. P. 2476.

**Eis'leben**, a town of Prussian Saxony, about 20 miles W. of Halle, with which it is connected by a railway. It is divided into the old and the new town, the former of which is enclosed by walls. It has an old castle and a gymnasium, also manufactures of potash and tobacco. Copper and silver are mined in the vicinity. Martin Luther was born here in 1483, and died here in 1546. The house in which he was born was partially consumed by fire in 1689. A remnant of it is still standing, however, having his portrait over the entrance. In the church of St. Andrews are preserved the cap, the cloak, and other relics of the great Reformer, and naturally the whole place is filled with memorials of him. Pop. in 1881, 18,187.

**Eit'elberger von E'delberg** (RUDOLF), a German artist-historian, born in 1817, became in 1852 professor of art-his-



tory at the University of Vienna, and has contributed much to the improvement of Austrian industry and art. He wrote, among other works, "Die Reform des Kunstunterrichts" (1848), "Mittelalterliche Kunstdenkmale des Oesterreichischen Kaiserstaats" (2 vols., 1858-60), and "Quellenschriften zur Geschichte der Kunst des Mittelalters und der Renaissance" (1871).

**Eject'ment** [Lat. *ejec'tio* *fir'mæ*, from *ejic'tio*, *ejec'tum*, to "cast out"], in law, is a *mixed* action, as it is resorted to in order to recover the possession of land, and damages for the wrongful withholding of it, though the damages are nominal. Originally, it was a "possessory" action—that is, adapted to the recovery of the possession of land. By a series of fictions it finally came to be a convenient means of testing the title. The substance of the fiction was a supposition that a lease for a certain number of years had been made to a tenant, John Doe, who had entered into possession, and had then been ejected by a person supposed to represent the party to be ultimately made defendant. This person was termed "a casual ejector," and was usually represented as Richard Roe. An action was then brought substantially under the following title: "Doe, as tenant of Edwards (claiming the land), against Roe." A written notice was thereupon sent in the name of Roe by Edwards's attorney to the opposing claimant (Archer), who is the party in possession. By this notice Archer was advised to defend the action, otherwise Roe would allow judgment to be taken against him and the possession would be lost. Archer, on making application to be made defendant, was allowed to defend upon condition that he would admit the validity of the fictitious portion of these proceedings; so that the matter was narrowed down to a trial of the merits of the case. The action was now deemed really to be between Edwards and Archer, though Doe still remained plaintiff on the records of the court. It is a well-settled rule in this action that the plaintiff can only recover upon a *legal* title, as distinguished from a title in a court of equity. He can succeed only upon the validity of his own title, and not upon the weakness of that of his adversary. He must also have, in legal phrase, a "right of entry." Where that does not exist, another form of action must be adopted. There was one serious practical inconvenience following this method of procedure. There was no limit in law to the number of successive actions of ejectment that could be brought by a plaintiff, although he had been worsted. He had only to substitute another fictitious tenant in the place of Doe, and all the proceedings might be gone through with again. The only check upon repeated actions of this kind was a resort to a court of equity for an injunction to prevent harassing, and perhaps exhausting, litigation. The fictitious portion of the proceeding was abolished in England by the Common-Law Procedure act of 1852, and the action placed upon satisfactory grounds. The same result had been accomplished as early as 1830 in New York.

Should the plaintiff succeed in his action, he has also an independent cause of action for the loss of profits sustained by reason of the defendant's wrongful possession. This is known as an action of trespass for *mesne* (intermediate) profits. In some of the American States—e. g. New York—this cause of action may be united with the action of ejectment. The recovery would, by the statute of limitations, commonly be limited to the mesne profits for the last six years. T. W. WRIGHT.

**Ejutla**, á-hoot'lá, a town of Mexico, in the province of Oajaca, about 250 miles S. S. E. of the city of Mexico. Pop. about 7000.

**Ekatérinburg**, a town of Russia, in the government of Perm, 160 miles S. E. of Perm. It was founded in 1722, has straight broad streets, many churches, a government mint for copper coins, is the principal city of the mining district in the Ural Mountains, and is surrounded by mountains on every side. Pop. in 1881, 25,133.

**Ekatérinoslav**, a government of South-western Russia, is bounded on the N. by Kharkof and Poltawa, on the E. by the country of the Cossacks of the Don, on the S. by Tauria and the Sea of Azof, and on the W. by Kherson. Area, 13,758 square miles. It is traversed by the Dnieper, the Samara, and the Walschija, and consists almost entirely of large steppes. The soil is fertile. Pop. 1,281,482.

**Ekatérinoslav**, a city of Russia, capital of the above government, 115 miles S. W. of Kharkof, on the Dnieper. It has a monument of Catherine II., a large cloth factory, and many other manufactures. Pop. in 1881, 33,973.

**Ek'ron**, an important city of the ancient Philistines, was in Judea, about 25 miles W. by N. from Jerusalem. Its site is identified with the modern *Akir* or *Akre*.

**El** is the Arabic definite article, often spelled *al*, the vowel employed in Arabic being the short, obscure *a*, whose sound approaches that of our short *e*. *El* is also the mascu-

line article in Spanish. *El* occurs frequently as an initial or as a final syllable in Hebrew proper names. It is one of the Hebrew names of God. The word, however, has a different etymology in each of these cases.

**Ela** (JACOB H.) was born in Rochester, N. H., July 18, 1820; became a printer; editor of Free-Soil Democratic journals; held several important public offices; U. S. marshal for New Hampshire (1861-66), M. C. (1867-69), fifth auditor U. S. treasury (1872-84). D. Aug. 21, 1884.

**Elæagnæ'cæ** [from *Elæag'nus*, one of the genera], a natural order of exogenous plants (trees or shrubs), natives of Europe, North America, and other parts of the northern hemisphere, being rare south of the equator. They have entire leoprous or scurfy leaves, superior ovary, and apetalous flowers. Several species indigenous in Persia and Nepal bear edible berries. This order also comprises the *Shepherdia argentea* or buffalo berry, which grows near the upper Missouri River, and bears a pleasant acid fruit; this and the *Shepherdia Canadensis* and the *Elæagnus argentea* (silver berry of the North-west) are the only known North American species. The oleaster (*Elæagnus angustifolia*) is a native of the Levant and Southern Europe. This tree is often planted in shrubberies for the sake of its fragrant yellow flowers and its silvery white foliage. It attains a height of nearly twenty feet.

**Elæagnus**. See ELÆAGNACEÆ.

**Elæ'is** [from the Gr. *ἐλαίον*, "oil"], a genus of trees of the natural order Palmaceæ. The *Elæ'is Guineensis*, or oil-palm, a native of Western Africa, produces the palm oil which is extensively used in the manufacture of candles and soap. This tree abounds in the tropical parts of Africa, and bears a very large quantity of fruit, from the outer fleshy rind or coating of which the oil is obtained by boiling in water. This oil is made into soap more readily than any other known oil. A still further supply of oil can be obtained from the fruit by treatment of the boiled fruit. This is called "palm-nut oil." This species and others of the genus have been naturalized to some extent in tropical America, where they are cultivated for their oil. They also yield a pleasant alcoholic drink.

**Elæocarpa'cæ** [from *Elæocar'pus*, one of the genera (from the Gr. *ἐλαίον*, "oil," and *καρπός*, "fruit")], an order of exogenous plants allied to the Tiliaceæ, are mostly natives of the East Indies. Several species produce edible fruit.

**Elæococ'ca** [from the Gr. *ἐλαίον*, "oil," and *κόκκος*, a "berry"], a genus of plants of the natural order Euphorbiaceæ. Useful oil is obtained from the seeds of several species. A tree called *Elæococ'ca verrucosa* is cultivated in Mauritius and Japan for its oil, which is used for burning. One or more species in China yield drying oils, used in that country for preparing varnishes and paints. These oils have acid properties.

**Elæoden'dron** [from the Gr. *ἐλαίον*, "oil," and *δένδρον*, a "tree"], a genus of trees belonging to the order Celastaceæ. *Elæodendron croceum*, commonly called saffron-wood, grows near the Cape of Good Hope, where it is prized for building and cabinet-work. *Elæodendron glaucum*, found in Southern India, is called the Ceylon tea tree. Some of the species yield a fixed oil like oil of olives.

**Elæopt'en** [from the Gr. *ἐλαίον*, "oil," and *πτερός*, "flying," hence "volatile"], the liquid portion of certain volatile oils when separated from the concrete part.

**Elagaba'lus**, or **Heliogaba'lus** [Fr. *Élagabale* or *Héliogabale*], (MARCUS AURELIUS ANTONINUS), a Roman emperor, born in Antioch in 204 A. D. His original name was VARIUS AVITUS BASSIANUS, but on being appointed a priest of the god whom the Syrians called Elagabal, he assumed that name. Caracalla was assassinated Apr. 8, 217 A. D., and Macrinus was proclaimed emperor Apr. 11, 217. Elagabalus was proclaimed emperor by the army in Syria May 16, 218. A battle was fought between Macrinus and Elagabalus June 8, 218, and Macrinus was put to death some days afterward. He was cruel, and indulged in debauchery. He was assassinated by his soldiers Mar. 11, 222 A. D., and succeeded by Alexander Severus. Elagabalus was one of the most infamous of all the Roman emperors.

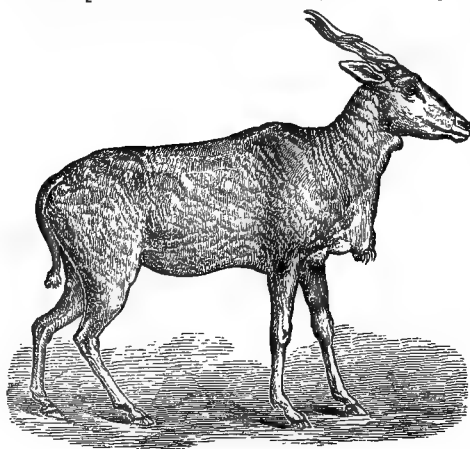
**El Ahsa**. See LAHSA.

**Ela'in** [from the Gr. *ἐλαίον*, "oil"], that portion of oil or fat which remains liquid at ordinary temperatures; the oily principle of solid fats. It is generally called olein, and is not of invariable composition; but in all cases it consists of oleic acid, or of some acid homologous with the oleic, combined in various definite proportions with glycerin. Drying oils and volatile oils do not contain elain. The elain of commerce is chiefly a crude oleic acid prepared from palm oil in the British candle-factories. "Lard oil" is a similar product derived from lard in the U. S. Both are now chiefly used for oiling machinery.



**E'lam**, the name given in the Bible and in the cuneiform inscriptions to that part of the ancient Persian empire called Susiana and Cissia by the Greeks; for the Elymais of the Greeks appears to have been only that part of Susiana next the Persian Gulf. Shushan or Susa was its chief city. The ancient, like the modern, people were chiefly nomadic. The northern part is mountainous, the southern flat, the gulf coast marshy and unproductive.

**E'land** [the Dutch name for the elk, incorrectly applied



Eland.

to this animal], (*Antelope*, or *Boselaphus oreus*), a species of African antelope, the largest of the family. It is about the size of a horse, measuring five feet high at the shoulder, with two horns, nearly straight, about a foot and a half long and turned backward. In form it somewhat resembles the ox tribe, being much less slender in the body and limbs than other antelopes. It also has a large protuberance on the larynx, like that of the elk. The elands are gregarious, and are found in large herds in South Africa. A variety has been discovered by Dr. Livingstone marked with narrow white bands across the body. The flesh of the eland is highly prized. The eland has been bred in England with complete success. His flesh is considered equal to the best beef, and has considerably less bone than that of the ox. The eland is a great eater, and hence his domestication may prove unprofitable. His flesh is remarkably tender. It is asserted by the best authorities that the eland never drinks, even upon his dry native plains. He is always fat, and hence is so unable to run that he falls an easy prey to the hunter. The eland is called *impoofs* or *pohu* by the natives. There are several varieties, besides the bastard eland (*Boselaphus Canina*), which is generally regarded as a distinct species. It is somewhat smaller than the true eland, but much resembles it.

**Elanet** (*Elanus*), a genus of birds of the kite kind, but differing from them in having the claws, except that of the middle toe, rounded, and the tarsi partly covered with feathers. The black-shouldered hawk (*Elanus dispar*) is found in the U. S., and *Elanus melanopterus* is a native of Africa and India, and is found in Europe, and even in Australia. The elanet is a bold and active little bird, feeding mostly on insects, but often capturing snakes, and more rarely mice and birds. Several other species of the genus are described.

**E'laps** [Lat. *elaps*; Gr. *ελαψ*; originally the name of a harmless serpent], a genus of mostly venomous snakes, natives of tropical America, Australia, etc. Three species are found in the U. S. They are very slender in form, often brilliant in color, and feed chiefly on other reptiles. The *Elapes* of the U. S. are scarcely venomous. The best known of them is the *Elaps fulvius*, or bead snake, which is often dug up in sweet-potato fields in the Southern States. It is one of the handsomest snakes known, having bands of jet black, carmine red, and golden yellow. It has erect poison-fangs, but is never known to use them. It may be handled without fear, since it is of very gentle disposition. The Labarri snake of South America (*Elaps lemniscatus*) is a large, fierce, and mortally poisonous reptile. The name is true of *Elaps lubricus* of that continent.

**El Araiseh**, called **Carache**, or **Larache**, a fortified town of Morocco, in the province of Aygar, at the mouth of the Luecos, which forms an excellent but shallow harbor. It is 15 leagues S. W. of Tangier. The surroundings are covered with olive groves and rich pomegranate and orange orchards, but they are unhealthy. It has a fine old mosque and market-place. The exports of

corn, cork, wool, and beans are considerable. Lat. 36° 13' N., lon. 6° 9' W. The name signifies "The Garden of Enjoyment." Pop. 4000.

**El Arish** (anc. *Rhinocolura*), a walled town of Egypt, on the confines of Palestine, near the "river of Egypt" (Wady el Arish). It is situated on an eminence half a mile from the Mediterranean, in lat. 31° 6' N., lon. 33° 56' E., 195 miles N. E. of Cairo, and 52 miles S. of Gaza. It has a few remains of the Roman period. Pop. in 1871, 2255.

The ancient *Rhinocolura* or *Rhinocoura* is said to have taken its name (signifying "the cutting off of the nose") from the fact that King Actisanes of Æthiopia founded it as a penal colony, and the convicts sent thither had their noses cut off. Before the rise of Alexandria it was a great emporium of the Red Sea trade.

The Wady el Arish is supposed to be the "river of Egypt" mentioned in the Bible. It drains the central part of peninsula of Sinai, and empties into the Mediterranean at El Arish. It is a small brook, which dries up in the summer.

**Elasmobranchiates**. See APPENDIX.

**Elastic Curve**, in mechanics, is defined by James Bernoulli as the figure which would be assumed by a thin horizontal elastic plate if one end were fixed and the other loaded with a weight. The equation of the curve to rectangular co-ordinates, of which the origin is at the fixed extremity and the abscissa axis horizontal, is  $y = b(\frac{3}{2}ax^2 - x^3)$ , where  $b$  is a small quantity depending on the ratio of the attached weight to the elastic force of the plate, whose length is  $a$ .

**Elasticity** [from the Gr. *ελαστικός*, "that which drives or strikes," from *ελαίνω*, to "drive," to "strike," and hence to "strike back," as a spring] is that property in physics possessed by certain bodies of recovering their original form and size after the external force is withdrawn by which they have been compressed. Matter is believed to be composed of molecules or small particles, acted upon by attractive and repulsive forces; and from the combined action of these forces result the various forms and properties of matter. According to this view, molecules are not in contact, but at an infinitesimal distance from each other, which, however, may be increased or diminished. When the body is at rest the opposite forces which any of its molecules exercise on each other are in equilibrium. If the distance between the molecules be increased within the limits of the action of the forces, both forces are diminished; and if the distance is lessened, both are increased, but not in the same proportion. Solid bodies are imperfectly elastic, and do not entirely recover their form when the disturbing force is removed; but there seems to be no limit to the elasticity of gases. The phenomena of elastic bodies are—1, That a perfectly elastic body exerts the same force in restoring itself as that with which it was compressed; 2, The force of elastic bodies is exerted equally in all directions, but the effect takes place chiefly on the side where the resistance is least; 3, When a solid elastic body is made to vibrate by a sudden stroke, the vibrations are made in equal times to whatever part of the body the stroke may be communicated. No theory of elasticity founded on any assumed hypothesis as to the molecular constitution of matter has as yet been found satisfactory when applied to solids. In this case, therefore, the theory of elasticity is best investigated without resorting to any such hypotheses.

**Elastic Tissue**, a form of fibrous tissue sometimes called **Yellow Fibrous Tissue**, is so named from its peculiar property of allowing its fibres to be drawn out to twice their original length, and returning again to the same. It is found in the membranes which connect the cartilaginous rings of the trachea and various other structures of the animal body requiring elasticity. In the human body perhaps the most remarkable example of the elastic tissue is seen in the *ligamenta subflava*, or intervertebral ligaments. Almost all other ligaments are unyielding and inelastic, but these are extremely elastic. Their action is to help restore the spinal column to its vertical position when it has been deflected by muscular action. In some of the lower animals the *ligamentum nucha*, the great ligament of the nape of the neck, is highly elastic, and serves to maintain the proper equilibrium between the muscles that erect and those that depress the head, as when the animal is grazing.

**El'ater** [Gr. *ελατήρ*, a "driver"], a Linnæan genus of coleopterous insects, now the type of a very large and distinct family of the sericorn Coleoptera, called Elateridæ. They have a narrow, elongated body, and are distinguished by the presence of a strong spine projecting from the posterior margin of the prosternum, and a groove or socket fitted for the reception of the spine. If they fall on their back, they recover their feet by a violent muscular effort, which throws them into the air with a jerk and a clicking

sound. Hence they are called click-beetle, snap-bug, etc. This movement is the rebound caused by the sudden disengagement of the spine from its socket. The wireworms of the U. S. are larvæ of the Elateridæ, and are very destructive to growing crops. The elaters feed on flowers, leaves, and other soft parts of plants. The firefly of tropical America is the *Elater* or *Pyrophorus noctiluca*, and it has been discovered that the larvæ of at least one North American species of *Melanætes* are luminous.

**Elate'rium** [Gr. *ἐλατήριον*, a "cathartic," from *ελαίνω*, to "force"], a drug obtained from the *Ecballium agreste*, or wild cucumber, called also squirting cucumber. It is an annual belonging to the order Cucurbitaceæ, with a trailing stem, heart-shaped leaves, lobed and toothed, yellow flowers, axillary; fruit grayish-green, about an inch and a half long, covered with soft prickles. The fruit in parting from its stalk expels the seeds, along with a mucus, through the opening in which the stalk was inserted. Elaterium is contained in the thick green mucus surrounding the seeds. It is a powerful and dangerous cathartic, and is very irritating to the eyes and skin. The active principle called elaterin is obtained from it. Elaterium is sometimes used in dropsy.

**E'lath** [Heb. *Eloth*, "trees;" Lat. *Æla'na* or *Ela'na*], a town several times mentioned in the Bible, was built at the foot of the valley El Ghor in Idumæa, and at the head of the Elanitic arm of the Red Sea (now known as the Gulf of Akabah), near lat. 29° 30' N., lon. 30° E., ten miles E. of Petra. It was conquered by King David, and under Solomon became an important commercial emporium. It continued to be a seaport of importance under the Romans. It was twice taken by the Crusaders (1116 and 1182 A. D.), but after their time fell into decay. It stood on or near the spot now occupied by the fortress of Akabah, which is held by a small garrison of Egyptian troops. Extensive ruins are found there.

**E'l'ba** [Fr. *Elbe*; anc. *I'va* and *Ætha'lia*; Gr. *Αἰθάλια*], an island of Italy, is in the Mediterranean Sea, between Corsica and Tuscan, from which latter it is separated by a channel about five miles wide. It is about 18 miles long, and varies in width from 2½ to 10 miles. The coasts are bold, and deeply indented by several gulfs which form good harbors. The surface is mountainous, and the highest point has an altitude of about 3500 feet. Among the productions are iron, good wine, wheat, olives, and various fruits. Of manufactures there are none. On account of the lack of fuel, the excellent ore which the island produces is not smelted, but shipped directly to the opposite coast of the mainland. The sardine and tunny fisheries are of some importance. The climate is mild and equable, and the whole island salubrious with the exception of a few spots on the coasts. Pop. 21,755. Capital, Porto-Ferraio. By the Treaty of Paris this island was designated as the residence of Napoleon I., who removed to it in May, 1814, and escaped in Feb., 1815.

**E'l'ba**, capital of Coffee co., Ala. (see map of Alabama, ref. 7-E, for location of county) on Pea River, about 75 miles S. by E. from Montgomery. Pop. in 1880, 222.

**El Bacharieh** (anc. *Oasis Trinytheos*), one of the Libyan oases, N. of El Khargeh, about lat. 28° N. It yields fruit and alum, and is chiefly remarkable for its ancient Artesian wells. It has ruins, principally of the Roman period.

**Elbe** [anc. *Au'bis*; Bohemian, *La'be*; Dutch, *El've*], an important river of Germany, rises in the N. E. part of Bohemia, among the mountains called Riesengebirge. One of its sources is about 4500 feet above the level of the sea. It flows generally in a north-western direction, drains the northern part of Bohemia, intersects Saxony and Prussia, and enters the German Ocean near Cuxhaven. It drains an area of 59,000 square miles. Its total length is about 700 miles. This river is several miles wide at every point between its mouth and Altona, a distance of nearly seventy miles. Its principal affluents are the Havel, the Moldau, the Saale, and the Eger. The chief towns on its banks are Dresden, Magdeburg, Hamburg, and Altona. Between Dresden and Aussig it flows between high rocky banks like natural battlements, and presents very picturesque scenery. Vessels drawing fourteen feet of water can ascend at all times to Hamburg. Small steamboats navigate the Elbe between Hamburg and Magdeburg, and between Meissen and the mouth of the Moldau. At Schandau, 489 passenger steamers and 2658 vessels and barges of various kinds annually pass up the stream, and a similar number down.

**El'berfeld**, an important manufacturing town of Rhenish Prussia, is on the Wipper, 16 miles E. of Düsseldorf, with which it is connected by a railway. It is irregular in plan, and is several miles long. The newer streets are well

paved. Barmen, a rich and prosperous town, is contiguous to the eastern part of Elberfeld, which has a gymnasium, a museum, a public library, and a school of manufactures. Here are extensive manufactures of silk stuffs, velvets, cotton fabrics, merinoes, ribbons, and tapes. Elberfeld has about seventy dyeing establishments, ten bleaching-grounds, and several print-works. It is famous for the dyeing of Turkey red, and this dye is said to be imparted here at a cheaper rate and with more firmness of color than at any other town in Europe. Pop. 93,503.

**Elbert** (SAMUEL), a Revolutionary officer, born in South Carolina in 1743. He distinguished himself as colonel in the war for independence. In 1785 he became governor of Georgia. At the time of his death he was major-general of militia. Died Nov. 2, 1788.

**Elberton**, on R. R., capital of Elbert co., Ga. (see map of Georgia, ref. 2-I, for location of county), lies near the Savannah River, 78 miles N. W. of Augusta. It has one male and one female academy. Pop. in 1880, 927.

**Elbeuf**, or **Elbœuf**, a town of France, department of Seine-Inférieure, is beautifully situated on the left bank of the Seine, 12 miles above Rouen and 75 miles N. W. of Paris. Several of the newer and finer streets converge to a spacious open area called the Champ de Foire. It has eight artesian wells and six public fountains, and is lighted with gas. Among the finest edifices are the churches of St. Étienne and St. Jean Baptiste. Steamers ply daily between this place and Paris and Havre. It has important manufactures of fine flannels, billiard-table covers, habit cloths, chequered stuffs, woollen fabrics, chemical products, machinery, etc. Pop. in 1881, 23,152.

**El'bing** [Lat. *Elbinga*], a fortified town and river-port of Prussia, is on the navigable river Elbing, 5 miles from its entrance into the Frische Haff, and about 40 miles E. S. E. of Dantzic. It has eight or more Protestant churches, a gymnasium founded in 1536, and a large public library also manufactures of cotton and linen fabrics, sailcloth, soap, tobacco, leather, etc. Here are a number of iron-foundries, dye-works, print-works, sugar-refineries, and breweries. Nearly 500 vessels are employed in the trade of Elbing, which is connected by a railway with Berlin and other towns. The town originated in the beginning of the thirteenth century, German colonists from Lübeck and Bremen settling around a fortress which the Teutonic knights had built there, in the midst of the Slavic population. The town afterward belonged to Poland, but in 1772 came into the possession of Prussia. Pop. in 1881, 35,842.

**Elbow Lake**, Minn. See APPENDIX.

**Elbrooz**, **Elbruz**, or **Elburz**, a range of high mountains in Asia, in the northern part of Persia, forming the connecting chain between the Anti-Taurus and the Kuen-Lun. The Elbrooz extends nearly parallel with the S. shore of the Caspian Sea, and forms the southern boundary of the basin of that sea. The highest point of this range is the volcanic peak of Demavend, which rises about 21,000 feet above the level of the sea. This name is also applied to the loftiest range and summit in the Caucasus, between the Black and Caspian seas. Mount Elbrooz is situated in lat. 43° 20' N., lon. 60° E.; its altitude is 18,572 English feet.

**Elces'aïtes**, or **Elkesaites** [a name said to be derived from *Elxai*, their pretended founder, though it is believed by some that the name is derived from *Elkesi*, a village of Galilee, while others say it is from *Elxai*, a book which was their great authority in doctrine], a sect of Essenian Ebionites, or of Jewish Christians who mingled Judaism and Christianity in their doctrines, adding to them certain pagan or Gnostic views and magical practices. This sect appears to have originated in the early part of the second century, and probably lasted till the fourth century. They claimed to be in possession of a book which had fallen down from heaven to them, or at least been specially revealed to them by the Son of God. The book, which was a coarse mixture of Christian, Judaistic, and pagan element, was widely circulated and highly esteemed. Our principal source of information concerning the sect or school is HIPOLYTUS, "Philosophumena." It authorizes the practice of astrology and magic, which indicates its Persian origin.

**El'che** (anc. *N'ici* or *N'ice*), a town of Spain, in the province of Alicante, about 6 miles from the sea and 15 miles S. W. of the city of Alicante, is enclosed by walls. It is situated on both sides of a steep ravine, which is crossed by a handsome bridge. It has an Oriental aspect, being built in the Moorish style and surrounded by large groves of date-palms. Among the remarkable edifices are an old castle, and a church which has a majestic dome and a famous organ. It has manufactures of cotton and linen stuffs,

brandy, wine, cigars, and soap. Many dates are exported hence. Pop. about 18,000.

**El'chingen**, a village of Bavaria, on the left bank of the Danube, 8 miles N. E. of Ulm. Here the French marshal Ney defeated the Austrians on the 13th of Oct., 1805.

**El'cho** (FRANCIS Wemyss-Charteris), Lord, eldest son of the earl of Wemyss, was born in Edinburgh, Scotland, in 1818, and was educated at Oxford. He became a conservative member of the House of Commons in 1841, and a lord of the treasury in 1853. He took a prominent part in the formation of the national rifle association in 1860. In 1866 he opposed the Reform bill of Russell and Gladstone, and was connected with the party called "Adullamites." He represented Haddingtonshire in Parliament for twenty years or more.

**Eldad Ben Malchi**, also called **Ha-Dani**, or **The Danite**, a Jewish traveller of the ninth century of the Christian era, was a native either of South Arabia or of Media, and about 860 undertook extensive journeys in order to visit his Jewish brethren in Asia and Africa. Among his many other adventures, he at one time fell into the hands of cannibals. All his companions were eaten, but he was too lean; and while he was being fattened he was saved by the invasion of a neighboring tribe. Ransomed by a countryman of his, he was again able to continue his voyages, and he visited both China and Spain. The work which bears his name is written in Hebrew and consists of six books, but it seems to be only an abbreviation, and not the original form of the narrative. It was first printed in Constantinople in 1518, then at Venice in 1540 and 1605, and afterward oftener. There exists a Latin translation of it by Genebrard (Paris, 1563), "*Eldad Danius de Judæis clausis eorumque in Ethiopia imperio*;" there is also a German translation. The most complete text and translation are found in Dr. Jellinek, "*Beth-Ha-Midrash*" (Leipzig, 1853-55). One of the most curious passages in the whole work is the account of the Levites, who, according to the author, were miraculously guided into the land of Havila, and are there protected from their enemies by the mystic river Sabbatiare, a fierce and fordless current.

**El Dakkel** (anc. *Oasis Minor*), the third of the five Egyptian or Libyan oases, situated in lat. 29° 10' N. It is well watered and has warm springs. It anciently yielded much wheat, and now furnishes dates, olives, etc.

**El'der** [Fr. *sureau*; Ger. *Holunder*], (*Sambucus*), a genus of shrubby plants belonging to the order Caprifoliaceæ. The common elder (*Sambucus nigra*) is indigenous to Europe and parts of Asia and Northern Africa. It sometimes attains the size of a small tree, having pinnate leaves, terminal cymes of creamy white flowers, and small black berries, 3-seeded. The young shoots contain a great deal of pith. The common elder (*Sambucus Canadensis*) of North America grows from five to ten feet high. Another American species is the red-berried elder (*Sambucus pubens*), which is found in rocky woods and among mountains. The *Sambucus glauca* grows in the West. There is also a scarlet-fruited elder (*Sambucus racemosa*) found in some parts of Europe, which is prized as an ornamental shrub in Great Britain. The dwarf elder or danewort (*Sambucus Ebulus*) is seen occasionally in Great Britain. It was formerly believed to have sprung from the blood of Danes killed in the Anglo-Saxon wars. The flowers of the elder are used in medicine, and elder-flower water, employed in perfumery, is distilled from them. Wine is also made from the berries.

**Elder** [Heb. *zaken*, "an old man"; Gr. *πρεσβυτερος*, "senior"], a term in use among the Hebrews and other ancient nations, originally indicative of age, but acquiring in time a secondary official sense. Each Hebrew town had its senate of elders, who administered justice. (Deut. xix. 12.) Commonly, each synagogue had also its board of elders, although in smaller towns there was often but a single rabbi. The early Christian Church is believed by many to have borrowed its eldership from the Jewish synagogue. In the New Testament elder and bishop are thought by many Christians to be identical, but opinion on this point is by no means uniform. But at least as early as the second century (in the Ignatian Epistles) we find the three orders of bishops, presbyters (or elders), and deacons. Presbyterians have both "teaching" and "ruling" (or lay) elders, but whether this distinction existed in the apostolic age is still a mooted question.

**El'don** (JOHN SCOTT), EARL OF, lord chancellor of England, was born at Newcastle June 4, 1751. He was educated at Oxford, where he gained in 1771 a prize of £20 for an English prose essay. In 1772 he contracted a clandestine marriage with a lady named Elizabeth Surtees, and by this act forfeited a fellowship which he had obtained in the college. He studied law in the Middle Temple, was called to the bar in 1776, inherited £3000 from his father in that year,

and began to practise in the northern circuit. After four years of moderate success, he gained great distinction, and rose rapidly to fame and affluence. He became in 1783 a member of Parliament, in which he supported Mr. Pitt, and showed himself an able debater. He was appointed solicitor-general in 1788, and attorney-general in 1793. During the excitement of the French revolution he prosecuted Horne Tooke and others who were accused of treason, but they were defended by Erskine and acquitted. In 1799 he became chief-justice of the court of common pleas, was created Baron Eldon, and entered the House of Peers. On the formation of a new ministry by Mr. Addington in 1801, Lord Eldon was appointed lord chancellor. He appears to have owed this promotion to the favor of the king. He continued to fill that high office under several successive administrations for a period of twenty-six years, except an interval of nearly a year in 1806-07. His reputation as a judge was very high, but as a statesman his merit was not great. He was an enemy of religious liberty, and opposed the abolition of the slave-trade and parliamentary reform. He received the title of earl in 1821, and was compelled to resign the great seal when Canning became prime minister in 1827. He died Jan. 13, 1838. His brother William was an eminent judge, and bore the title of Lord Stowell. (See TWISS, "*The Public and Private Life of Lord Eldon*," 3 vols., 1844; LORD CAMPBELL, "*Lives of the Lord Chancellors*."

**Eldo'ra**, capital of Hardin co., Ia. (see map of Iowa, ref. 4-H, for location of county), on R. R. and the Iowa River, about 66 miles N. N. E. of Des Moines. It has a State reform school. Pop. in 1870, 1268; in 1880, 1584.

**El Dora'do**, a Spanish term signifying "golden" region, was the name given by the Spaniards in the sixteenth century to a country supposed to be situated in South America between the rivers Amazon and Orinoco. By fabulous reports, which were generally credited, this region was represented as abounding in gold and precious stones, and surpassing Peru in riches and splendor. Expeditions were conducted by Sir Walter Raleigh and others to discover this imaginary paradise of gold-seekers, but they were not successful. The term "El Dorado" has passed into the language of poetry, or, rather, has become a standing metaphor used to express a land of boundless wealth or a region in which riches are abundant.

**El Dorado**, capital of Union co., Ark. (see map of Arkansas, ref. 6-C, for location of county), about 145 miles S. by W. from Little Rock. Pop. in 1880, 443.

**El Dorado**, R. R. junction, capital of Butler co., Kan. (see map of Kansas, ref. 7-H, for location of county), on Walnut River, has large public school building, flouring-mills, and good water-power. Pop. in 1880, 1411.

**Eldred**, Pa. See APPENDIX.

**Elea**, or **Ve'lia**, an ancient Greek city of Southern Italy, in Lucania, on the Mediterranean Sea. It was the native place of Parmenides and Zeno. (See ELEATIC SCHOOL.)

**Eleanor** (el'e-nor) [Fr. *Éléonore*] of GUIENNE, queen of France, and subsequently queen of England, was born about 1122. She was the daughter and heiress of the last duke of Aquitaine, and was married in 1137 to Louis VII. of France, with whom she went to the Holy Land in 1147. She was divorced from Louis in 1152, and was soon married to Henry II. of England. It appears that she instigated her sons to rebel against their father (Henry II.), who imprisoned her for fifteen years. She acted as regent while her son, Richard I., conducted a crusade to Palestine. Died in 1203.

**Eleatic School**, a system of philosophy founded by Xenophanes of Elea, who flourished about 530 B. C. While the Ionic school gave their attention to outward nature, and investigated the laws which regulate its progress, the Eleatic philosophers directed their speculations to the idea of Being in itself, which they conceived to be the only object of real knowledge. They regarded as vain and illusory the world of change and succession, which they designated *το γινόμενον* ("that which becomes or happens," as by accident). Time, space, and motion they considered as phantasms, caused by the deceiving senses, and incapable of scientific explanation. They distinguished between the pure reason, the correlative of being, and opinion or common understanding, which judges according to the impressions of sense. Parmenides and Zeno were the most celebrated disciples of Xenophanes; the former was the author of an epic poem on the Eleatic and Ionic systems.

**Elecampane** (*In'ula*), a genus of plants belonging to the order Compositæ. The common elecampane (*Inula Helenium*) is indigenous to Middle and Southern Europe, and grows in various parts of the U. S. The root somewhat resembles camphor in taste, and has sudorific and diuretic properties. It contains the principles *helenin* or elecampane camphor, and *inulin*, which resembles starch.

**Election** [Lat. *elec'tio*, from *elec'tum* (from *e*, "out," and *le'go*, to "gather"), to "choose," to "read"], in law. The law frequently imposes upon a party the duty to choose between two inconsistent or alternative rights or claims. This obligation may present itself in all branches of the law, and often occurs as a rule of practice. In a court of law, as distinguished from equity, there may be a case of election where a contract is to be performed in the alternative, as where an insurance company stipulates that in case of loss of a building by fire it may either pay its value or rebuild. In such a case, should the company elect to rebuild, its election would be irrevocable. It may also happen that a creditor will have a right, from the circumstances of the case, to elect one of two persons as his debtor. A case of this kind occurs in the law of agency, when an agent purchases goods on credit for an undisclosed principal; the seller, on subsequently discovering the principal, may elect to regard the sale as having been made to him or to the agent, as he may see fit. An instance of election in the case of real estate is that of dower in land which the husband exchanged for other land. The widow has her choice to take dower in either parcel, but she cannot take it in both.

In courts of equity the doctrine of election assumes great importance. The case may occur where alternative benefits may be presented to a person by a will or other legal instrument, or more generally he may be required to choose between a gift made to him and something to which he is already entitled. The duty to choose in such a case is not a positive rule of law, but a matter of equity practice, and is not imperative when this artificial doctrine is not known to be a legal rule by the party to whom the gift is made. The fact of election must be shown by some positive act; and if a party who ought to elect holds two estates under inconsistent titles, there is no evidence of an election having been made. A person under a duty to elect between the retention of his own property and the gift of another, may retain his own without forfeiting the gift, but must make due compensation. Thus, if a testator devises an owner of property land of his own, and then assumes to dispose of the property of the devisee, and the latter elects to retain his own property, he does not forfeit the devise, but is required to make compensation to the testator's estate equivalent in amount to the property retained by him. Election in procedure may take place in the choice of remedies; as where an owner has been wrongfully deprived of a chattel, he may elect to sue for its value or for the chattel itself. A court will in some cases require a party to an action to elect as between inconsistent allegations as to the cause of action.

T. W. DWIGHT.

**Election**, in politics, is the choice of public officers by those persons who possess the right of suffrage, as distinguished from "appointment," which is such choice made by superior officers. Popular elections were held in ancient times, as, for example, in the Roman *comitia* and the Athenian popular assemblies; but soon after the establishment of the Roman empire elections, outside the Christian Church, became obsolete. Elections reappear in mediæval Europe in the choice of representative burgesses, who stood for the third estate. Certain monarchs, as the German emperors and the kings of Poland, were also elected to their place, but not as popular representatives. In no other European country did the election of representatives become so important in the Middle Ages as in England; and the representative systems of other nations have been chiefly imitations of, and in some cases improvements upon, the English system. Especially is this the case in the U. S. (See REPRESENTATIVE SYSTEM.) Elections are called *direct* when officers are chosen by a direct vote of their constituency; *indirect*, when electors are chosen for the purpose of designating the persons who shall exercise official powers.

With regard to the officers voted for, political elections are distinguished into *local* or *municipal* elections, at which officers for some particular town or locality are chosen; *general* or *State* elections, at which officers for the whole of a commonwealth are elected (the most important of which are the gubernatorial and presidential elections for filling the places of governor and President); and *congressional* or *legislative* elections, at which members of Congress or legislatures are voted for. Vacancies in offices are sometimes filled, and the acceptance or rejection of particular laws is decided, by *special* or *supplementary* elections. All questions relating to political elections must be fully provided for in the election laws of the State. The great interests which are frequently at stake at elections naturally tempt bad men to *election frauds*, which have assumed in some countries, and in particular in some parts of the U. S., the most alarming dimensions. In view of them honest statesmen consider it their duty to improve, as much as possible, the existing election laws. Special attention has been given for that purpose to stringent registration laws, requiring every voter to register his name some time before the day

of election, in order to enable the authorities to verify his claim to taking part in the election. The inspectors of elections, whether appointed or elected, are generally taken from the different political parties which engage in the contest. The excitement which often prevails at political elections is apt to lead to *election riots*. These are of frequent occurrence in England, Ireland, and Greece, and have also of late caused considerable trouble in the U. S.; they are almost unknown in France and Germany. As in most cases the instigators and leaders of election riots are acting under the influence of intoxicating liquors, many States have provided by law that on election days all liquor-stores must be closed. When the defeated party believes or claims that the declared majority owes its success to election frauds, the elections are likely to be contested. At elections to legislative assemblies these assemblies decide finally on the claims of rival candidates; in most other cases the decision rests with the courts. If a presidential election is contested in republics, there is danger of civil war, of which, in particular, the republics of South and Central America furnish many examples. Of still more frequent occurrence have been, in consequence of the weakness of the federal authority, the civil wars in the particular states constituting these federal republics in case the election for governor is contested. The U. S., which, on the whole, have been free from the sad experience of the South and Central American republics, had in 1873 a conspicuous instance of a contested gubernatorial election and its disastrous consequences in Louisiana, where for several months two rival governors claimed each to be the lawful executive of the State, and tried to enforce his claim, until on May 22, 1873, the President of the U. S. interfered by a proclamation in favor of one. (See also NOMINATION, PLÉBISCITE, REPRESENTATIVE SYSTEM, SUFFRAGE, and VOTE.)

**Election**, in theology. See CALVINISM, by PROF. A. A. HODGE, S. T. D.

**Elective Governments** are those in which the rulers and public functionaries are chosen by popular vote or by the votes of a privileged class. The republics of ancient Athens and Rome were elective governments.

**Elect'or** [Fr. *electeur*; Ger. *Kurfürst*; Lat. *elec'tor*, from *el'igo*, *elec'tum*, to "choose"], a title of those German princes who had the right or privilege of electing the emperor of Germany. There were originally (1256 A. D.) seven—namely, the electors of Cologne, Mentz, Treves, Bohemia, Brandenburg, Saxony, and the elector Palatine. The first three were archbishops of Cologne, Mentz, and Treves. The electors had several important privileges, and a very peculiar position in the empire. They usually chose the heir or near relative of the preceding emperor. As the electoral dignity of the Palatine had been transferred to the dukes of Bavaria, an eighth electorate was established by the peace of Westphalia in 1648 for the Palatine, which ceased in 1777, when the House of Bavaria became extinct. In 1692 the electorate or dignity of elector was conferred on the dukes of Brunswick-Lüneburg, who were afterwards styled electors of Hanover. The electors were entitled to all royal dignities and honors except the title of majesty. On the dissolution of the German empire in 1806, the office became obsolete, but the title was retained by the rulers of Hesse-Cassel till 1866, when that state was united to Prussia.

**Electoral College.** See CONSTITUTION OF THE U. S., Art. XII., and ELECTORS.

**Electoral Commission.** See PRESIDENTIAL ELECTORAL COMMISSION.

**Elect'oral Crown, or Cap**, was a scarlet cap worn by the electors of the German empire. It was surmounted with a golden demicircle, which was ornamented with pearls and a golden cross at the top.

**Elec'tors**, in the political system of the U. S., is the title of the persons who are chosen by the people of the several States to elect the President and Vice-President. Each State chooses a number of electors equal to the whole number of members it sends to both houses of Congress. No Senator or Representative, or person holding an office of profit or trust under the U. S., can be appointed an elector. The electors must be chosen on the same day in all the States—that is, on the Tuesday next after the first Monday in November. The Constitution ordains that the electors shall meet in their respective States on the first Wednesday in December, and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves; and they shall make distinct lists of all persons voted for as President, etc., and of the number of votes for each; which lists they shall sign and certify, and transmit sealed to the seat of government of the U. S., directed to the president of the Senate. The electors of all the States constitute the electoral college. A majority of the whole number of electoral votes is necessary to elect the President and Vice-President. In 1894 the whole num-

ber of electors was 401. They meet at the capitals of their respective States. The electoral votes are opened and counted on the second Wednesday of February by both houses of Congress, which meet in the chamber of the Representatives. In the actual mode of performing their duty the electors do not exercise any judgment or discretionary power in the choice of President and Vice-President, but cast their votes for the candidates previously nominated by their party, usually in a national convention. If no candidate has a majority of all the votes, the House of Representatives has a right to choose either of the three persons having the highest number of votes.

**Electra** [Gr. Ἠλέκτρα], a daughter of Agamemnon, king of Mycenæ, was sister of Orestes and wife of Pylades. She was sometimes called Laodice. Her story is the subject of dramas written by Æschylus, Euripides, Sophocles, and Racine. The most perfect of the ancient tragedies of "Electra" is that of Sophocles; in this she stimulates her brother Orestes (whose life she has saved from the violence of her father's murderers) to avenge the death of that parent. This he accordingly does, with the aid of Apollo.

No less than five other persons of this name occur in the Greek mythology.

**Electric Fishes** are remarkable as being probably the only animals having the power to give sensible shocks of electricity. Nine or more species of very diverse character are known to have this power. Three species of *Torpedo* (of the ray family), one of which is occasionally found on our Atlantic coast, are among the best known electric fishes. The *Trichiurus*, a sword-fish of the Indian seas, and the *Tetraodon*, a balloon-fish of the Comoro Islands, have not been as well studied. The *Gymnotus electricus*, a fresh-water eel of South America, sometimes twenty feet long, has the power of overcoming men, and even horses, by its tremendous shocks. Two species of *Malapterurus* (*Silurus*) of the African rivers are also electric. Faraday observes that the *Gymnotus* may produce a shock equal to that of fifteen Leyden jars, containing in all 3500 square inches, charged to the highest degree. The force is ordinary static electricity, and readily affords a spark. The *Torpedo* and *Gymnotus* have electric organs intimately connected with the nervous system, consisting of a series of highly vascular cells or hollow prisms containing a watery fluid. Other electric fishes have a less definite apparatus for this function. It is not known that this remarkable power is of any service to these fishes, except in self-protection.

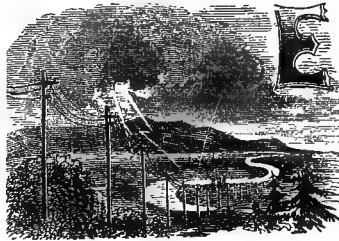
**Electric Clocks** are of several kinds, but are nearly all constructed on one of the two following principles: (1) electricity is the motive-power which propels the machinery of the clock; or (2) power is obtained from weights or springs, and electricity is used for controlling or regulating the motion.

In some electric clocks there is an electro-magnet, which attracts a soft iron keeper whenever a current passes through it. The keeper gives motion to the clock-hands by an extremely simple arrangement of levers and wheels. The current is made and interrupted by the vibrations of a standard clock, which may serve to give time to any number of secondary electric clocks, even if they are at a great distance from each other.

Bain's clock has a soft, hollow electro-magnet for a pendulum, swinging between the like poles of two permanent magnets, the current in the pendulum being broken and reversed in every swing, so that it is forcibly repelled from each magnet.

Electric clocks are capable of running a long time without attention, but when moved by electricity alone are not very regular in their motion, owing to slight irregularities in the electric currents; but when electricity is used as a regulating power, it is capable of rendering important services in making ordinary clocks do accurate work. For example, an astronomical clock of great precision is connected in the proper manner by telegraph wires with a great number of common clocks, in such a way that signals are sent at given intervals. Now, suppose that any one of the common clocks has gained or lost a small interval of time between two signals, the electric current is found in practice to retard or accelerate the motion just enough to correct the work, and to impart to all the common clocks the precision of the astronomical clock. In these cases the common clocks are often fitted with a Bain's pendulum, but there are other successful modes of attaining the same result.

**Electric Column**, an instrument formed of numerous alternating disks of zinc-leaf, silver-leaf, and paper, was invented by De Luc. It is generally called a "dry battery" or "dry voltaic pile." The moisture of the air is an essential element in the operation of the "dry pile;" for if the apparatus be placed in an artificially dried atmosphere, it ceases to work, while in ordinary air it will act for years, with a somewhat feeble current.



Electricity.

ural philosopher. The observation in question was, that when amber had been rubbed it acquired the property of attracting light bodies, and from the Greek name of amber (ἤλεκτρον) comes our term Electricity.

As knowledge was extended, however, it was found that many effects, such as those produced by magnets and by chemical action upon certain metals, which had at first sight no relation to this property of amber, were nevertheless due to the same force; and thus the title "electricity" in its widest sense comes to include the science relating to all those actions depending upon the force first seen in the amber, and must be divided into Static or frictional, Dynamic or galvanic, and Magnetic electricity.

Of these we will first consider the one first named—**STATIC ELECTRICITY.**

2. The observation of Thales may be well regarded as one of the fundamental facts of the science, and as extended and modified by subsequent observers may be thus described:

If a light body *A*, such as a pith-ball, is attached to the end of a thread of shellac, a straw, or other light rod, suspended in the manner shown in the accompanying figure (Fig. 1), it will form a very sensitive means of recognizing the existence of forces of attraction or repulsion. If, then, a piece of amber, rosin, sulphur, glass, or the like is rubbed or beaten with a woollen cloth, silk handkerchief, piece of fur, or any similar material, and brought near to the pith-ball *A*, it will be found that this moves towards it, giving evidence of attraction.

3. A piece of metal held in the hand and similarly treated will fail to produce any such effect, but if supported on a rod of glass, or cut off from contact with the body by any of the above-mentioned substances, it will act as well as the others; and in fact we shall find that if the proper precautions are taken, not amber alone, but all bodies, can exhibit this power of attraction after friction.

We see, however, already, that this action is due to something which is carried off and lost by metals and the human body, but retained by glass, rosin, etc. We are therefore led at once to divide substances into electric "conductors," or those which will transmit this influence from one place to another, and "non-conductors," which refuse so to do. A wider experience, however, shows us that this is only a question of degree, the best conductor offering some obstacle or "resistance" to the transfer of electric force through it, and the worst conductor allowing some to pass; and that, moreover, every degree of transmitting power can be found in some substance or other—from silver, which is the best conductor, to dry air or other gas, which is perhaps the worst.

4. Returning to our first experiment, if we allow the ball *A*, when attracted by the rubbed or "excited" amber or other like body, to touch it, we shall find that the conditions are now reversed, and that in place of being attracted by the "excited" substance, it is repelled. This at once seems to indicate that whatever caused the excitement of the amber and its attractive action is self-repellent in its nature, since a portion of it, communicated by contact to the pith-ball, and reacting with the remainder in the amber, has overcome the attraction before exhibited and substituted a repulsion. If, again, while the pith-ball is still in this new (or, as we call it, "charged") state, we bring near it the "rubber" (i. e. woollen cloth or other substance with which the excitement was produced), the ball will be very powerfully attracted. Care, of course, must be taken that the "excitement" in this as in the previous case is not lost by contact with the hand or other conductor.

This last experiment teaches us that there is something developed in the "rubber" opposite in character to that found in the amber, since where the latter repels, it attracts.

Again, if we take a rod of glass and a silk handkerchief, and rub them together, and then, while the ball is still in the condition which causes it to fly from the amber, approach it with the excited glass, we shall find that the

**Electricity.** 1. The science of electricity owes its name to an observation attributed by Diogenes Laertius to Thales, one of the Seven Wise Men, who about the year 500 B. C. flourished, like his remote successor, Franklin, as a statesman and nat-



glass attracts it as did the woollen cloth, while at the same time the silk handkerchief repels it as did the amber.

We thus learn that the cause of the opposite excitements first noticed in the amber and cloth did not lie in the fact of one being the rubber and the other being rubbed, but in the nature of the substances themselves.

5. Similar experiments repeated with a great number of bodies will show us that this ability to secure one or other of these sorts of excitement is not of essence, but of degree; so that if all bodies were arranged in a list according to this ability, any one when rubbed with a substance above it would acquire one kind, and with one below it the other kind of excitement.

These kinds of excitement are for distinction called positive and negative, the kind produced in glass when it is rubbed with silk being positive, and that developed in amber when rubbed with wool, negative. These contrary terms are only employed to distinguish, and not to describe, the states, the negative being just as active, powerful, and efficacious for practical purposes as the positive.

A few familiar bodies are arranged in accordance with this view in the following table:

<i>Most Positive.</i> —	Wood,
Catskin,	Sealing-wax,
Diamond,	Rosin,
Flannel,	Amber,
Ivory,	Sulphur,
Rock-crystal,	India-rubber,
Wool,	Gutta-percha,
Glass,	Prepared paper ( <i>i. e.</i> parch-
Cotton,	ment paper),
Linen cloth,	Collodion,
White silk,	Gun-cotton.— <i>Most Negative.</i>
The dry hand,	

(*De la Rive, "Traité d'Électricité,"* tome ii., p. 549.)

6. To take an example from the foregoing table: Suppose a fragment of rock-crystal to be rubbed against some ivory; the crystal would acquire negative excitement, but if it were rubbed with wool it would be positive. Of course the most powerful effect would be obtained by selecting the substances at the extremities of the table, but the question of convenience from a mechanical point of view will here have great weight.

Another table frequently quoted gives the following order of many substances not included in the foregoing:

<i>Positive.</i> —Fur,	Paper,
Smooth glass,	Silk,
Woollen cloth,	Lac,
Feathers,	Rough glass,
Wood,	Sulphur.— <i>Negative.</i>

The difference between the positions of smooth and rough glass will indicate the cause of the great deterioration which the plate of an electrical machine suffers when it gets scratched to any considerable extent. Of course, all substances in nature might be arranged in such a table, but these brief lists will answer as a scaffolding into which we may fit such other members as we may from time to time wish to locate.

7. With the few simple facts which have been so far stated we can now proceed to an intelligible explanation of the electrical theories generally in use; which, however, are regarded rather as convenient means of associating and remembering the facts of the subject than as philosophical explanation of their ultimate cause.

The theory which owes its origin to Franklin, and is also called the single-fluid theory, assumes that all matter in its normal condition contains an imponderable fluid which attracts matter generally, but is self-repellent. Friction of dissimilar substances causes this substance to accumulate in one at the expense of another. Thus, the surcharged body attracts unexcited bodies generally, and repels others like itself, while the bodies more or less emptied of electricity are likewise attracted by unexcited matter, by reason of the reduction of repellent force between their fluid and that of the normal substances. The repulsion of negatively excited substances is due likewise to the superior attraction of surrounding matter generally, aided by certain actions called induction, to be presently explained. Conduction would on this theory be simply the flow of this fluid, and its tendency to pass from a positive to a negatively excited substance resemble the rush of air from a compressed reservoir into a vacuum.

8. The theory of double fluid, due to Dufay, assumes the existence of two fluids, alike in certain properties, but opposite in what we regard as their electric actions. These, in a proportionate mixture, exist in all substances without affording any indication of their presence. Friction of unlike materials separates them, and each being self-repellent, but attractive of the other, all the phe-

nomena of attraction and repulsion already mentioned are equally well accounted for on this hypothesis.

9. Other theories, such as one which represents the positive and negative states as vibrations, or one assuming a polarization of molecules, have also been proposed, but these, while deficient in that fulness and precision which can entitle them to confidence, are far less effective than the old ones as mnemonic aids, and have therefore, we think, deservedly failed to replace the former in the language of science or in works of reference and general treatises on this subject.

As regards the former (or fluid) theories, no facts now known to science are fatal to either of them; and though the general tendency of discovery in cognate subjects leads us to feel that the true theory is something else than either of these, we do not believe that this "true" theory has been as yet developed.

Minutely to discuss the merits of the two theories would be here out of place; suffice it to say that either will serve, and that the experiments regarded at one time as fatal to the first have been proved not to be so, and that it is rather gaining than losing ground at the present day.

As, however, the double-fluid theory furnishes us with the simplest and most direct expression for the co-ordination of facts, and is to be more generally encountered in works of reference, we shall adopt it in the present exposition as a matter of convenience.

*The Double-fluid Theory.*—10. According, then, to this view, a non-excited body contains equal or equivalent quantities of the two opposite fluids, which we may well designate by the signs + and -. When two such bodies are excited by friction, some of the positive fluid goes out of one into the other, being replaced at the instant by an equal amount of negative fluid leaving the second. Excitement therefore does not imply a change in the total amount of the fluids in a body, but only in the proportion of the mixture, the interchange being invariably reciprocal, as above stated. Thus, A being a normal or unexcited

A.	B.	C.
— + — + — +	++ — + ++	— — + — —
+ + — + — +	+ + + — + +	— + — + —
— + — + — +	+ + — + ++	— — + — —
10 +	16 +	4 +
11 —	5 —	17 —

body, with about equal numbers of positive and negative units, B would be the same, positively charged, in which 6 positive units had been substituted for 6 of the negative ones; while C would represent the same in an equal negative state, having 6 negative units more than A. To introduce a single positive or negative unit without abstracting a corresponding one of the opposite kind in each case, is to be regarded as, in the nature of things, impossible. Every transfer is an interchange.

11. Remembering the self-repellent character of each fluid, it will be easily understood that in charged bodies the particles of the fluid in excess, flying as far as possible from each other, will accumulate on the surface, and especially on points and edges.

If B and C were brought into contact, the excess of positive fluid in B would go to C, receiving in exchange the excess of negative from this last; and so both would be left in the condition of A.

The amounts of the fluids which we can displace in bodies it must, however, be remembered, are very small as compared with the total quantities which they contain.

12. Some bodies allow the electric fluids to pass freely from particle to particle, while others resist their transfer, and allow them to move from one to another only when a certain change or "polarization" (to be more fully considered under "Induction") has reached a high degree of intensity.

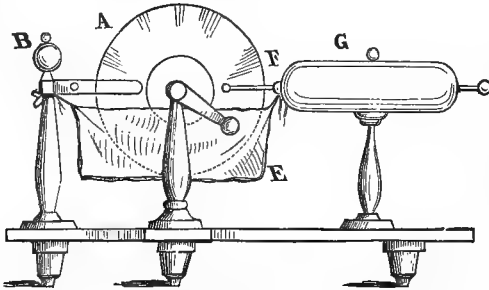
Bodies of the first class are called conductors, and of the latter, non-conductors or insulators. This, however, is a distinction of degree, since no known body is either a "perfect" conductor or insulator, while every degree of perfection in one property or the other may be found among existing substances.

13. When the electric fluids, by reason of excessive accumulation of single kinds at certain points, acquire power enough to force their way through a resisting material, their passage through is always accompanied by an evolution of light and heat. This is not the result of the mingling of the opposite fluids, but of the resistance offered to their mutual approach.

SOURCES OF ELECTRICITY.—14. Friction, as we have already seen, is the most evident source of electric action; and in order that it should be developed by this means with the greatest facility certain electrical machines have been from time to time devised. We will select typical forms of the most important classes.

*The Plate Electrical Machine.*—This consists, in the first place, of a glass disk A mounted on an axle and turned by a handle. Against this is caused to press a "rubber" (below and to the right of B), which is made of two brass plates covered on their faces with leather sprinkled with "mosaic gold" (bisulphide of tin), and held against the opposite sides of the plate by a stiff brass spring sustained by the column under B. At F are two brass rods, armed on their inner sides with points, which are turned towards the surfaces of the plate rotating between them. These are supported from the end of a metal cylinder G, resting on a glass column, and called the prime conductor.

FIG. 2.

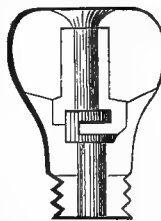


The operation of the apparatus is as follows: The glass plate, by friction, takes positive fluid from the rubbers, giving them negative in exchange, and passes in the direction BEF inside of a silk bag or apron. When the plate comes between the points attached to F, it gives to them positive fluid, receiving negative at the same time until it has been restored nearly to a normal state. The positive fluid thus brought to F passes into G, and is diffused generally over it. If B were allowed to remain insulated, of course the amount of positive electricity which it could give up would be soon exhausted; we therefore connect it by a chain or wire with the ground, which is best done by passing the chain over a gas or water pipe. If we desire to collect negative electricity, we connect the "prime conductor" G with the ground, in place of B, and then get our supply of negative fluid from B.

A cylinder of glass is sometimes used in place of the disk, but principle and action are identical in both cases.

*The Hydro-Electrical Machine.*—15. An accidental observation with a leaking boiler, followed up by Armstrong, led to the construction of this curious machine. (*Phil. Mag.*, 1840, vol. xvii., pp. 370-452, etc.) It was afterwards thoroughly investigated by Faraday (*Phil. Trans.*, 1843, p. 17), who showed the true source of the very powerful effects which it develops. It consists essentially of a steam-boiler placed on insulated supports, and provided with a series of outlets or jets, by which wet steam (i.e. steam carrying particles of water) may be made to escape with much friction. Fig. 3 shows the structure of the individual jets. The particles of water carried by the steam play the part of the glass plate in the ordinary machine, while the metal surfaces of the jets act as the rubber. The jets and boiler thus become negatively charged, while the water-spray is positive, and will communicate that electricity to a set of points presented to it.

FIG. 3.



16. The electrophorus and its development, the Holtz machine, will be explained under "Induction," and the induction coil will be fully described after the points in galvanism and electro-magnetism necessary for its explanation have been handled.

17. Not only does actual friction tend to develop electricity, but anything resembling friction, such as the splitting or fracturing of crystals, or the act of solidifying in certain instances. So likewise does a change of temperature in some crystals, such as the tourmaline. Chemical action, as we shall presently see in connection with galvanism or dynamic electricity, is another fertile source; and, last but not least in importance, as we shall see in the same connection, the contact of dissimilar substances.

18. All are familiar with the existence of electrical disturbances in the atmosphere, but their cause is rather a subject of conjecture than knowledge. (*De la Rive, "Electricité,"* Walker's translation, vol. iii., p. 116.)

By attaching to an arrow a fine wire whose farther end terminated in an instrument for measuring electricity, Becquerel showed that positive tension was manifested when the arrow was shot up, but none appeared when it was shot in a horizontal direction.

The connection which, in the opinion of many, has been shown between the auroral displays and solar disturbances gives a cosmical interest to this special portion of our atmospheric excitement.

Animal electricity is noticed under "Galvanism," farther on.

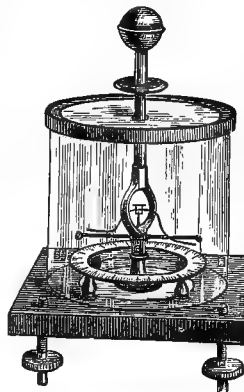
**APPARATUS FOR THE RECOGNITION AND MEASUREMENT OF ELECTRICITY.**—19. The gold-leaf electroscope is one of the simplest of these, and consists of two strips of gold-leaf hung side by side from an insulated metallic support within a cylinder of glass, on whose inner surface are attached strips of tin-foil. When an excited body is brought in contact with the metallic support, the fluid, entering both strips of gold-leaf alike, causes them to recede from each other; and lest they should be in danger of touching and clinging to the glass, the strips of tin-foil are placed there to discharge them and make them fall back.

20. In the modification known as Bohnenberger's electroscope a single strip hangs between two plates which form the terminals of a "dry pile" (see farther on, under "Galvanic Batteries"), and are therefore feebly and constantly charged in opposite senses. If, then, the leaf receives any charge, it will strongly incline towards the plate of the opposite kind.

21. The electrometer of Coulomb consists of a light rod carrying pith-balls at each end, or one ball with a counter-weight suspended by a silk thread within a glass case. A rod with brass balls at each end enters through the side of the case. This being charged, attracts one of the pith-balls, or after contact repels it, the force being measured by the amount of twist necessary to give the thread in order to keep the ball at a certain distance. This instrument was much improved by Snow Harris.

22. Peltier's electrometer, shown in the figure, consists

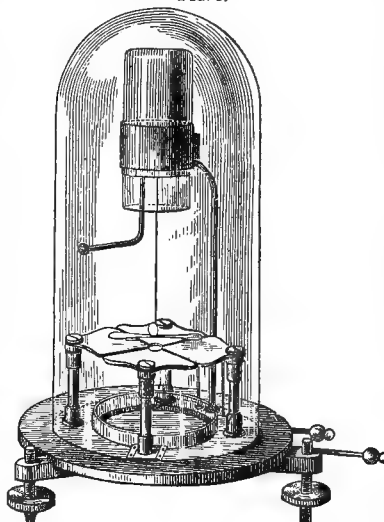
FIG. 4.



of a convenient support, etc. carrying a light bent rod of aluminum turning on a pivot, and having a small compass-needle attached to it. The needle gives it a delicate directive force, and a charge communicated to the central part, which is insulated, will cause the aluminum rod to be repelled from the heavier brass one. The amount of displacement is read directly on the graduated circle.

23. Thomson's quadrant electrometer consists of four metallic segments supported in the same plane, but not in contact. They are connected alternately with the two projecting rods and balls at the right. Over these hangs a

FIG. 5.



Sir W. Thomson in the "British Association Reports" for 1867, part i., p. 489.

**INDUCTION.**—24. Next in importance to the simple yet fundamental facts of attraction and repulsion between electrically excited bodies, or, in the words of theory, between bodies containing excess of the positive or negative fluids, we come to the action of induction.

Induction is the general term used to designate the mutual or reciprocal action of the electric fluids in adjacent but electrically separated bodies, and is sometimes described as "action at a distance" or "excitement by influence." All the effects produced by this means are called inductive. This force is not like that of gravity, unaffected by the interposed material, but acts with different amounts of energy through different substances. This difference in the power of transmitting this influence is designated as specific inductive capacity; and by Faraday and Harris the following values have been assigned to different substances:

Air.....	1.00	Wax.....	1.86
Spermaceti.....	1.45	Glass.....	1.90
Resin.....	1.76	Shellac.....	2.00
1 tch.....	1.85	Sulphur.....	2.24

The higher the inductive capacity of a substance, the greater will be the action which it transmits.

25. Passing now to a study of the action of induction, we will at once take an illustration, as an example will be worth more than any amount of general definition in such a case. Let A and B be metal spheres suspended by silk threads or sustained by any other non-conducting supports, and let A be positively charged (i. e. have some of its normal negative electricity replaced by positive). Let B, however, be in its normal state, or charged with equal quantities of both fluids. We know that the positive fluid in A will strongly attract the negative in B, and as strongly repel its positive; hence, we may well figure B as having all its negative on its left, and all its positive on its right side. This representation must not carry us too far, however, and make us think that these exact locations have any special meaning; rather we should regard the positive fluid as put in the condition of trying to escape, and the negative as so contracted or drawn together as to allow room for more. The mode of representation used is, however, convenient for expression.

Let us now suppose that for a moment B is put in connection with the earth, a practically infinite reservoir of both electricities. Evidently, the repelled positive fluid will escape, and its place will be supplied by negative, and the body B will be now negatively charged. But will its condition be exactly that of a single body with a negative charge? The negative fluid added to B was brought there solely by the mastering attraction in A, and if it had had any power of repulsion under that influence, it could not have been forced against its nature to enter with the negative fluid already in B. It is simply because it has been seized, captured, and bound by the positive A that it is now in B, and therefore cannot, while under this influence, exert its natural powers like a free agent. If, however, A is removed, then B will become in all respects a body negatively charged, and capable of giving out its excess of negative fluid, and influencing other bodies in its turn. The negative fluid in it, however, while A is present, is very appropriately called "bound electricity."

26. The subject of induction owes its thorough exposition to Faraday, according to whose view it is an action propagated or conveyed through the substance separating the bodies under consideration by successive polarization or forcible rearrangement of its particles. Thus, in the case just given the attractive and repellent influence of the fluid in A is transmitted to B by a successive change in the particles of the intervening air. This change might be considered as identical in character with that already described in B before it was connected with the ground, though it is usual to associate it with a change of position or polarization in the material particles. Thus, if the little circles in Figs. 7 and 8 represent the atoms of air, and

as in Fig. 8, A is positively charged, then in the adjacent particles the negative sides or negative fluids will be turned towards A by reason of their attraction for the positive fluid in it, and, as a consequence, their positive sides will

Fig. 8.



face the other way. The positive fluid in these will then exert a similar influence upon the next row of particles, and so on. This change, it should be remembered, may be regarded either as a rotation of the particles, with fixed positions for their fluids, which is the stricter idea of polarity, or as a shifting of the fluids in the particles, exactly as in the case of B in Fig. 6.

27. When this action has reached a certain intensity, a transfer of the fluids occurs bodily from one particle to another, and this is conduction; the difference between good and bad conductors consisting simply in this, that in the former but little inductive excitement is needed to bring about the transfer, while in the latter this must reach a high degree of intensity, and a large amount of the opposite fluids must be brought to the adjacent surfaces of the particles before this transfer or discharge can take place.

28. Induction plays an important part in almost every action connected with electricity, and, simple as it is in principle, develops some complex results. We will briefly consider a few of the more important cases, beginning with the simplest.

**Induction concerned in Simple Illustrations of Attraction and Repulsion.**—When an excited body is brought near to a neutral one, the unlike fluid of the latter is drawn near, and its like fluid repelled, and even expelled if any outlet is available; and thus the effectiveness of the attractive force is increased. Moreover, the "induced" excitement of the second body will react upon the "mixed" fluids which still exist, as we have before mentioned, in even the most powerfully charged object, and by separating them in the same manner as its own were before separated will yet further intensify the action.

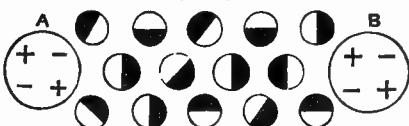
29. It is in consequence of this reaction or reinforcement of action that the attractive forces in excited bodies do not always vary, like those of gravitation, light, heat, etc., inversely as the squares of the distances, but according to laws which depend upon the conditions by which this reinforcement or the reverse action is controlled. Thus, as has been shown by Snow Harris, if a small surface which is maintained at a constant degree of charge is caused to act with another which is insulated, so that its repelled electricity cannot escape, the force of attraction will vary inversely as the square roots of the distances. (*Phil. Trans.*, 1834, part ii., p. 213.) If, however, the charge of the first surface could be kept constant, while the other was allowed to give up its repelled fluid and take the opposite, but not to cause a rise of charge by reaction in the first, the attraction would vary inversely with the squares of the distances. Again, if the reaction, as well as action, were allowed full play, the force would vary inversely with the cube of the distance. These last points have been developed, and Harris's results in the same connection corrected, by Sir William Thomson. (See "Phil. Mag.," 1854, vol. viii., p. 42.)

The same laws hold good with reference to repulsion, although much greater difficulties are experienced in making the measurements. If an excited ball were placed in the centre of a hollow sphere, its inductive force would be equally distributed on all sides, and would decrease outward as the square of the distance increased; but if the ball be made to approach one side of the globe, almost the entire inductive force will be concentrated on that point, to the neglect of the other and more distant parts.

As we have already noticed, a large part of the apparent repulsion exhibited by excited bodies is due to the attraction of surrounding objects excited by induction. This is well shown by the following familiar experiment: To an ordinary electrical machine is attached a doll's head covered with long hair; on working the machine the individual hairs stand out in every direction by their mutual repulsion. If now the hand or any other conductor connected with the ground is brought near, all the hairs in its vicinity turn towards it, and even crowd upon each other to approach it. The same actions of induction, and consequent exhibitions of attraction and repulsion, are illustrated in the numerous electrical toys with which most collections of apparatus are profusely furnished, such as the chime of bells, the sportsman and birds, dancing figures, dancing pith-balls, etc.

**The Electrophorus.**—30. One of the most important in-

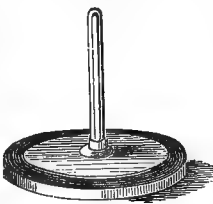
Fig. 7.



their black halves the negative fluid, we may imagine them when between two normal bodies, as in Fig. 7, to have these negative sides turned in all directions. If, however,

struments in which induction is largely involved is the electrophorus. This consists of a metal dish filled with rosin or shellac, or similar non-conductor easily excited, and also of a metallic plate smaller than the dish and provided with an insulating handle. To use this apparatus, we first beat the shellac with a cat skin or other appropriate rubber, and then, setting the plate on the surface of the shellac, touch it with the finger. After this, if the plate is lifted up by its insulated handle, it will be found to have acquired a positive charge.

FIG. 9.



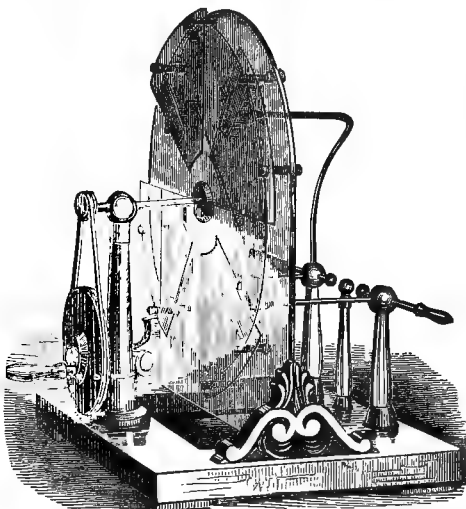
31. The theory of its operation is as follows: The friction with the fur excites in the shellac negative electricity. When the metal plate rests upon it the repulsion existing between the negative electricities causes that of the brass plate to be repelled, and to escape in part when the plate is touched with the finger, its place being supplied by an equal amount of positive entering from the hand at the same time. This, however, as long as the plate is near the shellac, is "bound," exactly as was the case in the first instance of induction, which we illustrated with the bodies A and B in Fig. 6. But when we raise the plate by its handle, the restraining force is escaped as the plate recedes from the shellac, and the lately "bound" fluid exhibits its properties as free positive electricity.

As often as we please we can discharge the movable plate, and by merely placing it on the shellac and touching it can restore its charge; for, taking nothing from the shellac, it in no way exhausts its charge. The plate is of course attracted by the shellac, and the force expended in pulling it away is the full mechanical equivalent of the electric action developed.

32. A pretty application of the electrophorus is found in the many effective and artistic contrivances for lighting gas by its means which have been devised by Mr. Robert E. Cornelius of Philadelphia; and a development of the same principle, which is one of the most striking discoveries in connection with this subject, is exhibited in the Holtz machine, which may be well defined as a *continuous electrophorus*.

A convenient form of this machine is that shown in the figure, which represents a modification devised and con-

FIG. 10.



structed by Mr. E. S. Ritchie of Boston. In this a large vertical plate of glass serves as the support for the various parts of the machine. From its edges are sustained four glass sectors, and between these and the plate is a glass disk capable of rapid rotation, and driven by the pulley seen at the left. Between this disk and the large plate, moreover, are four combs, corresponding to the sectors, and connected with the discharging posts by wires piercing the plate. On one edge of each sector is a narrow strip of varnished paper with a projecting point.

33. The action of the machine is briefly as follows: We set the disk in rotation, and at the same time hold an excited body, such as the plate of an electrophorus, a piece of charged vulcanite, or the like, against one of the paper slips. This gives the paper a charge—let us say, of positive electricity; this, acting upon the disk, repels the posi-

tive electricity from the corresponding part of its farther surface into the metallic combs which are there located. If the disk stood still, this would happen, once for all, at a single point; but as the disk rotates, every point is in succession brought under the same influence. The portions of the plate passing away from this place as it rotates are therefore negatively charged, having lost some of their positive, and therefore having acquired a corresponding amount of negative fluid. As soon, however, as they pass the farther edge of the first sector, or that one on whose edge was the paper we began with, they experience the following action with the point attached to the paper of the next sector: Being negatively charged, they tend to repel negative electricity, and thus this negative charge, being on the farther side of the disk, repels some negative from the nearer side, and drives it into the paper strip, so making it negative. Thus, while the first paper was positive, the second will be negative; hence it will tend to drive out of the rotating disk into the second comb exactly that negative fluid which had been drawn from the first comb; and so, the first comb being made positive, this will be negative.

Exactly the same action will be observed in the case of the other sectors, which will be successively positive and negative, and each will feed the paper strip of its successor, so that the action being once started will continue indefinitely without further assistance. Here, however, as in the case of the electrophorus, the reacting bodies attract, and the force required to maintain the motion in opposition to this is an exact expression of the mechanical equivalent of the electric force developed; not all of which, however, is necessarily available.

There are many curious reactions involved in this machine, and many improvements or modifications in its structure, which we cannot even enumerate here, but will refer the reader to the following papers, in which he will find the subjects extensively discussed: "Cosmos," 1865, p. 689; "Journal of the Franklin Institute," vol. lii, pp. 281-420; vol. liii, pp. 36, 119, 121, 253, 255, 344; vol. lvii, p. 335; vol. lviii, p. 32; vol. lx, pp. 58, 117. Also to Pogendorff's "Annalen," vol. cxv, p. 469; vol. cxvi, p. 157; vol. cxvii, pp. 177 and 320; vol. cxxx, pp. 287 and 518; vol. cxxxi, pp. 215 and 495; vol. cxxxv, p. 120; vol. cxi, pp. 168, 276, and 560; vol. cxliii, p. 285; vol. cxlv, pp. 1 and 333; vol. cxlvi, p. 288. Also Ganot, "Traité de Physique."

34. The next application of induction is found in the Leyden jar. This consists of a glass jar coated inside and out to within a few inches of its edge with tin-foil, and having a wooden cover, through which passes a

FIG. 11.



metallic rod terminating above in a knob or ball, and below being in connection with the inner lining of tin-foil. Suppose this jar to stand on a table and within a short distance of an electric machine, so that a spark might go to its knob. If a spark of positive electricity enter, it will diffuse itself over the inner surface of the glass by aid of the conducting power of the tin-foil, and by induction it will draw into the outer coating and surface of the glass a nearly equal quantity of negative fluid. The mutual attraction of these, acting through the glass, will cause each to bind the other to a great extent, and thus the original positive charge, in place of having a tendency to escape to surrounding objects, is largely confined by this attractive action to the inner surface of the glass.

In acting through the glass a certain resistance is encountered, and thus the charge drawn to the outside must be always less than that drawing it; and again, this exterior charge will lose some of its power in transmission. If, for example, this difference amounts in all to one-tenth, then evidently nine-tenths of the interior charge will be bound, and only one-tenth will be free. The tendency to escape and resistance to the entrance of additional fluid depends only on the free electricity; therefore in such a case ten times as much electricity can be stored in a given space as if no such action were made available.

The form of a jar is of course in no way essential for the principle here stated, and in fact plates of non-conductors coated with tin-foil are largely used when we want to store electricity in a small space for any purpose.

35. The same principle of induction is similarly involved in the case of that attachment to an electroscope known as a condenser. In this case the upper cap of the instrument carries a varnished metallic plate, on which can be placed another plate of equal size having a glass handle. The plates being superposed, if a feeble source of electricity is connected with the lower one, and the upper one is connected with the ground by being touched with the finger, a charge of "bound" electricity will accumulate, just as in the case of the Leyden jar above described. On removing the upper plate this charge will be set free, and will produce its effect upon the indicating parts of the instrument.

Sir William Thomson has devised a number of beautiful applications of induction as a means of developing electrical charge, such as a series of drops of water falling within a cylinder, a flame similarly placed, copper filings running from one vessel to another, and various more complex instruments. (See "Proc. Roy. Soc.," June 20, 1867; "Phil. Mag.," Jan., 1868.)

**TRANSFER OF ELECTRICITY.**—36. There are three methods by which electricity may pass from place to place—namely, Conduction, Convection, and Discharge.

Conduction has already been discussed to some extent (see §§ 3 and 27); and in addition we may say that it might be defined as the passage of electricity between particles sensibly in contact.

When the conducting substance is of such a nature and amount as to carry the electric force without much resistance, no visible effect is produced; but if this is not the case, striking phenomena of heat and light may be exhibited. Thus, if the united charge of several Leyden jars is caused to traverse a strip of gold-leaf enclosed between slips of glass, the gold will be fused into the glass, causing a purple stain, and a flash of light will at the same moment be seen. Fine wires similarly treated may be fused, and the effects of lightning on bell-wires and other small conductors illustrate the same thing.

Different substances possess this property of conduction in the most various degree, but this action will be more fully discussed under "Galvanism," or dynamical electricity, where the means for its accurate measurement will be described.

37. The velocity with which an intense charge of electricity travels in a good conductor under certain conditions was shown by Wheatstone (*Phil. Trans.*, 1834, p. 589) to be 288,000 miles in a second. His method, which was a very beautiful one and most fruitful in applications, consisted in viewing in a rapidly rotating mirror the images of three sparks taken at the ends and in the centre of a long line. The displacement of any image as compared with the others gave a means of finding the time of its occurrence when the velocity of the mirror was known. It was shown by Faraday that the velocity of conduction varied with the intensity of the charge and with the nature of the conductor.

38. *Convection* is the transfer of electricity from one body to another by moving particles of an interposed fluid. Thus, if a charged conductor stands exposed in the air, particles of that fluid touch it, are charged, are repelled, and travel off to distant objects, to which they give up their charge, and then are ready to return for more. This action can be well illustrated by holding a candle near a point projecting from an electrical machine. The flame will be almost blown out by the current of charged particles flying away.

39. *Discharge*, which may be of various kinds, consists in general of the simultaneous transfer of the electricity developed by induction along a line of resisting particles between two conductors, and is always accompanied by some development of light and heat. The passage of the fluids may be variously resisted, and thus the character of the discharge be modified to any extent; but we may conveniently divide discharges into two kinds—the flash, spark, or disruptive discharge, and the flame, or diffused discharge.

40. The spark discharge is illustrated in its simpler form by the flash which passes from the prime conductor of an electrical machine to the hand or any other conductor brought suddenly near to it. It then appears, through persistence of vision, as a blue, irregular line. When a greater amount of electricity is accumulated, as in the Leyden jar, the spark or flash looks whiter. By modifications of Wheatstone's revolving mirror and other methods its character, duration, and composition have been studied by Fæddersen (*Pogg. Ann.*, vol. ciii., p. 69) and Prof. O. N. Rood. The last-named physicist, who has carried out his researches in a most complete manner, has proved that the discharge of a jar charged by an induction coil consists of a series of acts whose total duration varies with the area of coated surface, the distance of the electrodes, etc., but that the first and brightest portion does not last, with a jar having a surface of 114.4 square inches, more than the 175-billionth of a second. Prof. Rood has also proved that with a jar having a surface of 11 square inches, the duration was only 40-billionths of a second. The successive discharges or other steps involved in this act have been made the subject of extended investigations by Prof. Rood, published with the above in the "Amer. Jour. of Science" for 1872, vol. iv., pp. 249 and 371; 1869, vol. xlviii., p. 153; also 1871, vol. ii., p. 160, and 1872, vol. iv., p. 249.

41. The spark is in all cases found to carry away with it minute particles of the bodies between which it leaps, which are intensely heated by the action; and it has thus become

a very useful means for the spectroscopic study of certain substances. (See Huggins, "Phil. Trans.," 1864, part ii., p. 139.) By taking the spark between a platinum wire and the surface of a solution, metallic elements present in the solution may in many cases be recognized by the aid of the spectroscope.

With powerful sources of electricity, such as the Holtz machine or the induction coil, which will be subsequently described, many beautiful illustrations of spark discharge may be exhibited. Thus, if the terminals of a large coil are brought near the extremities of a long sheet of metallic paper, such as is often used for enveloping tea and coffee, and whose surface has been broken by rumpling, at each discharge brilliant flashes of light will stream across in lightning-like paths. Again, narrow strips of tin-foil having been attached in a convoluted but continuous line to a plate of glass, a knife is drawn across them at points corresponding to the outlines of some design, such as a bird or flower. When this is made the line of a series of discharges, the design appears pricked out in stars of light.

42. Besides the influence on the duration of the spark exerted by the size of the charged surface, as shown by Rood, an effect is produced by the nature of the transmitting material. Thus, the spark from a Leyden jar carried directly to points immersed in loose gunpowder will scatter the powder without igniting it; but if part of the circuit consists of a wet string or like imperfect conductor, the spark will pass more slowly, and will ignite the powder.

43. The most magnificent display of the disruptive discharge is, however, furnished in the lightning. Here flashes occur as much as three miles in length. The failure of some attempts to measure their duration has occasioned a general impression that they are exceedingly brief. Faraday, however, in 1857 noticed that some flashes seemed to him fully as long in duration as one second, and Prof. O. N. Rood, with a very efficient form of apparatus, has extensively investigated the subject, with the following result: He finds that lightning-flashes generally consist of several acts, varying individually in duration from less than one one-thousandth of a second to more than one-twentieth of a second; even these extreme varieties being found at times in a single flash, whose total duration may be fully one second.\* The cause of this great duration is probably to be found in the extent and character of the electric distribution in the cloud.

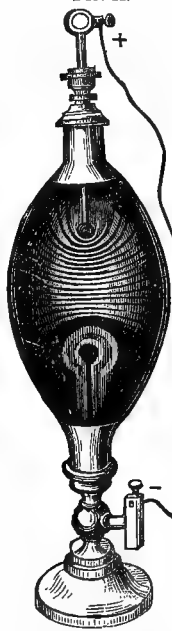
The brush and glow discharges are simply aggregations of numerous and very minute sparks. The glow sometimes seen on the spars of vessels, and called Saint Elmo's fire, is of this character.†

44. While air at its normal density and temperature offers so great a resistance to the passage of electricity, it is found that when highly rarefied its power of transmission is greatly increased, and that under these conditions

the discharge passes in a diffused and flame-like form. To exhibit the characteristics of this discharge in various gases and at various degrees of rarefaction, we employ glass vessels, either of an egg shape or globular form, provided with metallic caps securely cemented to their ends, and sliding rods, stopcocks, etc. These may be exhausted with the air-pump, and the flashes of a coil being passed through, the appearances of the discharge may be studied. Under these conditions we find that the color of the discharge varies in different parts, being usually blue near the negative pole, and pinkish near the positive, and variously tinted, moreover, according to the degree of the rarefaction and the nature of the gas. Thus, under certain states of rarefaction, nitrogen gas gives a light of a pink-purple, carbonic acid of a green, hydrogen of a violet, and oxygen of a peach-blossom tint.

45. Moreover, at a certain degree of exhaustion the discharge is seen to be crossed by dark layers or strata, as shown in Fig. 12. These have been elaborately studied by De la Rive, who considers them to be due to variations in density produced in the rarefied gas by the electric force prior to the actual passage of the discharge. (*Ann. de Chem. et de Phys.*, Aug., 1866, vol. viii.,

FIG. 12.



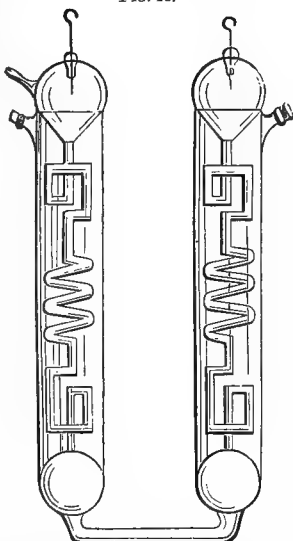
\* "American Journal of Science," 1873, vol. v., p. 182.  
† "Spectrum of Glow," "Am. Jour. of Science," 1867, vol. xliii., p. 394.



p. 437.) Plucker found that these strata, and also the streams and glows of the discharge, obeyed magnetic influences in a remarkable way. (*Phil. Mag.*, 1858, p. 119.) These discharges were also studied by Gassiot, and produced by a galvanic battery, as well as by other forms of electrical generators. (*Proc. Roy. Soc.*, 1859, p. 36.) These discharges have been further studied by De la Rive, Müller, and Spottiswood (see "*Phil. Mag.*," 1876 (5), vol. i. p. 239); also by De la Rive and Müller in connection with a chloride of silver battery of many thousand cells with very remarkable results. (See "*Proc. Roy. Soc.*," 1877, vol. xxvi., p. 519; 1878, vol. xxvii., p. 374; 1879, vol. xxix., p. 281; 1880, vol. xxx., p. 563; 1883, vol. xxxv., p. 292.) But the most remarkable investigations are those of Dr. Wm. Crookes in connection with his researches on radiant energy, in which he has shown that the light surrounding the negative pole in an exhausted tube is caused by impact of individual molecules of the residual gas at the end of their free path against the mass of residual gas held back by their impact. His papers, under the title of "Illumination of Lines of Molecular Pressure," are given in "*Proc. Roy. Soc.*," 1878, vol. xxviii., p. 103; "*Phil. Trans.*," 1879, vol. clxx., p. 135; "*Phil. Mag.*," 1879 (5), vol. vii., p. 57; also under the title "Radiant Matter" in "*Chemical News*," 1879, vol. xl., pp. 91, 104, 127.)

46. Geissler, a very skilful glassblower in Bonn, was employed by Plucker to make some permanently exhausted tubes for such experiments, and, enlarging on the idea, has developed one of the most beautiful illustrations in the whole range of the subject. These instruments, called "Geissler tubes," are of an infinite variety in pattern, containing different gases variously rarefied, thereby giving every imaginable tint. They are also often made of fluorescent glass, or are surrounded with glass jackets (as in Fig. 13), which are filled with fluorescent solutions, thereby yet further increasing the brightness and beauty of their appearance.

FIG. 13.



#### DYNAMIC ELECTRICITY, OR GALVANISM.—

47. When dissimilar substances of any kind are brought in contact with each other, a difference of electrical condition analogous to that produced by the friction of dissimilar substances is at once developed in them, one becoming in a very slight degree positive, and the other negative. If these bodies are conductors, and are partially immersed in a liquid capable of acting chemically on one of them more than on the other, their difference of electric condition brought about by contact, as above stated, will determine a chemical reaction by which the one body will combine with one chemical element of the solution, and another element will be deposited upon the other body. The net energy resulting from the chemical combination and decomposition involved will then appear in the form of an electric current, which we may assume as originating at the surface of the body acted on by the liquid, and which will then pass through the liquid to the other body and come out by it, thus making the body not acted on the positive pole. The body most acted on will be the negative pole in like manner.

48. The power of establishing an electric current as above described is indicated by the expression "electromotive force" when applied to such a combination. Thus, suppose that we take as an example a plate of copper and one of zinc immersed in ordinary water. While the plates are not in contact no appreciable electric developments occur. If, however, we bring the plates in contact directly or indirectly through a conductor, then at the point of contact a difference of electric state will be produced which will extend to the immersed portions of the plates. The zinc will become electrically positive, and will begin to combine with the negative oxygen of the water, while the hydrogen of the same will be deposited in minute bubbles on the copper. The positive electricity will also pass from

the decomposed water to the copper and render it the positive pole. Though the action is initiated by the contact of the copper and zinc, the available energy of the current is derived solely from the chemical action in the liquid. This may be compared to the case of a mass of rock poised on the brink of a precipice, or to a pond and waterwheel with the floodgate closed. Some slight action is needed to topple the rock over the edge or to open the floodgate, but the energy of the falling rock or descending water is not derived from this. It has been suggested that the electrical disturbance due to mere contact is caused by a loss of molecular motion due to conflict between the surface-particles of the dissimilar bodies, which have presumably different rates of vibration.

49. The above considerations will show us at the outset what is the relation between the conditions of the preent subject and of that which has before been discussed. We have here the fluids separated by a relatively feeble power of dissociation, but in quantities which will be very great if the resistance opposed to their reunion is slight. To give the reader a physical illustration, we may regard this action with reference to either of the electric fluids as a power of raising its level. Thus, suppose that a sieve placed vertically in a trough of water had the power of pushing the water towards one end, and so raising the level a very little on one side. When the water had reached the full height at which the power of the sieve would maintain

FIG. 14.



it, all further action would cease; but if we now made a communication by which the water from the higher side could run around to the lower, then the sieve would continue to keep up the head, and a constant current would result. Again, if several sieves were placed in series, then each in turn starting with the water which had been raised by its predecessor, and raising it higher, the level at the end of the tank would be as much higher as the sieves were more numerous.

50. This is not, of course, intended to be a statement of fact about sieves and water, but to be a purely imaginary illustration, which may aid us in remembering the general fact that the nature of the action of the elements in a galvanic couple on the electric fluids is to accumulate, each one slightly on opposite sides; in consequence of which they act in all respects as would material liquids in whose level a similar slight change had been effected. It will, in fact, be found to be of the greatest convenience to acquire the habit of thinking of the electricities developed in galvanic actions as fluids with certain "levels," which give the corresponding tendencies to flow.

51. Carrying this view back into our former subject, we would regard the fluids in charged bodies as having a great "head" or high level. It will be evident on this view that a sufficient number of galvanic elements in series (as illustrated above by the succession of sieves) should give us a "head" equal to that of a statically charged body. In fact, Gassiot, with a battery of 3400 pairs of zinc and copper plates in distilled water, produced all the effects of attraction, repulsion, discharge, etc. which are obtained from bodies excited by friction (*Phil. Trans.*, 1844, p. 39), and the present writer, with a series of 15,000 such cells, made by Mr. Charles T. Chester of New York, has obtained similar results in a yet more striking manner. Indeed, with the delicate instruments now at command we can readily exhibit the actions of attraction and repulsion with the electricity set free by a single galvanic couple of the simplest description, thus proving the identity in nature of the two actions of frictional and chemical "excitement."

52. Such being a general view of the condition of galvanic electricity, we will next pass to the methods used for its development. We have above spoken only of a metal (say zinc) and water as the active agents; but in fact there would be practical difficulties in using these alone, among which we will first consider only the fact that the oxide of the metal would soon cover its surface and cut off all action. For this reason, as well as others, we introduce with the water, some acid capable of dissolving the metallic oxide, but not able to attack the other conductor. This introduces another element. The solution of the oxide in the acid furnishes another source of force, and our numerical relation of energies thus takes a new shape, which is well expressed by Rankine as follows:

Total "equivalent" due to oxidation of zinc and solution in sulphuric acid and water.....	3006
Total "equivalent" consumed in liberating hydrogen from the dilute acid.....	2106

Total "equivalent" of force developed.....	900
--	-----

These numbers, expressing "British thermal units," we can easily reduce at once to a practical expression, and say that the total force which can be developed by a pound of zinc in such a combination would be  $900 \times 772 = 694,800$  foot-pounds, or about one-sixteenth of that developed by burn-

ing a pound of pure coal or carbon. We of course have neglected all causes of loss in both cases, but this is the highest result possible with all causes of loss excluded.

53. There are evidently two directions in which this result can be improved: 1st. By increasing the relative attraction between the active element and the liquid which is the first cause of the action; 2d. By reducing the attraction to be overcome in separating the expelled element from the liquid.

For the first object we may use in place of zinc some more chemically active body, such as magnesium or sodium, or substitute some other fluid for water. But in practice it has been found that no substance which by reason of its cost or other considerations is available will give us better results than zinc and water acidulated with sulphuric acid.

With reference to the second point, however, much may be done. Thus, if sulphate of copper were mixed with the acidulated water, that compound would as a final result be decomposed, its copper being deposited on the inactive element as a substitute for the hydrogen. Now, the expulsion of copper from this compound does not require as much force as does the liberation of hydrogen from water, and thus we get an obvious increase of effect, as follows:

Total equivalent of combination of zinc with oxygen, sulphuric acid, and water.....	3006
Total equivalent consumed in expelling copper from solution of sulphate.....	1587
Total equivalent of force developed.....	1419
1419 $\times$ 722 = 1,095,468 foot-pounds per pound of zinc;	

which is, however, less than one-tenth of the total force developed by the combustion of a pound of pure coal or carbon.

54. The decomposition of nitric and chromic acids requires still less force than does that of sulphate of copper, and thus by substituting these still better results may be obtained; but we must not forget that the upper limit, or highest attainment of theoretical perfection, would be to gain the whole 3006 units due to the combination and solution of the zinc, which would, after all, amount to but one-fourth the total energy developed by a pound of pure coal.

Passing from these general considerations to questions of detail, we notice, in the first place, that if in the simplest form of galvanic apparatus we employ a plate of ordinary zinc and one of copper immersed in a vessel of diluted sulphuric acid, as was at first done, several difficulties are encountered.

55. In the first place, impurities, in the shape of specks of iron, cadmium, etc., scattered through the zinc, impair the action by establishing "local circuits," in which the impurity acts as the second element, and sends a part of the current back to the zinc without traversing the connecting conductor, so causing it to elude our use. This difficulty is remedied by coating the zinc with mercury. This substance dissolves a portion of the zinc and forms a sort of metallic varnish, which is of course perfectly homogeneous and covers up all irregularities. The mercury does not dissolve in the acid, but yields the zinc, itself dissolving a fresh supply as fast as it is required.

56. Secondly, the hydrogen going to the copper plate collects on it in a layer of bubbles, by which the contact with the liquid is diminished, and which, moreover, by reason of its strong negative condition, tends to combine with oxygen and reverse the battery action. (See "Gas Battery," farther on.) To remedy this difficulty, Smee proposed the use of platinum plates covered with fine particles of platinum, obtained by electric decomposition (see "Electrolysis," farther on), which "shed" the hydrogen bubbles. He also used silver plates coated with platinum, or plates of lead first silvered and then coated with platinum. The silver plates in time become brittle, and the others lose their coating; and this has led to the adoption of plates of compact carbon, made from the graphitic deposit found in coal-gas retorts. These are also platinized by painting them with a solution of platonic chloride, and then immersing them in their own solutions, with the circuit closed for a few minutes.

57. The present writer has used with good effect, where a continuous, uninterrupted action for a limited time was required, and where the first cost of the apparatus was important, a combination of zinc and sheet-iron plates in acidulated water. A battery of this sort, having a zinc surface of about 240 square feet, was used on several occasions for twelve hours at a time, with a very satisfactory result.

58. The employment of sulphate of copper was first introduced by Prof. Daniell, and in order to prevent the copper from depositing on the zinc, and thus establishing local circuits which would soon have interfered with the useful action of the battery, he divided the vessel into two parts by a porous partition made of parchment, bladder, leather, or porous earthenware. In one part was placed

the zinc surrounded by acidulated water, and in the other a copper plate immersed in solution of sulphate of copper. We may here explain that it is not supposed, when a molecule of water is decomposed by the action of the zinc, that its hydrogen atom travels bodily across to the other plate, but that it simply displaces the hydrogen in the next molecule of water, and this in turn acts on the next, and so on. Thus, in the Daniell battery the liberated hydrogen travels by such successive displacements through the acidulated water, with which the porous partition also is soaked; and when the copper solution is reached, the displacement of a copper atom is substituted for that of hydrogen, the hydrogen atom taking at its entrance oxygen from a molecule of oxide of copper, and so setting free the copper atom, which is thenceforth "exchanged" on, until the last in the series is reached, when a particle of the metal is thrown down on the copper plate.

59. This form of battery has many advantages, but is open to two serious objections: the porous cell or other partition, while allowing the transfer of elements to take place through it, does not do so without offering a considerable resistance; and again, the copper is liable to deposit in its metallic state in the porous part, so closing it, and finally, getting upon the zinc, destroys its efficiency by local circuits or local action. To remedy these defects a great variety of modifications have been adopted, which may be called as a rule gravity batteries. These depend upon the difference in density of the solutions, to maintain their separation. One of the earliest of these, invented by Meidinger, consisted of a plate of copper attached to an insulated wire and placed at the bottom of the jar; upon this was thrown a quantity of sulphate of copper. The jar was then filled up with water, with a little sulphate of zinc to give it conducting power, and in this was hung the zinc. The superior weight of the sulphate of copper solution was relied upon to keep it away from the zinc.\* This has been modified in detail, and is in many cases effective, so that such batteries can be left in closed circuit for months.

60. A recent modification of this gravity battery, known as the Lockwood battery, involving some action not fully determined, appears to be wonderfully efficient in practice.

61. When nitric acid was introduced by Grove, a porous cell of earthenware became absolutely requisite, and a plate of platinum for the negative element. For this last, Bunsen substituted gas carbon to diminish the expense; then Pogendorff proposed a mixture containing free chromic acid to replace the nitric. This mixture is obtained by mixing 1 part by weight of bichromate of potash with 10 of water and 3 of common oil of vitriol. This has the advantage of cheapness, and also of avoiding fumes, as chromic acid reduces to a solid sesquioxide of chromium, which of course remains in the solution. Its disadvantage is that it is less efficient than the nitric acid, and soon loses effect in closed circuit through the accumulation of sesquioxide of chromium upon the negative element, this body requiring time to dissolve. This difficulty has been met by the addition of nitric acid to the solution. In this case the nitric acid first loses its oxygen, but immediately takes it again from the chromic acid; thus, while no fumes of nitrous acid are developed, the action on the chromic acid is diffused more generally, and we have the quickness of the nitric acid, combined with the good qualities of the other material.

62. The above chromic-acid mixture, without nitric acid, may be used in a battery of zinc and carbon plates, provided these be only immersed when in use. The convenient "French flask batteries" are thus made, and for use with the large electro-magnet of the Stevens Institute of Technology, and his own induction coil, where great power in a compact form is needed for a short time, the present writer caused to be constructed four sets, of three cells each, on the same general principle. These expose surfaces of about five square feet of zinc in each cell, or sixty feet in the aggregate. During three years' constant use they have given entire satisfaction for the purposes named.

63. A battery of zinc and carbon, in which the exciting fluid is a strong solution or paste of acid sulphate of mercury, is very convenient for medical use. The present writer pointed out some years ago that this substance could be replaced with advantage by a mixture of glauher salt and chloride of mercury, and that even glauher salt, a harmless and non-corrosive substance, would in many cases answer very well alone. (*Jour. Franklin Inst.*, vol. 1, p. 68.)

64. The Maynooth battery, in which the elements are zinc and cast iron, the iron being in contact with a mixture of strong sulphuric and nitric acids, makes a very powerful combination, but the fumes evolved in filling and emptying it are very objectionable.

65. For running electric clocks and such work, not re-

\* Though this is often quoted as the first, one was patented in England some years earlier by C. F. Varley, Dec. 8, 1858, No. 2818.

quiring much force, the Leclanche battery is found to be very convenient. This consists of a square-shaped glass vessel, within which is set a porous cylinder containing a plate of carbon, and small fragments of black oxide of manganese packed tightly around it. In one corner of the square vessel is placed a rod of zinc, and the vessel is partly filled with a strong solution of sal-ammoniac. (*Les Mondes*, 1868, vol. xvi., p. 532.) Chloride of zinc is formed in this battery, and the hydrogen liberated is taken up by oxygen of the oxide of manganese, or escapes.

*Dry Piles.*—66. The slight amount of moisture which even ordinary paper will retain is sufficient to produce a galvanic action with dissimilar metals, and this may become quite appreciable if a sufficient number of elements are used.

*Grove's Gas Battery.*—67. We have already mentioned that a plate of platinum covered with hydrogen was strongly positive, and, following out this principle, Grove constructs what has been called a gas battery. In this a number of vessels are provided each with two platinum strips. The vessels contain acidulated water, and the strips, partly immersed in this, are covered with bell jars, one containing oxygen, the other hydrogen. Under these conditions the hydrogen in contact with the platinum acts like zinc, and combines with some of the oxygen of the water, setting free other hydrogen, which, passing to the other strip, there combines with some of the free oxygen.

68. On a principle suggested by this action and some of its relations are constructed what are called *Secondary Piles*. If, for example, we immerse two or more plates of lead in a solution of glauber salt, and pass the current of a small battery for some time between the plates, there will be formed on one plate a film of oxide of lead, while the other will acquire a layer of excited hydrogen. If the charging battery be now removed, and the terminals of the other arrangement brought together, a brief but very powerful current will be developed by the combination of the hydrogen at one side and the oxygen at the other.

(For a full discussion of this subject, see J. Thomson, "Pogg. Ann.," 1865, vol. xxiv., p. 498, and of an improved form by G. Plante, "Phil. Mag.," 1868, vol. xxxvi., p. 159.)

Early in 1881, M. C. Faure made an improvement on the plan of Plante by coating the lead plates with a paste of red lead and sulphuric acid kept in place with sheets of felt, and then by an electric current converting one into a sponge of metallic lead and the other into peroxide of lead. This greatly increased the electric capacity of the battery. Further improvements were soon made by Swan, Selou, Volekmar, Brush, and others, who made the lead plates cellular and filled the cells with the porous active material. (See "Telegraphic Journal and Electrical Review," 1881, vol. ix., pp. 192, 491, 511; 1882, vol. x., p. 230, p. 21, 211; 1882, vol. xi., pp. 64, 329; "Harper's Monthly," Dec., 1882, vol. lxvi., p. 84.)

#### Instruments for the Measurement of the Galvanic Current.

*The Voltmeter.*—69. This instrument is based upon the principle that a current can only pass through such a substance as water by decomposing it, and that thus the amount of water decomposed or of gas liberated will afford a true indication of the amount of electricity which has been transmitted. We have therefore, for this purpose, a vessel with two strips of platinum entering it from below, partly filled with slightly acidulated water, and a graduated bell-jar or closed tube filled with water placed over them. When a current passes, bubbles of oxygen and hydrogen gases will rise, and the quantity collected in a minute will give us an indication of the amount of the electric current that has passed. Of late, decomposition of solutions of copper or zinc sulphate has replaced that of water. The gain in weight of the cathode or plate on which the metal is deposited is .328 milligrammes of copper or .342 of zinc pr. ampere pr. second.

70. In 1820, Ørsted discovered that when a galvanic current was passing through a wire a magnetic needle tended to set itself at right angles to the wire.\* The direction in which the needle turned from a position parallel to the wire depended upon the direction of the current and upon the location of the wire (*i. e.* whether it was above or below the needle). It thus came about that if a needle was suspended in a coil, the parts of the coil above and below would reinforce each other in their action on the needle, and that a reversal in the direction of the current would be indicated by a reversal in the position of the needle.

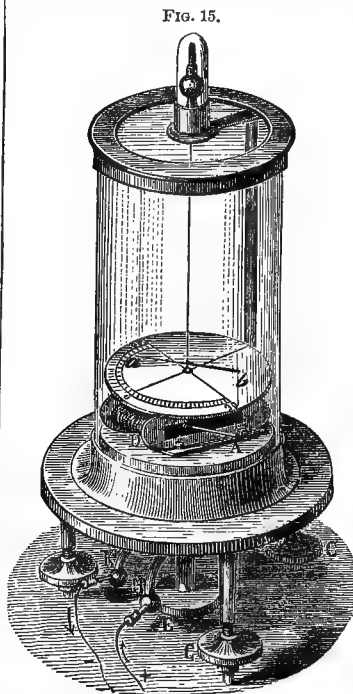
A galvanometer, then, in general consists of a magnetic needle suspended in a coil of wire, which is placed in the magnetic meridian (*i. e.* N. and S.), or in the same direction

as the needle. To the needle is attached a pointer, by which the angular displacement which it suffers may be read off on a divided circle.

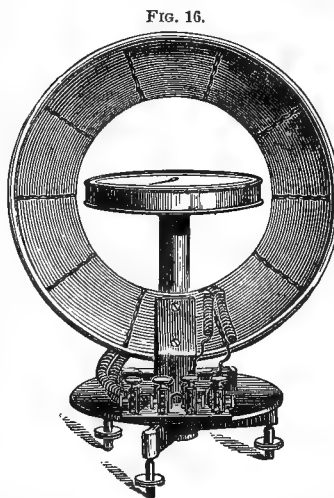
For various uses different forms and combinations are adopted, of which we shall mention the principal.

#### The Tangent Galvanometer.

71. A simple trigonometrical discussion (see Sabine on the "Electric Telegraph," p. 237) will show that if the needle is very small in comparison with the size of the coil—say, one-fifteenth of its diameter—the force of the current will vary as the tangent of the angle of deflection for small displacements. With a coil so distant from the needle as this condition involves it would



only be possible to measure very powerful currents in this way; but Gauguin has shown that if the coil be wound in the surface of a



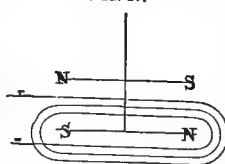
frustum of a cone whose apex passes through the centre of the needle, the same relation between the current and deflection will be maintained, even when the diameter of the coil is but five or six times the length of the needle. For certain purposes the coil in this instrument is made in two equal parts, so that either half or all of it may be used at pleasure. Fig. 16 shows one of these instruments, as made by Messrs. Knox & Shain of Philadelphia.

*The Sine Galvanometer.*—72. In this instrument the coil is movable, and in making observations it is rotated until its plane coincides in direction with the needle. Under these circumstances it may be shown that the force of the current varies with the sine of the angle of deflection. (See Sabine on the "Electric Telegraph," p. 241.)

*The Astatic Galvanometer.*—73. Yet further to increase the delicacy of this instrument we diminish the directive

force of the needle without diminishing the influence of the coil upon it, by uniting two needles rigidly, but at a distance, one over the other, with their poles reversed. By this means, if the needles were absolutely equal they would stand E. and W.; and if not absolutely equal, they take some intermediate position between this and the magnetic meridian, with a directive force which is diminished as their complete equality is approached. The astatic combination is then so introduced in the coil that one of the needles is inside, and the other outside. If we now bear in mind that the direction in which the needle tends to

FIG. 17.



\* It appears, however, that this fact had been observed by Romagnesi of Trent, and was published in the "Manuel du Galvanisme, etc., par Joseph Izaru," Paris, 1804.

move is reversed—1st, by a reversal of the current; 2d, by a reversal of the magnet in relation to it; and 3d, by reversal of its relation with reference to being above or below—we will see that the action of the currents on the two needles will coincide in direction, and so assist each other in producing the deflection.

74. One of the most complete instruments of this type is Sir W. Thomson's double coil astatic galvanometer. In this instrument we have two coils, which are exactly equal in resistance and in their effect upon the included magnets. These two magnets are rigidly connected with reversed poles, and the upper one carries a small mirror. Above them is a bar magnet, which serves to regulate their sensitiveness by counteracting more or less the influence of the earth's magnetism, and also to give us a means of bringing them to a fixed position. The binding screws at the base allow us to bring the two coils into any relation we please, either to use them in combination or opposed to each other. The instrument here represented has its coils composed of very fine wire in very many turns, but it is also made with a short thick wire for other purposes.

The movements of the astatic combination of needles are read in the following manner: At a distance of about two feet in front of the instrument is placed the frame and lamp shown in Fig. 19. (The instrument would be to the right, as this is shown in the cut.) The light from the lamp, passing through the vertical slit in the frame, falls on the mirror in the upper part of the galvanometer, which is curved so as to throw an image of the flame back upon a scale attached to the other side of the frame. The motion of this image indicates the movement of the needles.

**Resistance Coils.**—75. For use with these various instruments we have sets of "known resistances," consisting of bobbins of insulated German silver wire, carefully graduated to correspond with fixed standards. These bobbins are placed in a box with their terminals attached to a series of heavy brass pieces, between which fit conical plugs. When these plugs are in place they form with the brass pieces a conductor of inappreciable resistance, but by taking out any one, the current is obliged to pass through the corresponding coil, and so experience its resistance. These resistances are expressed in "units" or in "ohms." These two terms express standards slightly different—one, known as Siemen's unit, defined to be the resistance of a

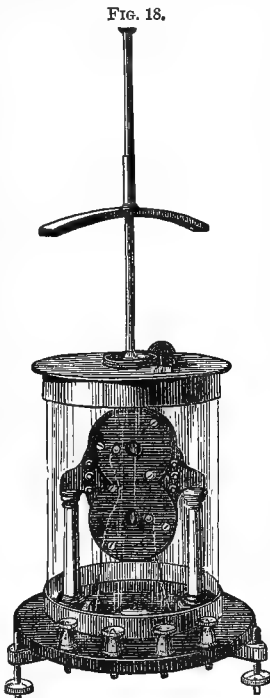


FIG. 19.

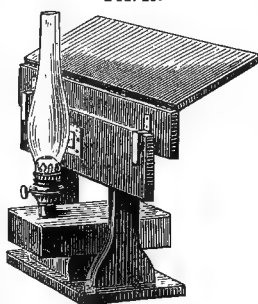
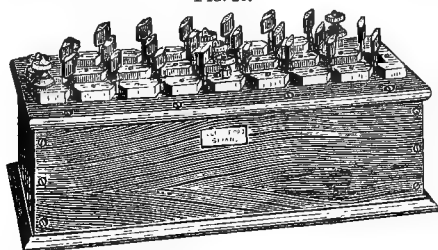


FIG. 20.



prism of pure mercury of one square millimetre section, and one metre long, at 0° C.; the other, known as the British

Association unit, or B. A. unit, is founded on an absolute determination of the relation of resistance to work or energy through the production of heat. The unit first obtained, and known as the  $\frac{\text{metre}}{\text{second}}$  unit, when raised to the seventh power, gives us the B. A. unit, or ohm, whose relation to Siemen's unit is as 1.0456 to 1. One million of ohms make a megohm; one-millionth of an ohm is a microhm.

**Thermo-electric Couples.**—76. A separation of the electricities similar in character to that which we have just described as accomplished by chemical force is brought about by the direct action of heat on dissimilar conductors

in contact. Thus, if we have a series of bars of antimony and bismuth united at their alternate ends, as shown in Fig. 21, and heat one side, DC, while the other, AB, is either exposed to the air or otherwise cooled, a separation of the electric fluids will be effected, and one extremity of the series will acquire a positive, while the other gains a negative, charge. As can easily be imagined, the electro-motive force is very feeble in this case, and thus very delicate instruments are required to recognize the effect. Moreover, the internal resistance of the system will be very small, since it consists entirely of conductors, and we must therefore employ low-resistance circuits for the measuring instruments to be used with it.

By uniting a large number of minute bars of antimony and bismuth in the manner indicated into a square prism, a "thermo-electric pile" is formed. This is generally enclosed in a brass case, provided with hollow conical reflectors, such as  $\alpha$ , for its ends, and supported on a stand. It then forms with an astatic galvanometer (see § 73) the most delicate means we possess of indicating changes in temperature, the change in temperature being estimated from the effect of the electric action which it produces. Many experiments have been made by Becquerel, Bunsen, Marcus, and others on the development of this source of electric force. (See "Phil. Mag.," 1865, vol. xxix., pp. 159, 406; also vol.

xxx., p. 77; likewise "Jour. of Fr. Inst.," vol. xlix., p. 420.) The best battery is that of Mure and Clamond. (See "Tele. Jr. and Elec. Rev.," London, 1872, vol. i., p. 11.)

**ANIMAL ELECTRICITY.**—77. It has been shown that pieces of muscular tissue from animals recently killed will develop actions identical in character with those produced by chemical or heat forces, as before described, and moreover that certain animals, notably the torpedo and electric eel, have the power of giving at pleasure heavy discharges by means of a special apparatus which resembles in its structure a series of galvanic couples. (Faraday, *Phil. Trans.*, 1839, part i., p. 1.) It has been shown by Matteucci that in living animals an electric current is perpetually circulating between the internal and external portions of the muscles. This no doubt derives its source from the chemical actions constantly in progress in connection with the vital processes.

Other, and what may be called secondary, methods of exciting galvanic electricity, such as that of induction from another current or from a magnet, will be given farther on, after the subject of induction itself has been discussed.

**Mechanical Effects of Electric Currents.**—78. Our consideration of that form of electrical development known as galvanic or dynamic has led us thus far rather to notice its close resemblance to, or rather general identity with, the statical or frictional form of the same action; but while there is this exceedingly close relation between the two—while, in fact, they only differ in the degree of some of their conditions—it is yet true that this amount of difference is great enough to warrant the division of the subject which exists, and to make two classes of phenomena, which, while equally existing in both, are each of them pre-eminent in one of the two subjects, and practically inappreciable in the other.

These marked differences are in the quantity and intensity of the electric disturbances. In the case of the simple galvanic couple already described the amount of the fluids which can be separated is immense, but the separating force is so deficient in intensity that it can accomplish no condensation of the fluid in an insulated conductor, but can only do its work when the fluids are allowed to flow round and unite as fast as they are developed. It is like

FIG. 21.

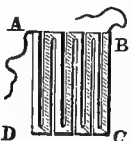
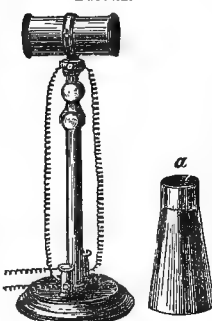


FIG. 22.



one of the great wheels used in draining the Haarlem Lake, which by rotating in a broad canal pushed the whole body of water along, and raised it only a few inches. It could produce the current as of a river through a nearly level channel, but for producing a "head" of water or high pressure it was all but powerless.

On the other hand, the frictional methods of excitement give us a means of packing away or condensing the fluid to any extent, but are able to put but little in motion at a time. To carry out our former illustration, they might be compared to the pumps of hydrostatic presses, which can produce a tremendous "head" of water, but deliver only a few ounces at each stroke.

The great self-repellent force of each fluid makes the condensation of even a small amount into a limited space a work requiring great intensity of power, while the want of weight in the electric substance makes the movement of great quantities a matter dependent simply on what might be called frictional resistance (*i.e.* the obstacle offered by the transmitting material or conductor to their passage). It thus comes that while in statical electricity we have chiefly to do with what we may consider highly compressed fluids forcibly accumulated in different bodies, in dynamical electricity we have to consider the flow of large volumes of the same fluids but little compressed, and thus having little mutual repulsion or tendency to diverge. Thus, it comes that in the first case we can only have marked results as a rule from the properties these fluids possess when at rest. There will not be volume enough to produce any effect if let out as a current. It would be like letting out the water from a hydraulic press against a mill-wheel. And so, on the other hand, we must have a clear circuit and free passage for the fluids in order to obtain the dynamical phenomena. The quietly flowing river can swing round a hundred wheels, but would not push down a handful of earth that fenced it off from some child's excavation in its beach.

While, therefore, there are tension and accumulation and every effect resulting from the properties of the fluids when at rest, in dynamic electricity; we have to consider mainly the effects of currents flowing easily in closed circuits. According to our double-fluid theory, we know that if the positive fluid is moved into one body, the negative equally goes into the other, and that thus the flow of one in one direction will involve the flow of the other in the opposite. It therefore becomes an unnecessary repetition to go over each description a second time, simply reversing the order, and we therefore commonly confine our descriptions to the motions of the positive fluid, assuming that the negative follows the same track, "the other way round."

**Attractions and Repulsions of Electric Currents.**—79. The attraction for light bodies exhibited by those excited by friction evidently depends upon the accumulation of one or the other fluid in the excited body; but nothing like this can exist with a current, which being, as we have seen, duplex in its character (*i.e.* an equal flow of positive in one direction and negative in the other), can have no accumulation or charge of either fluid at any point. Thus, no phenomena of attraction and repulsion are to be expected from closed circuits upon light bodies.

We may, however, expect that two currents, or the conductors carrying two currents, should attract or repel each other, and that this attraction and repulsion should depend upon the relation of their directions. This is indeed found to be the case. If two currents flow in parallel wires in the same direction, the wires tend to approach; if the directions are opposite, they tend to recede. This fact may be illustrated in a variety of ways, but perhaps that which is at once the simplest and most striking is to have two pieces of wire bent so as each to form three sides of a square; then so to weight these by rods rigidly attached that they will stand on their ends. Four slight hollows containing mercury are then so arranged as to receive the ends of these wires when they stand close together and parallel. If, then, the mercury cups are so connected that a current from a battery will traverse the two wires successively in the same direction, they will be seen to approach; if in opposite directions, they will recede.

80. If straight conductors carrying currents are so placed as to form an angle with each other, they will attract if both currents go towards or from the apex of the angle, but will repel if one approaches and the other recedes. This is, however, a direct consequence of the former law. The action of a sinuous current is equal to that of a rectilinear one equal to its length in projection.

81. From the law of angular currents we easily derive the law regarding currents at right angles to each other—one in a fixed conductor and the other movable round an axis or in any direction parallel with itself. If the current in the movable conductor approaches the fixed one, then it will cause the movable conductor to advance in a line paral-

lel to that of the fixed conductor, in a direction opposite to that of its current, and in the same direction as this current if the direction of the current in the movable wire be away from the fixed one. Consequently, a vertical rectangle or circle carrying a current will tend to assume a position parallel to a horizontal conductor, and so as to bring the horizontal currents of both into the same direction.

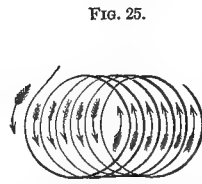
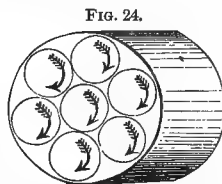
82. Again, as a direct consequence of the reactions of angular currents not in the same plane, we will see that a current in a wire occupying the relation of a radius to the line around which it is free to move will tend to perform a continuous rotation if acted upon by a current in a tan-

gent or circumferential conductor in or parallel to its plane of motion. A current in a wire perpendicular to this same plane would be similarly affected.

Thus, if a current is made to pass up through a central column, and then divide in opposite directions through wires A B, then descending into a trough of mercury while another current or a continuation of the same passes through a surrounding ring of wire, EF, a continuous rotation will be maintained.

These are some of the results of the simple general law that currents in the same direction attract, and in opposite directions repel.

**Relations between Magnets and Currents.**—83. The theory of Ampère, fully explained in another place (see "Magnetism"), develops all the properties of magnets, from the assumption that they are equivalent to spirals carrying currents, or are made up of particles, each of which has in it a closed circuit, all moving in the same direction. (See Figs. 24 and 25.) From this it would naturally follow that mutual actions would exist between magnets and cur-



rents, such as might be derived from the elementary law and examples given above. Such is indeed the case. Moreover, the earth itself playing the part of a powerful magnet, we should expect certain relations to subsist between its directive force or polar action and the movements of free conductors carrying currents. These also we find.

84. Thus, we have, as perhaps first in importance, the fruitful fact discovered by Ørsted that a magnet tended to set itself at right angles to the line of a current, and reciprocally that a conductor carrying a current would set itself at right angles to a magnet. Regarding the magnet simply as a series of currents in planes perpendicular to its length, these actions are simply examples of the tendency of currents to get into parallel planes, resulting from the first simple law of their attraction and repulsion. For exactly similar reasons, free conductors carrying currents place themselves at right angles to the magnetic meridian.

85. The rotations of magnets around conductors and conductors around magnets, which flow from this same relation, are as numerous as their explanation, by reference to the above general considerations, is obvious. For an extended discussion of these the reader is referred to De la Rive's "Traité d'Électricité," tom. i., chap. 2.

86. A solenoid is a helix or spiral, with the wire of which it is formed returned along its axis. When therefore a current traverses it the longitudinal effect of the spiral is counterbalanced by that of the return wire, and it becomes in all respects equivalent to a series of equal and parallel circular currents. In fact, it fulfils exactly Ampère's description of a magnet. As might be expected, therefore, it behaves in all respects exactly like one.

**Magnetization by Currents.**—87. If a bar of soft iron is inserted in a solenoid, it is found to become powerfully magnetic as long as the wire is traversed by a current, the order of the poles being as follows: if the current passes round in the direction of the hands of a watch, the pole on the near side will be a south pole.

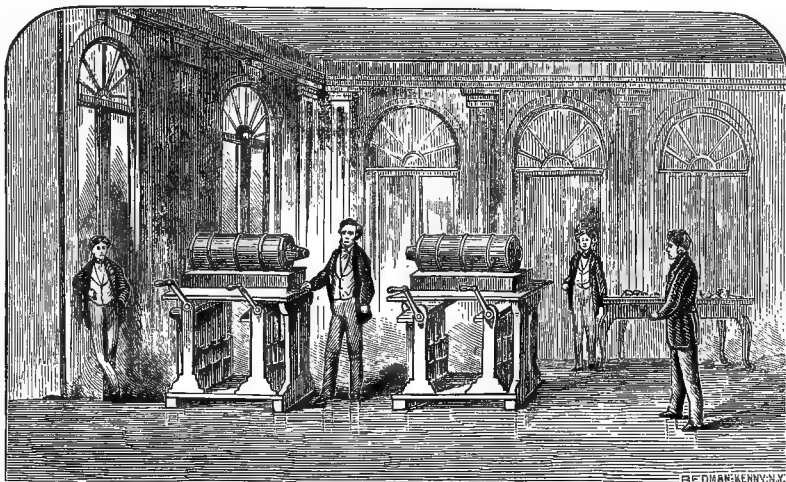
If in place of a solenoid, we surround the iron bar with a multiple coil of many layers of insulated wire, the current acting repeatedly will produce a greatly-increased effect. By this means magnets of the greatest power are produced. They are called, for distinction, electro-magnets, and, as has been already remarked, lose their power practically with the cessation of the current.



The largest and most efficient electro-magnet yet constructed is one built, after the designs prepared by Prof. A. M. Mayer and the present writer; by Mr. William Wallace of Ansonia, Conn., for the Stevens Institute of Technol-

ogy. It weighs with its armatures about 1800 pounds, has cores of soft iron six inches in diameter and three feet three inches each in length, and surpasses any similar instrument in the intensity of its effects.

FIG. 26.



On the peculiar properties of the electro-magnet was founded the invention of the electro-magnetic telegraph. (See TELEGRAPH.)

88. The great power which an electro-magnet exerts on a body near it has led many to attempt the application of this as a motor in driving machinery. A consideration of the numerical results given at §§ 52 and 53, in connection with the explanation of the origin of the galvanic force, will, however, show us that zinc consumed in one of the forms of galvanic battery which does not involve the use of some other very expensive material will yield us but about one-tenth to one-sixteenth the force produced by coal in its combustion; and even if made perfectly available by some discovery not yet even hinted at, would be but one-fourth as effective as coal. The price of zinc is moreover at present about forty times that of coal. Our present steam-engines give us about five per cent., or one-twentieth, of the total force evolved by their fuel; so that with an absolutely perfect battery and electro-motor the economic relation would be eight times in favor of the steam-engine with such batteries as could be used—twenty and thirty-two times if the engine were absolutely perfect; but with the best form of engine yet devised it would be 100 to 160 times more expensive to obtain power by a galvanic motor than by a steam-engine.

*Laws of Electro-Magnetism.*—89. It has been shown by Lenz and Jacobi that with a uniform current—1st, Magnetism in any given bar is directly proportional to the number of coils which act upon it. 2d, The diameter of the coils has no effect, the greater length of the larger coil exactly compensating for its greater distance. 3d, The thickness of the wire has no effect, the condition first named of a constant current being maintained. Of course, with the same battery the amount of the current will be largely influenced by the size and consequent resistance of the wire. 4th, The strength of the magnetism is proportional to the quantity of the current. This and certain other relations, it will be readily seen, have a limit in the capacity of a bar of iron to receive a magnetic charge. 5th, The attractive power of the electro-magnet for a saturated steel bar varies with the inverse square of the distance, but for a bar of soft iron, where induction comes in, with some function approaching the inverse cube of the distance. 6th, The retentive power varies with the square of the charge or of the quantity of current. 7th, The amount of magnetism developed is largely influenced by the surface of the iron, though not depending only on that; so that a tube whose thickness is about one-sixth its diameter would be equivalent to a solid bar of the same diameter. 8th, The length of the bar has no effect on its magnetic force, beyond that of diminishing the interfering action of the opposite poles by separating them. 9th, The position of the bar in the helix, whether in or out of its axis, is immaterial.

An excellent research on several of these points, involving a very beautiful and accurate method for comparison of magnetic forces, was published by Prof. A. M. Mayer in the "Am. Jour. of Science" for Sept., 1870.

*Electrolysis, or Chemical Action of an Electric Current.*—90. As a chemical combination is on the one hand an effective source of the electric current, so on the other side

this current may expend itself in reversing this action, or in decomposing such compounds as in their formation gave it birth. Thus, if the current from a series of galvanic elements be made to pass through a solution of sulphate of zinc, the oxide of zinc will be decomposed, metallic zinc appearing at one side, and oxygen gas being given off at the other. So with the sulphate of copper and other salts not too difficult to decompose; and in such cases it is found that if the conductor to which the oxygen goes is of a metal, such as copper, iron, zinc, etc., which can combine readily with that element, an oxide will be formed and dissolved by the liberated acid.

On this fact are founded the various processes of electroplating, of electrotyping, and the like.

A conducting matrix or mould or object is suspended in a solution of the metal to be deposited, in connection with the zinc or negative pole of the battery, and a plate of the same metal is suspended in the same liquid and in connection with copper, carbon, or other positive pole of the battery. The metal is then deposited gradually on every portion of the mould or object, and may either be left there, as in plating, gilding, etc., or stripped off, as in electrotyping, where it becomes the cast or duplicate original which is to be used.

91. The firmer the union of the elements or compounds the more difficult it is to separate them. Thus, if such a salt as sulphate of soda is placed in solution between the poles of a moderate battery, we can readily separate the acid from the base, but not the elements of the base. For this a very powerful combination is required, such as was used by Davy when he first separated, and so discovered, the metallic elements of the alkalis and earths. The elements of water are not very difficult thus to dissociate, and this has been adopted as a convenient means for measuring the quantity of the current. By employing the most intense means at our command, we can even act upon the elementary gases, so as to effect a possible separation of these. (See OZONE.)

92. A fluid state, as might naturally be expected, allowing of motion among the particles, seems to be essential to electrolysis, and we obtain this either by solution or fusion where it does not exist already; and we find that in all cases the most electro-negative element or component of the compound collects on the zinc pole, and the more positive on the other.

*TRANSFER OF DYNAMIC ELECTRICITY—Conduction.*—93. Conduction in dynamic electricity resembles in all respects the same action in the static condition of the fluids. It varies in the same way with different substances, but can be more readily studied and measured. Moreover, on account of the inappreciable "condensation" of a current, the conductor does not act mainly by its surface, but by its entire section. The following list will give some idea of the relation of a few substances in this respect.

Silver.....	100.
Copper, pure.....	99.9
" best commercial.....	85-95.
" ordinary .....	40-70.
Brass.....	20.
Zinc.....	29.
Steel.....	about 16.

Iron.....	about 15.
German silver.....	12-16.
Lead.....	8.3
Platinum.....	6.9
Mercury.....	1.6
Pure graphite.....	0.069,3
Coke, or coal-gas graphite.....	0.038,6
Tellurium.....	0.000,77
Red phosphorus.....	0.000,001,23
Solution of sulphate of copper, saturated.....	0.000,000,005,4
Sulphuric acid and water, 1-11 vols.....	0.000,000,088
Sulphate of zinc, saturated solution.....	0.000,000,005,7
“ “ “ half saturated.....	0.000,000,007
“ “ “ quarter “.....	0.000,000,005,4

From this table will be noticed the great effect which the presence of any impurity has upon the conducting power of a metal, and the very inferior conducting power of alloys as compared with their constituents.

Again, we see the vast difference between the conductivity of metals and that of non-metallic bodies and solutions, and that, moreover, in some solutions the conductivity reaches a maximum at a certain strength, and declines either by concentration or dilution.

94. It is observed, moreover, that in the case of metals the conductivity varies inversely with the temperature, while the non-metallic ones rise in conductivity as the temperature is elevated. Thus, in gutta-percha used to insulate cables for submarine telegraphy, the conductivity increases about thirty-six times in passing from 32° to 90° F. Glass at a red heat becomes a good conductor. The same general action takes place in liquids, conductivity increasing with temperature; and thus we find a moderate heat favorable to battery-action and to electrolysis.

95. Gases under ordinary circumstances are almost perfect insulators, but it has been shown by Andrews, Hankel, E. Becquerel, and Buff that some slight indications of conduction could be obtained, and Magnus found that hydrogen exceeded other gases in this respect. When intensely heated, however, as in certain spectrum or Geissler tubes, gases seem to conduct with a sensible facility; possibly also in the electric arc.

*Heating and Luminous Effects.*—96. When a galvanic current passes through a conductor, heat is developed to a degree varying with the amount of the current and the resistance of the wire. If the quantity of the current is increased, the heat will increase as the square of this quantity. Thus, if we have a platinum wire stretched between two rods or posts, and, connecting one of them with one pole of a powerful battery, draw the other terminal along the wire, beginning with the farther end, the heat in the wire will increase as the part through which the current passes decreases in length, until, if the battery is sufficiently powerful, the wire is at last even fused. Again, if a wire of some length is kept at a red heat by a battery, we may make one part glow much more brightly by cooling another with cold water. The reason is, that by cooling we increase the conducting power or diminish the resistance of that part, and so allow more current to be forced through the remaining portion. Recently, by arranging a delicate thread of carbon (obtained by heating, out of contact with air, bamboo fibres, slips of paper or of deoxygenized collodion films, and the like) in a small glass globe perfectly exhausted of air, and having the carbon thread connected by platinum wires passing hermetically tight through the globe, incandescent electric lamps have been made, which are operated by electric currents supplied by dynamo-electric machines. The carbon thread becomes white hot, but is prevented from burning by the absence of air.

97. The interesting conclusion has been reached by Favre (*Comptes Rendus*, vol. lv., p. 56) that the total amount of heat generated by the solution of a given quantity of zinc in galvanic circuit is constant, being diminished in the battery as it is increased in the exterior circuit; and moreover that heat is lost when motion is produced just in the proportion that Joule's theory and equivalent would require.

98. From what has been said above, we see that if electric fluid could be forced in any amount through a non-conducting substance, very intense effects of heat and light ought to be produced. This is in fact observed in the case of the statical discharge in air, which affords us the most intense exhibition of these forces with which we are acquainted. With galvanic electricity it is, however, under ordinary conditions, impossible to obtain sufficient concentration to rupture the resistance of air. If, however, the poles of a powerful battery of, say, forty or fifty Grove or Bunsen elements are brought into contact, and then slightly separated, a bridge of particles torn off from the positive and hurled upon the negative pole is formed, and maintains the connection. Resistance enough, however, is offered to develop a light of the most dazzling brightness.

It is found most convenient to make the terminals in this case from a very dense and, in an ordinary sense, in-

combustible carbon or "coal-gas graphite" (such as is used for elements in the battery cells, except that a finer and purer preparation is here essential). Even this material is slowly dissipated in the intense heat of the electric arc, and various forms of self-adjusting regulators have therefore been devised by which the carbon points are made to approach each other as they are consumed.

99. If the lower carbon is hollowed into a cup, various substances, such as the metals and salts, can be placed in it, and converted into incandescent vapor by the action of the discharge. By this means the peculiar colored lights which they emit may be analyzed with a prism and projected as "spectra" on a screen with a very beautiful effect.

While, as we have already shown (§ 88), a galvanic current derived from chemical actions involving the use of zinc and other expensive materials is not at all able to compete with the coal-consuming engine as a source of mechanical power, yet by reversing the order of conversions and employing the cheap mechanical power of the steam-engine to develop a galvanic current (see § 104), and using this to produce light as above, something useful may be accomplished. In an interesting paper on the cost of the electric light (*Am. Jour. of Science*, 1868, vol. xlv., p. 113), Moses G. Farmer has shown that where a light of about 1000 candles was required it could in this way be produced at one-tenth the cost of the same amount of gas-light.

*Galvanic or Dynamic Induction.*—100. This action, whose theoretical explanation has defied the insight even of Faraday, is in its simplest form of exhibition as follows: Suppose that two wires are arranged side by side, but mutually insulated for some length, and that one of them is connected in closed circuit with a delicate galvanometer, while the other may be made at will the path of a current from a galvanic battery. If this connection is made, we will notice an instantaneous movement of the needle in the galvanometer, indicating a momentary current in the opposite direction to that of the battery. While this battery flows all is absolutely at rest, but the moment that an interruption occurs, another instantaneous current is shown by the galvanometer, but now in the same direction as the battery current followed. These momentary currents are called secondary on induced currents, and that producing them is called the "primary" current.

If the two wires, in place of being in parallel straight lines, had been wound each in a flat spiral, and these spirals had been in close proximity, the effect would have been the same. In this case, moreover, if instead of causing the primary current to start and stop, we allowed it to flow continuously, but brought the spirals quickly together and then as quickly separated them, the same induced currents would have been generated as before.

Bearing in mind, as has been already stated, that a magnet represents in all respects a spiral carrying a current, it is evident that the mutual approach and separation of magnets and helices should produce secondary currents in the latter, and so likewise the charging and discharging of electro-magnets in the presence of spirals or other conducting circuits.

101. Again, this "induced current" may be developed in the primary circuit or wire itself. It is then called the extra current. Also, as Prof. J. Henry has shown, the secondary current may in its turn be made to develop another, and this again a fourth, and so on to an indefinite limit.

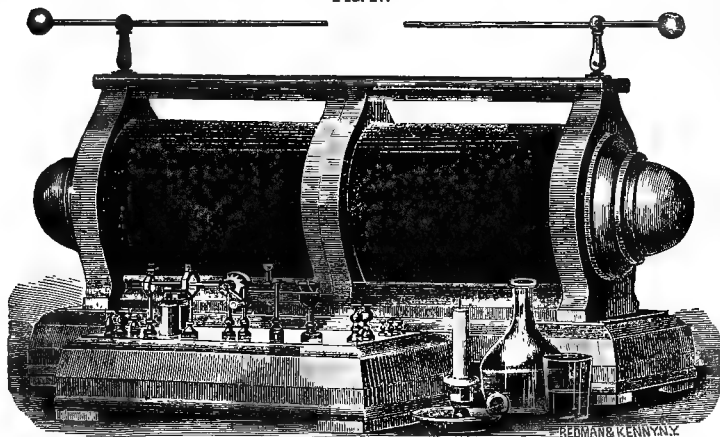
In addition to their great scientific interest, these actions above briefly noticed have developed two of the most remarkable instruments for the production of electric phenomena, the induction coil and the magneto-electric machine.

102. The induction coil consists of a thick wire wound into a spiral around a bundle of soft iron needles. This receives, through a "break-piece" or "interrupter," either automatic or moved by hand, a discontinuous current from a galvanic battery. Around this primary spiral, but most thoroughly insulated from it, even by a heavy glass jar, is another or secondary spiral of very fine wire and of great length. The terminals of this furnish the positive and negative fluids. To do away with the interfering action of the "extra current," a condenser is connected with the primary circuit at either side of the break-piece. This condenser is equivalent to a Leyden jar of great surface, and is made of tin-foil separated by oil-silk.

The battery connections being made, and the interrupter put in action, at each break of circuit flashes of electricity pass between the terminals with a length and brilliancy depending upon the size and perfection of the instrument. One of these coils, built for the present writer by Mr. E. S. Ritchie of Boston, to whom the instrument owes its efficient and practical development (*Jour. of the Franklin Institute*, vol. xl., p. 64), is shown in the accom-

panying cut. (See Fig. 27.) The outer or secondary coil of this instrument contains fifty miles of wire, .007 inch in diameter, covered with silk; the primary wire is 200 feet

FIG. 27.

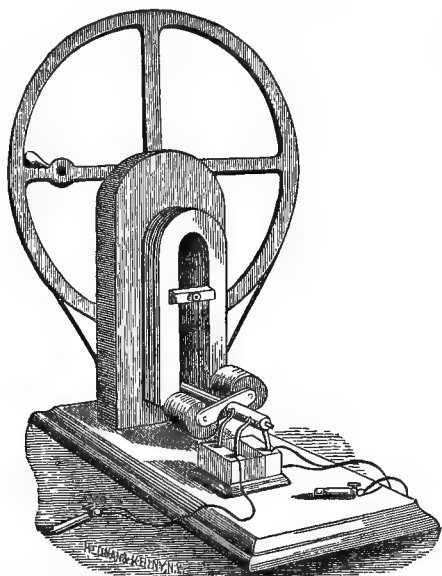


long and 0.1655, or about one-sixth of an inch, thick. The condenser contains 325 square feet of coated surface. With three cells of battery, each having in use, when freshly charged, not more than half a square foot of active surface, this instrument throws sparks in the air through a distance of twenty-one inches, and pierces solid blocks of glass three inches thick. When connected with a large Leyden jar the sound of its discharge is painful.

103. In addition to its numerous applications in scientific connections, this instrument has been used with great success as a means of lighting instantaneously the numerous gas-burners in public buildings, such as theatres. Many of these buildings in Boston, New York, and Philadelphia are so lit up. It is also employed in the Lenoir gas-engine to ignite the mixture of gas and air in the cylinder.

*Magneto-Electric Machines.*—104. If a coil of wire is rapidly caused to approach and recede from a permanent magnet, a series of induced currents will be developed in it. An easy way of securing this approach and withdrawal is to make several such coils rotate in front of large magnets in the manner shown in the cut. (See Fig. 28.) If bars of soft iron are fixed in the coils, they will receive and

FIG. 28.



lose their charge, and so greatly add to the effect. Thus, then, such a machine may be constructed, and by terminating the coils in plates on opposite sides of the axis, which thus will alternately touch springs resting against it on either side, we may correct the reversal of the currents, and get them from these springs in a constant direction. This machine has received a great number of modifications, of which the important ones are Siemens's armature and Wilde's application of cumulative action.

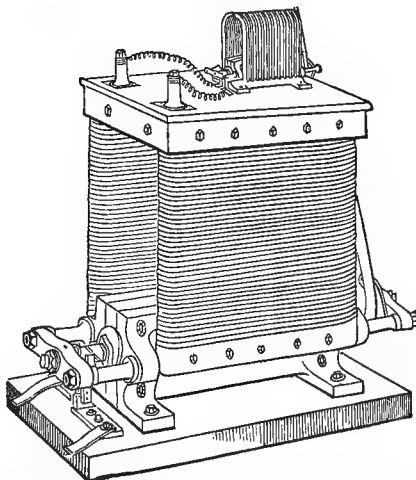
105. Siemens's armature consists of a small cylinder of iron having two deep grooves cut along its length on opposite sides. In these grooves the wire is wound, and by this means the whole piece can be placed between the poles of a series of horseshoe magnets, or otherwise in a very intense field of force. It is moreover in a form admirably adapted for rapid rotation.

106. Wilde was the first to apply the discovery that the current developed by one magneto-electric machine could charge electro-magnets with a far greater force than existed in the magnets of the first machine. Thus, by having one machine to charge the electro-magnets of another, a very great electric current could be readily produced. This plan was adopted in the machine shown in the accompanying cut. (See Fig. 29.) A number of permanent magnets placed above produce in the armature rotating between them a current which charges the large electro-magnets below, and the armature rotating within these electro-magnets yields

a current of great power.

107. Ladd of London has carried this idea yet farther

FIG. 29.



by dispensing with the upper machine, and causing part of the current developed by the large armature to circulate in the magnets around it. Some trace of magnetism will be found in any piece of iron, and this is enough to start the action, which, reacting on itself, soon brings the machine to its maximum energy of action.

108. These developments of electric action are not obtained without corresponding expenditure of force. The armatures are powerfully attracted by the magnets, and must be forcibly pulled away. Indeed, one of Wilde's machines when producing a very intense electric light requires about five horse-power to drive it.\*

109. Not only do magnets develop currents of electricity in coils of wire, but also in any moving conductors, and the currents so produced react upon the magnets, and also in passing through the conductors themselves develop heat. Thus, if a copper disk or tube is rotated in a powerful magnetic field, it will become very hot; indeed, fusible metal placed in such a tube may even be melted. So, again, a disk of copper rotated under a magnetic needle will cause this to be displaced. The magnet induces currents in the rotating disk, and these in turn affect the magnet.

*ELECTRICAL MEASUREMENTS.—General Considerations and Definitions.*—110. We have already at the outset, when considering the source of galvanic electricity, referred to the development of electro-motive force, and have shown that it there results from the separation of the electric fluids

\* These machines are now employed with entire success to deposit copper for electrotyping, as at the establishment of Mr. L. L. Smith, 135 West Twenty-fifth street, New York, and for some lighthouses. An account of the magneto-electric machine of M. Gramme, in the London "Standard" of April 9, 1873, confirmed by other information, leads to the belief that a decided improvement has been made in these machines.

caused by a difference in chemical attractions under certain conditions. We have compared this power, with reference to each of the fluids considered separately, to an imaginary property which we might suppose some substance to possess of forcing water through it in one direction until a slight difference in level had been established on opposite sides, when the action would be restrained by the hydrostatic pressure or head of the higher level. Now, it is evident that the quantity of liquid made to pass by such an action would depend on two things—on the intensity of the moving force (electro-motive force), and on the total resistance experienced to such motion, including both the resistance in the source of force itself (the sieve, for instance, in our illustration) and the channel by which the liquid could descend again to its first level.

Clearly, if the propelling force were constant the amount of liquid moved (there being in this case no question of inertia) would be so much the more as the resistance was less, and *vice versa*. We therefore see that this simple equation will express the relation between these three things;  $Q$  being the quantity of fluid moved,  $E$  the electro-

motive force, and  $R$  the resistance:  $Q = \frac{E}{R}$ . This is the famous law of Ohm, on which is founded the whole science of electrical measurement.

111. We will now consider a few cases in detail as a means of more clearly understanding the relations of this principle. Suppose that we have a number of electro-motive elements, such as galvanic battery couples, and arrange them in series (*i. e.* each one working into the next, as it were), and have an outside connection so short and of such a good conductor that it will offer no appreciable resistance. What will be the quantity of fluid set in motion in such a case, as compared with what a single element would yield with the same good outside connection? To make our equation full in its expression, we would have  $Q = \frac{E}{R + r}$  for the single element, and  $Q' = \frac{nE}{nR + r}$  for the number of elements;  $R$  being the resistance of the element itself, and  $r$  that of the exterior connection. Now, it is evident that if  $r = 0$ , as we have supposed in the case taken above, the second equation becomes  $Q' = \frac{nE}{nR} = \frac{E}{R}$  or identical with the first; or, in other words, that the series of cells, however great their number, will set in motion no more fluid than a single one.

Let us give the above a numerical shape. Let  $E = 50$ ,  $R = 20$  and  $n = 10$ ; then  $Q = \frac{50}{20 + 0} = 2.5$ , and  $Q' = \frac{10 \times 50}{10 \times 20 + 0} = \frac{500}{200} = 2.5$ .

112. Let us now consider the reason of this in the light of our illustration. Suppose we have a single sieve forcing water through a trough, and that this water can flow back with perfect freedom. There will then be no appreciable head acting against the sieve, and it will therefore force all the water that it is capable of transmitting. Now, suppose another sieve to take the water which has passed through the first; it will simply transmit it as did the other, without giving it any head or otherwise affecting it; for it must be borne in mind that we are not dealing with a dense material, which can acquire momentum, but with an imponderable fluid.

But now let us suppose that the exterior resistance was considerable—that, for example, the water raised to one side in the trough could only flow out by a narrow tube. Then clearly the sieve would produce a difference of level approaching that which was its maximum, and could then only pass on more water as the pipe allowed the accumulated quantity to flow back.\* If, now, a second sieve were added to the first, it would take the water at the height to which the first sieve had raised it, and would raise it just as much higher, so giving it twice the head to force it through the pipe; and for a fluid without weight this would cause a double flow. Returning to our equation, we would then have this case expressed as follows, making  $r$  no longer equal to 0, but, say, to 30:  $Q = \frac{E}{R + r}$  and  $Q' = \frac{nE}{nR + r}$ ;

$Q = \frac{50}{20 + 30} = 1$  and  $Q' = \frac{10 \times 50}{10 \times 20 + 30} = \frac{500}{230} = 2.17$ . In other words, in place of having the same quantity in both cases, as before, we now have more than twice as much in the one instance as in the other. It thus becomes evident that to obtain the best effect a certain proportion ought to exist between the exterior resistance and that of the electro-motor or battery, and our illustration will give us an easy way of seeing what this must be.

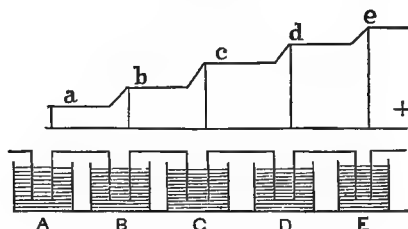
\* Moreover, this flow would evidently depend for its quantity on the amount of head propelling it.

113. It is, in the first place, evident that if the resistance of the exterior circuit is greater than that of the battery, the latter will "pump up" the fluid faster than it can come down again, and that so its whole capacity will not be utilized; while, on the other hand, if the exterior resistance is less than that of the battery, then the latter will be doing unnecessary work in raising the fluid to a higher level and giving it a greater "head" to flow down than is needed to keep up the supply; or, in other words, that we could very greatly decrease the number of active elements, and thus the expenditure of force, and yet but little diminish the amount of fluid put in motion. Thus, suppose we have 30 elements, each with an electro-motive force of 12 and a resistance of 2, and have an exterior resistance of 40; then  $Q = \frac{nE}{nR + r} = \frac{30 \times 12}{30 \times 2 + 40} = \frac{360}{100} = 3.6$ . If we now take away 10 elements, or diminish the expenditure of material by one-third, we will have  $Q' = \frac{nE}{nR + r} = \frac{20 \times 12}{20 \times 2 + 40} = \frac{240}{80} = 3$ , or a diminution in the current of only .6, or one-sixth of its former amount.

These examples, with the foregoing definitions, render the meaning of electro-motive force and Ohm's law sufficiently clear; and we will therefore pass to the next point, or the meaning of the terms—

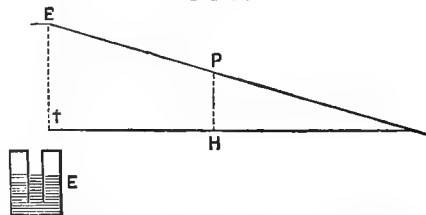
*Tension or Potential.*—114. These terms are used to indicate the condensation or accumulation of the fluids at any points, as compared with some standard assumed constant for the time being; or, turning to our former and convenient illustration, the tension or potential of any part of a circuit is the "head" or "hydrostatic column" of fluid at that point. Thus, suppose that A, B, C, D, E represented a series of galvanic elements or cells, with their negative pole connected with the ground at N, and the positive pole

FIG. 30.



insulated; then the successive levels a, b, c, d, e would indicate the + tensions of the various points, the relative tensions being expressed by vertical lines drawn to a common level. This shows us also at a glance the relation between electro-motive force and tension. The tension due to each cell equals its electro-motive force, and the total tension or maximum tension of the series is equal to the sum of the electro-motive forces.

FIG. 31.



Again, let us suppose that the + pole of battery E of the last diagram were connected by a long wire with the earth at F; then the positive tension at F would be nothing, and at various points in the line would be represented by the heights of corresponding points on the line eF. Or, to revert to our hydrostatic comparison, suppose water to be supplied to a pipe GF at G, and to run out freely at F, the head at any intermediate point, H, might be supposed to be HI. As we have before remarked, we do not propose this as an illustration in hydraulics, though by adding the necessary conditions it could be carried out in that shape, but simply as giving a physical shape to the idea of the electric state, which may render it more easy to handle.

*Derived Circuits.*—115. When more than one passage is presented to an electric fluid, it will divide itself between them in proportion to the ease of passage, or inversely to the resistance. Thus, suppose two circuits open to the current, one offering a resistance of 9 and the other of 1 unit. Then one-tenth of the current will flow through the first and nine-tenths through the second; and whatever be the

number, and however great the difference of the circuits, this rule will be rigorously carried out. Again, if two separate circuits have resistances of 2 in one case and 9 in another, and we wish to find what their resistance would amount to when they both acted together as parallel roads for the fluid, we easily derive it in this manner. If their resistances are 9 and 2 respectively, their conducting powers will be one-ninth and one-half, or the reciprocals of their resistances. Now, the sum of these, which would evidently be their united conducting power, would be  $\frac{1}{9} + \frac{1}{2}$

$= \frac{2+9}{9 \times 2}$ ; but this being the conducting power, the resistance is its reciprocal, or  $\frac{9 \times 2}{2+9} = \frac{18}{11} = 1\frac{7}{11}$ . But from the

above example we can derive the rule—namely, the resistance of a compound of two parallel circuits is the product of the resistances divided by their sum.

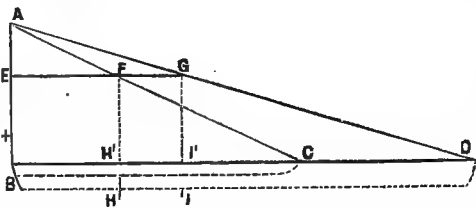
116. One of the applications of this principle is in the use of what are called shunts. These are resistances bearing some convenient relation to that of the galvanometer used, and therefore diverting a proportional amount of the current, so that we can measure with an instrument a current which would otherwise be much too powerful. Suppose, for example, that we have a coiled wire whose resistance is to that of the galvanometer as 1 to 9; then the total amount of current transmitted will be that due to their "combined" resistance when they form parallel connections.

Thus,  $\frac{9 \times 1}{9+1} = \frac{9}{10}$  will be the resistance of this "combined circuit," and hence its transmitting power will be  $\frac{10}{9}$ ; while the galvanometer resistance being 9, its transmitting power will be  $\frac{1}{9}$ , or one-tenth of this; hence, with this shunt in action, the force measured by the galvanometer will be one-tenth of the total amount passing, and hence all its indications should be multiplied by ten. In the same way we may use shunts whose resistances are to those of the galvanometers as 1:99 or 1:999, and so measure the one one-hundredths and one one-thousandths of the current.

MEASUREMENT OF RESISTANCES.—"Wheatstone's Bridge."

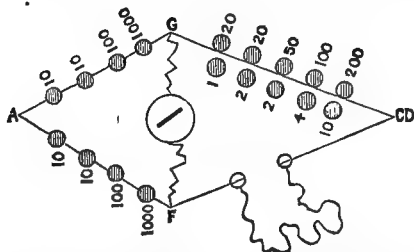
—117. Suppose that the positive pole of a battery, with a

FIG. 32.



tension represented by the height AB, is connected at B to two wires, BC and BD, whose resistances are represented by the lengths of those lines, and that these lines are both connected with the earth at their ends, C and D respectively. They will then of necessity have the same tension at B, and none at all at C and D, and at any point between their tensions would be represented by the heights of lines drawn to AC and AD respectively. Now, if any line be drawn parallel to BD, cutting AC and AD, as at F and G, it is evident—1st, that the tensions of the corresponding points H and I of the wires will be equal, being measured by the equal lines FH' and GI', and hence that if these points were connected by a conductor no current would pass, as there would be no reason for it to go from F to G or from G to F. 2d, By the similarity of triangles ACD and AFG,  $AG : AF :: GD : FC$ , from which we would conclude that if we unite two points in two circuits, so that the four segments are proportional in their resistance, no

FIG. 33.



current will pass. We have only considered the one fluid, the positive, but of course the same reasoning would apply to the negative, and being true for each would be true for both.

Let us now consider an application of this general principle. Suppose that we have adjustable and known resistances so arranged that a battery current entering at A divides on AG and AF; that from G to CD are arranged other known resistances, while between F and CD we introduce some unknown resistance which we wish to measure. The points G and F are connected through a galvanometer.

118. Suppose, then, that we make the adjustable resistance on AG 10, and that on AF 100, and then introduce resistances on G-CD until the galvanometer ceases to show any current. We will then know that  $AG : AF :: G-CD : F-CD$ , or  $x$ . If therefore we had found it necessary to introduce resistances of 173 at G-CD, we would have  $10 : 100 :: 173 : x$ ,  $x = 1730$ . This method, which admits of a very wide range of application, is perhaps more extensively used than any other.

With a double-coil galvanometer we may measure resistances by making the current divide and pass in opposite senses through the two coils. If each branch has an equal resistance, the two currents will be exactly equal, and their effects upon the needle or needles will neutralize each other. The unknown resistance being introduced in the one branch, we place known resistances in the other until a balance is obtained, and then know that the resistance so introduced equals the unknown one. Where the resistance is too great for our standards, we can, by introducing shunts on that side, increase their value 10, 100, or 1000 times. For resistances higher than can be measured in this way we note the deflection produced by the current, and compare it with that obtained with known resistances, either with or without shunts.

Induction.—119. This action in the case of insulated wires is exactly the same as that already discussed in the Leyden jar. It is measured by noting the deflection produced by charging and discharging the insulated wire immersed all but its ends in water connected with the other pole, and comparing this deflection with that obtained by like treatment with condensers of known capacity. The unit here used is the *farad*, for whose relations to other measures see "Electrical Units."

Resistance of Batteries.—120. With a double-coil galvanometer this measurement presents little difficulty. We connect one or more cells of the battery with a set of adjustable resistances, and pass the current through one coil of the galvanometer, introducing as much resistance as is necessary to bring the deflection to a sensitive point. We

note this effect, and then know that it or  $Q = \frac{E}{R + r + r'}$ ;

R being the battery resistance,  $r$  the resistance of the galvanometer, and  $r'$  the additional resistance which we have introduced. We now pass the current through both coils in the same direction, and add resistance until we get the same deflection as before. We then know that since by passing twice as often round the needle the electro-motive force has been doubled in efficiency, and yet has only produced an equal effect, the resistances must all have been doubled. Now,  $r$  is doubled by the use of the second coil, and we know the amount of  $r'$ , which is what we added to regulate the deflection; therefore any additional quantity which we have employed must be the duplicate of R, the battery resistance.

121. To compare the electro-motive force of batteries, we first determine their resistance, and then, connecting them successively to the same galvanometer, add resistances till they all make the same deflection; then their electro-motive forces will be inversely as the total resistances in the several cases, including those of the batteries themselves.

122. We have here given all the fundamental processes of measurement, but there are of course countless modifications.

ELECTRIC UNITS.—According to the recent revision of electric units suggested by the Paris Congress of Electricians, the following names and related quantities have been adopted: Unit of static capacity, the *farad*; unit of electric quantity, the *coulomb*; unit of current or rate of flow, the *ampère*; unit of electro-motive force, the *volt*; unit of resistance, the *ohm*; unit of electric work, the *watt*. A condenser of one *farad* capacity charged with the electro-motive force of one *volt* will contain one *coulomb*; and if this flows out in one second, the current so produced will be one *ampère* (formerly one *weber* per second); and if this *ampère* current flowed through a resistance of one *ohm*, it would perform one *watt* of electric work per second. The resistance of a copper wire one-sixteenth inch in diameter and 378 feet long is about one *ohm*. The electro-motive force of a Daniell's cell is about one *volt*. The current used for an ordinary incandescent electric lamp is about  $\frac{1}{2}$  of one *ampère*. One *watt* equals about .7373 foot-pounds per second, or 44.24 foot-pounds of work per minute.

HENRY MORTON.

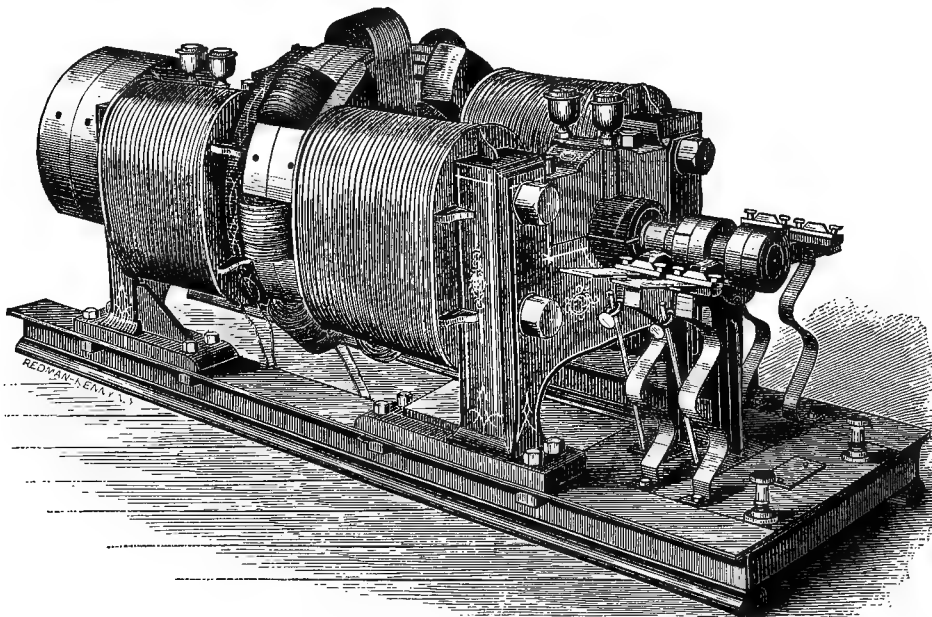


**Electric Light.** Since the publication (in old ed.) of *ELECTRICITY* (CYCLOPEDIA, Vol. I.) and *MAGNETO-ELECTRICITY* (Vol. IV., APPENDIX), the question of the practicability of substituting the electric light for the ordinary modes of artificial illumination in the business of life has been a subject of much investigation and experiment. To a certain extent, the desired object has been satisfactorily attained. For all purposes for which lights of great power can be advantageously used, as for the illumination of large open areas, such as public squares, parks, or pleasure-grounds, or of spacious interiors, like those of theatres, churches, assembly-halls, legislative chambers, great railway-stations, foundries, workshops, factories, etc., the electric light is to be preferred to the light of gas-beaks or oil lamps, not only on grounds of economy, but on account also of its vastly superior power and quality. For apartments of moderate dimensions, and for the ordinary uses of domestic life, the problem appears not as yet to have been so satisfactorily solved, or, if it has, its solution has not yet been publicly demonstrated. There is reason, nevertheless, to believe that the simple electric lamp of Mr. Edison described below, which that singularly ingenious inventor has been so long engaged in perfecting,

will be found, when given to the public, to fulfil all the conditions necessary to success in this direction also.

*Generation of Electric Currents.*—A complete account of electric light should include the theory of electric currents and a description of the apparatus or instrumentalities by which such currents are generated. These topics are, however, fully discussed in the articles above referred to in old Vols. I. and IV. of *CYCLOPEDIA*. Though the light was earliest produced by the voltaic battery, it is only as it is derived from the currents of dynamo-electric machines that it is capable of useful or economical application. The principal forms which have been given to these machines are described and illustrated in the article *MAGNETO-ELECTRICITY*. We supplement these descriptions by adding here a brief account of the peculiarities of one or two of the machines of more recent inventors. All these machines embody the general principle of a revolving wrapped armature, first illustrated in the Siemens machine, and made more effective by the modification of construction introduced by Gramme. All more recent improvements consist in further modifications of this armature. In the Brush machine, the device of Mr. Charles F. Brush of Cleveland, O., shown in Fig. 1 below, the armature is an

FIG. 1.



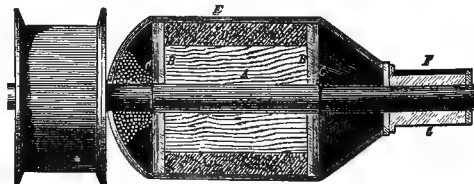
Brush's Magneto-Electric Generator.

iron ring wound as in the Gramme machine with coils of insulated copper wire; but the ring is not, as in the machine just mentioned, wholly covered by the coils, there being uncovered spaces alternating with the covered spaces at equal intervals; these uncovered parts being also larger than the covered, the wire coils falling into, and somewhat more than filling, the intermediate grooves. The coils on the armature are eight in number, the opposite ones being connected end to end, and the terminals carried out to the commutator. The ring revolves between the poles of two large field magnets, the two positive poles being opposed to each other at one extremity of the diameter of the armature, and the two negative at the other. The commutators are so arranged that, at any instant, three of the four pairs of coils are interposed in the circuit of the machine, the remaining pair, which occupies the neutral point, being thrown for the moment out of circuit; while in the Gramme machine the numerous armature coils are connected end to end throughout, forming always two sets of coils in multiple are interposed at the same time in the circuit; each set consisting of one-half the coils of the armature. It is claimed that the exposure of large surfaces of the armature ring intermediate between the coils, as in the Brush construction, facilitates the dissipation of the heat occasioned by the rapid alternations of magnetic polarity, and thus allows, without disadvantage, a higher rapidity of rotation of the armature than would otherwise be practicable.

In Fig. 2 is shown in section the armature of Edison's new electric generator. In this the ring is formed, as in the machine of Gramme, of many turns of soft iron wire,

but the enveloping copper wire carrying the induced current is not, as in other machines, wrapped round and round the annulus, but is applied only to the exterior circumference. The soft iron wire (size No. 20) is wound on a core, A, of wood, capped by soft iron disks, B, B, at the extremities, to which are applied vulcanized rubber disks, C, C, notched to receive the several coils, E, of insulated

FIG. 2.



Edison's new Generator-Armature.

wire wound lengthwise on the cylinder and connected with copper bars, F, on the commutator cylinder. Each of these coils, or strands, contains forty-one wires  $\frac{1}{32}$  inch in diameter. There are forty strands in all, and the opposite ends of all the wires in each are soldered to commutator bars on opposite sides of the commutator cylinder. This cylinder is pressed on opposite sides by copper wire brushes which take off the current.

The field magnets in this machine are immense. They are constructed of two straight magnet-cores, six inches each in diameter and thirty-six inches long, mounted on heavy

cast-iron blocks ten and three-quarter inches high and nine inches wide, and connected at top by a wrought-iron yoke six inches high and seven inches wide, each core being wound with three layers of No. 10 cotton-covered wire. The heavy blocks by which the cores are supported approach each other within about two inches, and form the poles. The adjacent faces are cut semi-cylindrically, forming the space within which the armature revolves. The armature-shaft is one and a half inches in diameter, and carries a ten-inch pulley with a five-inch face. The speed of rotation is about five hundred turns per minute.

With this machine Mr. Edison claims that he realizes, in useful effect, nine-tenths of the driving power. He claims also that the machine will convert and deliver twice the number of foot-pounds of energy that any other machine will deliver under like conditions. Comparing it with the Siemens machine, it is said that while that and nearly all other machines make the external resistance equal to that of the machine, and thus utilize only half the energy, "in Mr. Edison's generator five-horse power is transferred upon a resistance of five ohms, of which one-half an ohm is in the machine, thus delivering nine-tenths of the total current upon a circuit exterior to the machine, so that nearly the maximum economy is attained where other machines, under like conditions, will scarcely give any current at all."

**Production of Light.**—The luminous phenomena produced by the electric current are in all cases due to the resistance arising from the occurrence in some part of the circuit of imperfectly conducting materials. The energy expended in overcoming the resistance disappears as electricity, but reappears as heat, and, when the temperature is sufficiently raised, of light also. These effects are most strikingly manifested when the continuity of the metallic conductor joining the terminals of a voltaic battery or other source of electricity is interrupted at some intermediate point, and the electrodes or extremities of the interrupted conductor are slightly separated. The resistance is that of the intervening air, which is heated to incandescence by the force expended in bridging the gap. The electrodes themselves become also white hot at the extremities, and, unless of very refractory material, are fused, and to some extent volatilized, the vapor being transported by the current, and, by their added incandescence, exalting the intensity of the light. The electrodes are thus connected by an apparent flame of vivid brightness, which, when they are held horizontally, is convex upward, and is hence called the voltaic or electric arch.

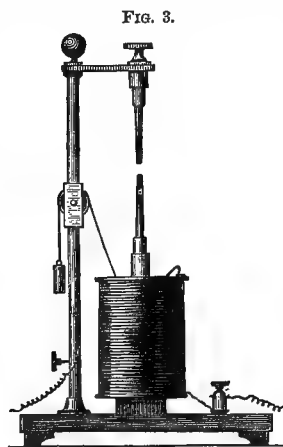
No material substance is a perfect conductor of electricity. All substances offer more or less resistance to the current flowing through them, and experience, accordingly, in transmitting the current, a greater or less elevation of temperature, dependent in degree on their conducting power, their dimensions, and the volume of the current. A comparatively good conductor of small cross-section and limited length may thus be heated to whiteness by a passing current, and so become a source of light. It thus appears that in endeavoring to apply the light of electricity to useful purposes resort may be had to contrivances of two distinct classes—viz. those which aim to utilize the electric arch, which is an incandescent gas or vapor, and those which employ an incandescent solid. Each of these modes of generating light has its advantages and its difficulties. The electric arch gives a light of great intensity, which it has not been found practicable so far to subdue as to adapt it to ordinary domestic uses. It requires very delicate adjustments, without which it is liable to annoying fluctuations of brightness, and which even the best automatic regulators yet constructed fail perfectly to effect. It is nevertheless well adapted for the illumination of large spaces, and under these circumstances several lights compensate each other's irregularities, and produce a satisfactory general effect. The light of an incandescent solid varies in intensity only with the variations of the current; and when this is derived from a dynamo-electric generator, it may be made almost absolutely uniform. But the heat of incandescence is far above the melting-point of most metals, and very near to that of the most refractory, such as platinum or iridium. Carbon, which will endure a very high heat without change, is extremely combustible, and when heated in the free air is soon consumed. Carbon and platinum have, however, both been employed in electric lamps of the second class, and it is to be hoped that some one of the inventions dependent on these will be successful.

Electric lamps employing the electric arch may be subdivided into such as are governed by mechanical regulators and those that regulate themselves. In all of these the material employed for the terminals or electrodes is carbon. In the early history of this subject, while the electric light was only a subject of laboratory experiment and illustration, ordinary wood carbons, first introduced

by Sir Humphry Davy, sufficed for the purpose. Foucault, in the year 1844, suggested as a substitute the hard carbonaceous incrustations formed in the interior of gas-retorts, which are very compact and durable. The electrodes formed from this substance, however, have serious defects. Owing to the presence in them of saline and earthy impurities, they conduct irregularly, and sometimes splinter. In recent years they have been to a great extent superseded by carbons artificially prepared of pure material and solidified by great pressure. Many processes have been invented for this manufacture—the difficulty not being to prepare a good article, but to prepare one which shall be cheap as well as good. Among the names of inventors may be mentioned those of Staite and Edwards, Le Molt, Lacassagne and Thiers, Curmer, Peyret, Archereau, Carré, Gaudoin, and Sawyer-Mann. (For information in regard to the several processes in detail reference must be had to systematic treatises.)

In order to improve the conducting power of the carbons, which is a matter of some importance when the current is sent through a considerable length of the substance, as takes place in many regulators and in the Jablochkoff candles, they are sometimes coated externally with precipitated copper or nickel. The Brush carbons are so treated. To the same purpose it has been proposed to introduce powdered metal into the substance of the material during the process of manufacture, or to form the rod around a wire as a core. The external coating is to be preferred.

**Electric Lamps with Mechanical Regulators.**—The electric current being supposed to be uniform and the electrodes homogeneous, the steadiness of the electric light will be dependent on maintaining the distance between the terminals invariable. As the carbons are gradually consumed by vaporization and combustion, it is necessary to provide some means of compensating the increase of distance between them which would otherwise take place. In the early laboratory experiments the correction was made from time to time by hand, the light being therefore subject to unequal and irregular fluctuations. Later, a variety of automatic contrivances were invented for accomplishing the adjustment by the action of the current itself. All of these depend on bringing in some manner into action the force of electro-magnetism; in order to which a solenoid, or a proper electro-magnet, is introduced into the circuit conveying the current. When the distance between the electrodes begins to increase by the consumption of the carbons, the magnetic energy diminishes, with the result of causing the carbons to approach each other. One of the earliest and simplest of these contrivances is Archereau's lamp, shown in Fig. 3. Here, as in most electric lamps,



the two carbons stand vertically one above the other, the upper one being carried by a horizontal bar which is supported by an upright pillar. The lower carbon is sustained at the end of a rod, half of iron and half (the lower half) of copper, which descends into the interior of a solenoid, with the copper lining of which it is in contact, though free to move. The current enters the solenoid, as shown, at the base of the figure, passes thence upward through the carbons and down through the pillar to the connection on the left or negative side. A cord attached to the lower end of the rod within the solenoid passes over a pulley fixed to the pillar, and supports a counterpoise weight, which, when the current is not passing, lifts the lower carbon into contact with the upper. The passage of the current excites the solenoid and draws the lower carbon downward, till the increasing resistance and diminishing attraction establish an equilibrium between the two forces of magnetism in the solenoid and gravity in the counterpoise. This contrivance operates tolerably for a time, but, owing to the necessary friction in the interior cylinder of the solenoid, is not very delicate; and manifestly, as the carbons are consumed, and the iron rod is farther and farther withdrawn from the solenoid, the distance between the carbons at which equilibrium will be established will

diminish. Moreover, the upper carbon-holder being fixed and the lower one only movable, the position of the light changes with the consumption of the carbons; a disadvantageous circumstance if the light is to be used for optical projections.

This disadvantage is obviated in the regulator of Gaiffe of Paris, which is similar in principle, but in which both carbons are movable, and are so connected by a rack-and-wheel arrangement as to approach or recede simultaneously, the point of meeting remaining constant. The constancy of this point is maintained by giving to the positive carbon double the amount of movement of the negative, for the reason that the consumption is twice as rapid on the positive side. The object is accomplished by making the radii of the gear-wheels which move the carbons severally, and which have a common axis, unequal in the ratio of one to two.

The same expedient is employed in several other regulators, as, for instance, in Duboscq's, Foucault's, Serrin's, the Häfner-Alte-neck (otherwise called the Siemens), etc. This last, which is a good example, is shown in Fig. 4.

The upper carbon, which is the positive, descends by its own weight, or it may be urged in its descent by a spiral spring in a barrel on the common axis of the intermediate gear-wheels. When contact is made, the current, which ascends on the right, descends on the left, and animates the electro-magnet E in the circuit. This attracts the armature A, pivoted at L, which through the pawl *s* acts on the ratchet-wheel U. In this movement the contact-screw *d* comes into contact with the stop *c*, and switches off the current from the electro-magnet E; whereupon the armature is withdrawn from the magnet by the spiral spring *f*, the magnet comes into circuit again, and this action is repeated until the carbons are so far separated that the magnet fails to act. R is a train set in motion by the descent of the positive carbon, and W is a fly moderating the velocity of descent. This train does not go backward when the wheel U is

The Siemens or Häfner-Alte-neck Regulator.

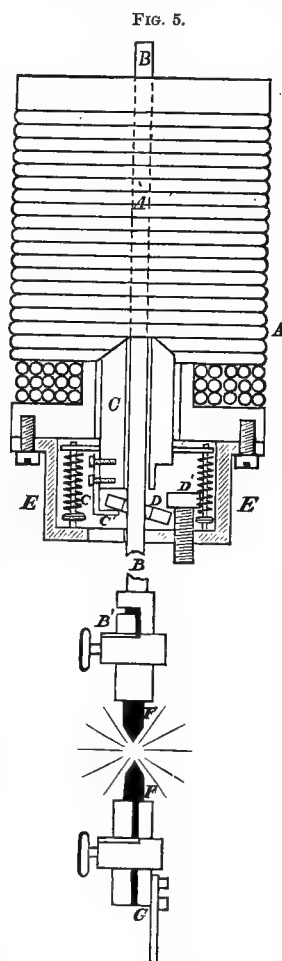
turned back by the pawl *s*; but when U goes forward it carries R, the connection between the two being made by another pawl shown in the figure. When the magnet is not in action the pawl *s* is held clear of the wheel U by the pin *n*. The Siemens regulators are used in two of the five British lighthouses which are lighted by electricity—viz. those at Lizard Point in Cornwall. Three others—viz. the two at the South Foreland, and one at Souter Point near the mouth of the Tyne—use the Holmes regulator.

In the Duboscq, the Foucault, and the Serrin regulators the force of electro-magnetism is employed, not, as in those just described, to effect directly the approach or the separation of the carbons, but to lock or unlock a train of wheels by which the regulation is effected. In the Duboscq regulator this train is driven by a clock-spring in a barrel. Its effect when in action is to cause the carbons to approach each other, but when the proper limit is reached, an electro-magnet interposes a detent, which stops the train. When, by the consumption of the carbons, the distance becomes too great, the magnet is enfeebled and releases the train, which advances the carbons again. In actual use there is no continuous motion of the train, but the arms of the stop-wheel escape at brief intervals with much regularity. Duboscq's regulator provides only for the approach, and not for the separation, of the carbons. Hence, in the beginning, it is necessary to make the first contact and to adjust the proper length of the electric arch by hand. Foucault's regulator is a Duboscq with a second train added, the object of which is

to separate more widely the carbons when too near. A single detent serves to check both trains when the adjustment is right; but by inclining in opposite directions it releases one or the other as occasion may require.

Serrin's regulator is one in which the weight of the upper carbon-holder, which is considerable, instead of a spring, serves to drive the regulating train. The upper carbon descends freely, and the train moves until contact is established, but then, as the circuit is closed, an electro-magnet draws downward the lower carbon, reversing the train and raising the upper carbon, but also, when the proper distance has been secured, interposes a detent, which stops the train and holds it until, by the waste of the carbon, the current has become enfeebled; when the magnet yields and the train moves again. In this, also, as in Duboscq's, the movement of the train, while the lamp is in action, is almost imperceptible. The Serrin regulator is used in the three electric lighthouses on the French coast—viz. two at Cape la Hève, near Havre, and one at Cape Grisnez, near Calais. Also at the Russian electric lighthouse at Odessa on the Black Sea, and at the Port Said lighthouse marking the entrance to the Suez Canal.

The Brush regulator, an American invention of much simplicity and well adapted to large lights for general illumination, is shown in principle in Fig. 5, in which A is a solenoid (seen partly in section toward the bottom), C is a soft iron core perforated from end to end, moving freely within the solenoid, and B a brass rod moving also freely within the core, and sustaining the positive carbon-holder B'. The iron core C is partially sustained by the spiral springs shown in the figure, which rest on the bottom of



The Brush Regulator.

takes place, however, by insensible steps, and the distance between the carbons is maintained to all appearance invariable.

In the later models of the Brush lamp a differential solenoid is used, the main current flowing through a coil made of short thick wire, and a shunt current through a long coil of thin wire wound around the first in such a way

a box E E screwed to the base on which the solenoid rests. A flat ring D of brass is supported at one side by a bracket C' attached to the core, and in the oblique position represented in the figure takes hold of and supports the rod B. The head of a set screw D' limits the upward movement when the core is attracted by the solenoid. Supposing the circuit broken, the core drops and rests on the base of the box, the bracket C' passing through an opening made for it, so that the ring D may lie flat. The action of the contrivance is this: When no current is passing, the core and ring rest on the base of the box, the rod B drops freely, and the carbons come into contact. When the current passes, the core rises, lifts the ring D into the oblique position, in which it seizes the rod B, and thus lifts the rod also, separating the carbons. As the carbons consume and the resistance increases, the magnetic energy of the solenoid diminishes, and the ring D touches the base by its lower edge, and presently loses its grip of the rod. This, descending, revives the energy of the solenoid, which lifts the ring again free of the base. The action here described

that the magnetic moments of the two coils oppose each other, that of the shunt coil, however, being always the weaker one. If the carbons are in contact, almost the whole of the current will flow through the main coil, which will then draw the wire rod that carries the carbon into itself upward and establish the arc. The resistance thus introduced in the main current diminishes the action of the inner solenoid and renders the action of the outer arc more effective; and in this way, by a balancing of forces, regulation is accomplished. These lamps are provided with an automatic arrangement which throws out of the circuit a lamp that, owing to any cause, ceases to convey the main current. The Brush lamps are at present more used than any other form.

The Wallace-Farmer regulator is another American invention of great simplicity, in which the carbons are in the form of plates eight or ten inches long and three or four broad, which meet, by their longer sides, the upper plate, which is the positive, having twice the thickness of the lower. The plates are in contact when the current is not passing, but in the original adjustment the parallelism of the opposing edges is not quite exact, and the contact is perfect only at one end. On closing the circuit, an electro-magnet raises the upper carbon and the arch is established. With the consumption of the carbon the light travels along from end to end of the plates, and then, reversing its direction, travels back again to the starting-point.

One of the earliest devised regulators, and one which is not surpassed in its performance by any of those since invented, is that of MM. Lacassagne and Thiers. In this the lower carbon is supported by a piston moving freely in a cylinder of two or three inches diameter containing mercury, both piston and cylinder being of iron. The upper carbon is fixed, but capable of adjustment by hand. A reservoir containing mercury standing at a higher level than the cylinder communicates with the latter by a small caoutchouc tube, the communication being closed by a stopcock near the reservoir when the lamp is not in use. When the carbons are in contact and the current is established, an electro-magnet in the circuit compresses the caoutchouc tube. The stopcock being opened, the mercury flows into the tube, but is prevented by the pressure of the armature of the magnet from passing into the cylinder. On gradually withdrawing the upper carbon the arch is produced. The force of the magnet ought to be so regulated that when the distance of the carbons exceeds a certain limit the armature shall yield, permitting mercury to flow into the cylinder, and thus lifting the lower carbon-holder. In practice there is no alternation of flow and stoppage, but the armature becomes stationary at a pressure which allows a minute thread of mercury to flow steadily into the cylinder, producing an arch of invariable length. The disadvantages of this regulator are, that it is somewhat cumbersome, and that the light does not remain fixed at one point, but travels upward as the upper carbon is consumed. This might be obviated by substituting for the reservoir a second cylinder with a piston carrying the upper carbon. This second cylinder should, in the beginning, be charged with mercury; and if the upper carbon is the positive, it should be only one-half as large as the lower in cross-section.

A lamp adapted to produce a light with a current insufficient to maintain an electric arch of sensible length has been invented by Profs. Thomson and Houston. The source of light is chiefly the secondary spark always produced on the sudden rupture of an electric current. In this the lower carbon is supported near the end of a horizontal elastic bar, which also carries the armature of an electro-magnet situated beneath it. The upper carbon rests on the lower, being guided, but not firmly held, by its support above. Its weight, if necessary, may be partially counterpoised. On closing the circuit, the armature of the magnet is so suddenly attracted as to break contact between the carbons, producing a vivid spark; but as this rupture of contact destroys the power of the magnet, the elasticity of the spring prevails, and contact is immediately restored. Thus there takes place a rapid motion of vibration, occasioning a succession of sparks so closely succeeding each other as to produce the effect of a continuous light.

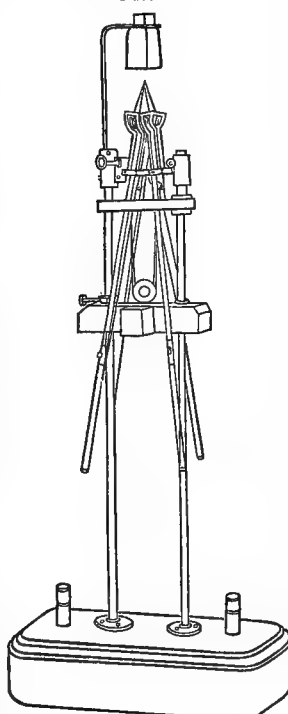
**Lamps without Regulators.—Electric Candles.**—Within the past two or three years the public interest in the subject of electric light has been strongly reawakened by the introduction of some forms of electric lamp in which the cumbersome and costly mechanical contrivances previously regarded as indispensable for maintaining the steadiness of the illumination are dispensed with. The first device of this kind, proposed and patented as long ago as 1846 by Staité of London, though apparently feasible enough, attracted little attention and failed to command success. It consisted in bringing two inclined rods of carbon near to each other at their lower extremities, where they were

supported by some solid and refractory substance, the rods descending in guiding grooves as fast as consumed. The distance between the extremities could be varied by a lateral movement given to the support of one of the rods. A more successful form of electric candle is that now so well known by the name of its inventor, Jablochhoff, an officer of the Russian army. This invention dates as far back as 1876, but it was first introduced into public use in May, 1877, at the grand magazines (commercial establishments) of the Louvre. It was not long after this that the same mode of illumination was employed in a number of the large open squares in Paris and in some of the public streets of that city. Early in 1879 more than three hundred Jablochhoff lights were in operation in Paris alone, and perhaps an equal or greater number in other parts of France. During the winter and spring of 1878-79 experiments were made with this light on the Thames Embankment, on the Holborn Viaduct, and in the Billingsgate Market in London, with results satisfactory so far as illumination is concerned, but less so as regards economy.

The construction of this candle is so simple as to require no figure to explain it. It consists of two flat strips or cylindrical rods of carbon, not more than three-eighths of an inch thick and about ten inches long, placed vertically side by side and about one-eighth of an inch distant from each other, the space between them being filled with some insulating substance like kaolin or gypsum. The current ascends one of the rods and descends the other. In order to establish the arch some conducting substance, like a bit of carbon, must be laid across the top. This candle does not perform well with a continuous current, the positive carbon wasting faster than the negative—a fault which the inventor endeavored to correct, but without success, by making the positive carbon of double thickness. With a machine giving a reciprocating current, however, it works perfectly. The principal objection to it is the rapidity with which it burns out, each candle lasting only about an hour and a half. Wilde has shown that the insulating substance between the carbons is unnecessary, provided they are well insulated from each other at the base. The presence of this substance to some extent diminishes the brilliancy of the light. Wilde's lamp, therefore, is a Jablochhoff without the insulator; and it has the advantage that in it the carbons may be adjusted to different distances at pleasure, and also that, by inclining one of them till the extremities meet, the arch may be established without employing any auxiliary conductor.

Another improvement on the Jablochhoff candle is that

FIG. 6.



The Rapiéff Electric Light.

of De Meritens, who introduces, between the two carbons conveying the current, a third one wholly insulated and out of contact with either. This serves as a kind of intermediate pier in the bridge which the arch forms between the principal carbons, and increases, according to the inventor, the brilliancy of the light.

Another form of electric light which may most properly be called a candle is the Rapiéff, in which there are two carbon rods on the positive and two on the negative side; the members of each pair being inclined to each other and meeting as here shown: A. Each rod slides in a guiding support, being urged forward as consumption goes on by a pulley and small counterpoise. The figure shows the arrangement now preferred by the inventor, though he at first placed one pair of carbons vertically over the other. Immediately above the arch is fixed a small block of lime or alumina, which by absorbing the radiant heat

becomes luminous and improves the effect. This light has been successfully employed in the office of the London Times.

*Electric Lamps employing Incandescent Solids.*—The light of the voltaic arch in the ordinary forms of self-regulating lamps is too powerful for the purposes of domestic illumination, and the lamps themselves are too cumbrous and too costly. Much ingenuity has been, therefore, directed to the endeavor to obtain from a given current many lights of moderate power in the place of one of excessive brightness; or, in other words, to accomplish what is called the subdivision of the light. There is no difficulty in obtaining many lights from one circuit. The misfortune is, that the sum-total of the intensities of such a series of lights is by no means equal to that of the single light which the same current will produce—in other words, there is a large absolute loss of light by subdivision. Some writers on the subject have maintained that this diminution obeys the law of living forces—that the vibratory velocities of the luminiferous molecules are reduced to one-half by a division of one light into two, to one-third by division into three, and so on; with the resulting consequence that, as the intensities are proportioned not to the velocities themselves, but to the squares of the velocities, each light in the first case will become only one-fourth, and in the second only one-ninth, of the original light. Granting the fundamental assumption of this hypothesis in regard to the velocities, the conclusion would be correct enough; but the assumption itself is not self-evident; and though there is always a large loss in the total amount of light on subdivision, it appears not to be by any means proportioned to the squares of the numbers of lights. Mr. Shoobred in his recent useful and compendious work on this subject has shown that in the use of Jablochhoff candles the loss by doubling the number on a circuit is not more than one-third of the total intensity. The voltaic arch, however, requires too great an amount of electric energy to maintain it at all, to allow, whether by subdivision or otherwise, of the construction of lamps of sufficiently moderate power to be used for the study or the table. If such lamps are ever produced, it will probably be by taking advantage of the incandescence of solids by electricity.

Lamps employing incandescent solids, or, more briefly, lamps by incandescence, were among the forms earliest proposed for making electricity available as a source of light. In 1841, Mr. F. Moleyns of Cheltenham, England, patented a contrivance of this sort, in which a spiral of platinum wire enclosed in a glass globe is made white hot by the passage of a current of electricity through it. The globe was air-tight, but a funnel-shaped tube filled with powdered charcoal let into it at the top allowed a minute stream of this powder to fall, like sand in an hour-glass, through a minute orifice upon the incandescent spiral, very materially heightening the brilliancy. In 1849 the same idea, omitting the charcoal, was reproduced by Petrie, who employed iridium instead of platinum. In 1853 it was reported to the French Academy of Sciences that De Changy, a French inventor, had solved the problem of the divisibility of the light, and had succeeded in producing twelve steady lights, independent of each other, from a single battery of twelve Bunsen elements. He also employed incandescent spirals of platinum. All these inventions were, however, practical failures. The difficulty in the case is, that the temperature of incandescence is too near that of fusion in platinum for safety, and that the spiral is almost inevitably destroyed by the current. Recently, this difficulty has apparently been overcome by Mr. Edison, who has constructed a lamp with a double spiral of platinum, in which, by an ingenious automatic contrivance, the current is switched off the moment the temperature approaches the limit of safety, and is turned on again as soon as the danger is past. Fig. 7 illustrates the principle of this invention. The source of light is a double spiral of platinum wire, of which the two ends are secured to studs, as shown. The current enters on the right, ascends and descends the spiral, and passes out on the left. A slender platinum rod or wire passing

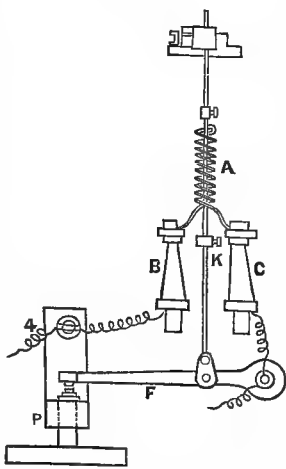
upward through the spiral and insulated at the top is attached at bottom to a horizontal bar which communicates with the positive conducting wire on the right, but is sustained just above and out of contact with the set screw P on the left. The radiant heat of the spiral expands the vertical rod, and at length brings the horizontal bar down to the contact-screw P, when the current leaves the spiral and passes along the bar. As the temperature falls, the contact is broken, and the current returns to the spiral. In another form of this lamp the current passes first upward through the rod, and is thence conducted to the foot of the spiral on the right, after which everything proceeds as above described. The design of this last arrangement is that the rod may be heated by the electric current directly, and not merely by the radiant heat of the spiral. In either case the contact-screw P must be set experimentally at a point which keeps the temperature within the limit of safety.

An additional security against danger from overheating in this lamp has been furnished by a remarkable discovery made by Mr. Edison in regard to the condition of platinum, and indeed of most metals, when prepared by ordinary metallurgical processes. In this condition, he says, metals contain air imprisoned among their molecules, which increases their fusibility, and is the cause of the phenomena of tempering and annealing. When a platinum wire has been repeatedly heated to incandescence in a perfect vacuum this air is expelled, and on the cooling of the metal, also *in vacuo*, is not reabsorbed. Its density is then found to have been increased, and its fusing-point raised. Moreover, it is no longer susceptible of being annealed, and it retains its strength and elasticity at the highest temperatures. With spirals prepared in this way, Mr. Edison even believes that the contrivance above described for preventing overheating will be unnecessary. This lamp bids fair, therefore, to be a practical success; and inasmuch as he proposes to furnish it at a very moderate price, it is quite possible it may soon come into general use in large towns. Neither this nor any other form of electric lighting can be economically substituted, however, for gas, oil, or candles in private dwellings, if every householder attempts to run an electric generator for himself. Economy will only be attained when the electricity is generated on the large scale, and supplied to individuals as gas is supplied at present.

Lamps by incandescence have been constructed in a variety of forms in which the incandescent substance employed has been a slender rod of carbon. The great combustibility of carbon suggests that in all these contrivances the incandescent rod shall be enclosed hermetically within a glass bulb or tube exhausted of air or filled with an incombustible gas, such as nitrogen. In the latter case it is not necessary to take the trouble to charge the bulb with the incombustible gas, since if it should be originally full of air the oxygen would very soon be exhausted, with no material loss to the carbon. The earliest invention of this kind was that of Starr and King of Cincinnati, U. S., in 1845, who employed the carbon *in vacuo*. Greener and Staite of England patented a similar contrivance in the following year. Neither of these proved successful. Recently the idea has been revived, first by Lodyguine of St. Petersburg (1873) and Kosloff of the same city; then (1875) by Konn of Paris; and later still by Bouliguine, an officer of the Russian army, and Fontaine of Paris. The several contrivances of these inventors are substantially similar in principle, but differ in details. A common difficulty attends them all. The carbons waste away, and must from time to time be renewed. The lamps of Konn and Fontaine are furnished with more carbons than one, which may be successively brought into use. That of Bouliguine has a single one of some length, which is gradually raised as it is consumed by cords attached to its lower extremity passing over pulleys above, in the manner of the Rapiéff carbons. The upper portion only is incandescent, the carbon being grasped a little below the end by a metallic band conducting the current. Considered as light-producers, these lamps may be regarded as measurably successful, but the inconvenience of being compelled frequently to dismount them must prevent their coming into general use.

There remain what are called by Fontaine the "lamps by imperfect contact." By this is meant the contact between a slender rod of carbon reduced to a point at its extremity, and a mass of the same substance of much larger dimensions, on which it rests lightly by its own weight, or against which it is pressed upward by a pulley or counterpoise. The Reyner lamp is a French invention in which the carbon rod rests on the circumference of a carbon disk mounted on an axis on which it turns. The contact being not vertically over, but in advance of the axis, the slow descent of the rod as it is consumed determines an equally slow rotation of the disk, removing the

Fig. 7.

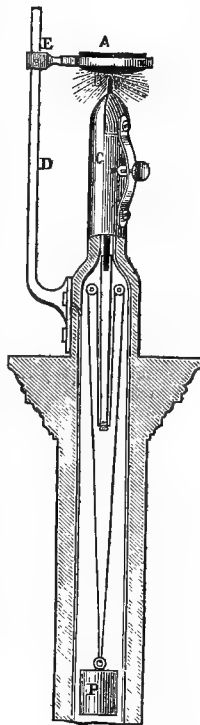


Edison's Electric Lamp by Incandescence.



residue of the combustion, which might otherwise interfere with the free passage of the current. The Werdermann lamp is an English invention founded on the same principle, in which the rod is pressed upward against the middle point of a lenticular disk of carbon placed horizontally. In both these constructions it is to be understood that the current is conveyed to the rod at a point very near the extremity, and that it is only the small terminal portion which is incandescent. The construction of the Werdermann lamp is shown in Fig. 8, in which B is the carbon rod passing through a fixed carbon-holder or guide C, one lip of which is movable and is pressed against the carbon by a spring. The lower extremity of the carbon is fixed in a wooden supporting rod, which in turn rests on a cord passing over pulleys and connected below with a counterpoise P. An insulated arm D sustains the carbon disk A, set in a metallic ring and supported by the bracket E. The small part of the rod above the holder at B is incandescent when the current passes. Theoretically, in this lamp there is a minute voltaic arch formed between the constantly wasting point of the rod B and the lenticular disk A; but, practically, the light of the lamp proceeds from the incandescent part of the rod. Mr. Ducretet of Paris has constructed a lamp of this form, varying only in the mechanical mode employed for advancing the carbons. In place of the pulleys and counterpoise he employs a cylinder filled with mercury, in which the carbons are for a large part of their length immersed, being consequently kept in contact with the disk by hydrostatic pressure.

FIG. 8.



Werdermann's Electric Lamp by Imperfect Contact.

**Relation of Motive-power to Intensity of Light produced.**—It is to be understood that in every system of electric lighting, whatever the form of apparatus employed, economy requires the use of mechanical generators of electricity, and not of voltaic batteries. It is an interesting question, therefore, what amount of light, photometrically measured, can be produced by the expenditure of a given amount of power in driving an electrical machine. This question does not admit of a general solution, since the resultant intensity of light produced in a single lamp by a given amount of horse-power in the motor varies materially with the kind of apparatus employed. Mr. Shoolbred remarks: "The luminous results per horse-power, as given off in a single light from the same machine, seem to be approximately represented by 15 for regulators, 5 for candles (Jablochkoff, etc.), and 1 for incandescent lamps. On the other hand, the luminous effect is not capable of subdivision in the use of regulators with the same economy as with candles and incandescent lamps."

Again, the luminous effect per horse-power is greater with large engines than with small ones, because there is less proportional loss in the mechanical resistances within the engine itself. Finally, the distance between the carbons of a regulator, or the length of circuit on which a line of lights is placed, affects materially the intensity of each, owing to the greater or less power required to overcome electrical resistances; and the total intensity increases with the velocity of rotation in the same magneto-electric machine. Every particular question of this kind, therefore, will have to be solved in reference to the particular conditions of the case proposed. It is found, moreover, that the intensity of the light furnished by a given regulator or lamp, especially with continuous currents, is unequal when observed at different angles in altitude. With the Serrin regulator and the Gramme machine the maximum intensity is found at an angle 60° below the horizontal, where it is sixfold greater than in the horizontal plane. With the same regulator and a reciprocating machine the intensity in the horizontal plane is greatest, and the difference at different inclinations is much less. With the Jablochkoff candles the intensity vertically upward exceeds by about one-eighth that in the horizontal plane. The light is also nearly fifty per cent. greater at right angles to the plane of the rods than directly in that

plane. A reciprocating current is also about one-fifth less effective than a continuous current.

In measuring intensities, a certain standard light is taken as a unit. The standard in England is fixed by act of Parliament, and is a sperm candle, six to the pound, consuming 120 grains (7.77 grams) per hour; in Germany it is a paraffine candle, six to the half kilogram (1.102 pounds), 20 millimetres (0.8 inch) in diameter, and burning 50 millimetres in height of flame per hour; in France it is a Carcel lamp (*bec Carcel*), burning colza oil at the rate of 42 grams (648 grains) to the hour. Leblanc, chief gas-examiner to the municipality of Paris, rates the *bec Carcel* at 9.5 British candles, a value generally accepted by British authorities.

It is to be further observed that, in speaking of the relation between electric light and the mechanical force producing it, the phrase "force absorbed" is to be understood as signifying the net force which remains after deducting the amount of energy consumed in moving the engine itself. With these explanations the following statements will be intelligible.

Experiments made by Mr. Fontaine on the intensity of the light emitted horizontally and at different inclinations in altitude from a Serrin regulator (the positive electrode uppermost), with a Gramme generator of the ordinary type, making 750 rotations per minute, driven by a gas-engine of five horse-power (nominal), and an effective "force absorbed" of 2.7 horse-power, the carbons being three millimetres apart, and the length of the circuit 100 metres, having a conductivity of 95 per cent. (silver being taken as unity), gave the results exhibited in the table below, in which 0° indicates horizontality, the positive sign denotes angles of elevation, and the negative, angles of depression:

Angle of observation.	Intensity in bees Carcel.	Intensity per horse-power.
+ 90°	12	4.44
+ 75°	21	7.77
+ 60°	79	29.26
+ 45°	119	44.08
+ 30°	130	48.15
+ 15°	144	53.33
0°	225	83.33
- 15°	400	148.15
- 30°	822	304.44
- 45°	1175	435.19
- 60°	1325	490.74
- 75°	1051	389.26
- 90°	00	00.00

The most effective distance of the carbons is one-half of that at which the light becomes extinct. The velocity of rotation of the generator greatly influences the luminous intensity. At 1000 rotations the intensity is four times greater than that obtained with 700, and twice as great as with 800. The force absorbed per 100 bees is more than twice as great at 700 rotations as at 1000.

The following table of the efficiency of different machines under similar circumstances is also derived from Fontaine's work. It will be understood that 75 kilogram-metres per second is the equivalent of one horse-power:

GENERATOR.	Revolutions, per minute.	Mean intensity, bees Carcel.	Force absorbed per sec. in kilogram-metres.		Bees per horse-power.
			Total.	Per 100 bees.	
Wallace (small).....	1000	118	292	248	30
Brush (small).....	1400	242	282	116	64
Holmes.....	400	217	240	110	67
The Alliance.....	400	279	270	96	77
Brush (large).....	1340	332	244	73	100
Gramme (small of 1873).....	800	190	138	72	103
Gramme (large of 1873).....	420	573	397	68	108
Siemens (large).....	480	1276	735	56	130
Siemens (medium).....	850	591	247	41	179
Gramme (normal).....	750	590	192	25	231

In this table the statements in regard to the numbers of revolutions per minute of the Brush machines are in both instances considerably in excess of the fact; and the luminous effect does not correspond to the statements of the same by the constructors. According to these, a small-pattern Brush machine (No. 3) makes 1200 revolutions per minute, and furnishes a light of 2000-candle power (210 bees Carcel); and a large-pattern machine (No. 7) makes only 750 revolutions per minute, and gives a light of 35,000-candle power (3700 bees Carcel).

**Cost of the Electric Lights.**—The cost of lighting by electricity depends so much upon conditions that it is difficult to present any satisfactory general statements on the subject. Where numerous and powerful lights are needed,

and where the service is regular and long continued, there is great economy in the use of this light as compared with the cost of any other form of artificial illumination; but for ordinary street lighting where gas is cheap, as in London and Paris, the light as produced by the Jablochhoff method (the most suitable for this use) or the ordinary regulators, is in excess of the need, and the theoretic economy has not been realized. The following results of experiment and computation will convey information on this subject as definite as can well be succinctly given.

Mr. Edmund Becquerel, in a report made twenty years ago to the Society of Encouragement of Paris, gave as the minimum cost at which an electric light of the mean intensity of 50 Carcel bees could be maintained by a Bunsen battery, three francs per hour, which is equivalent to six centimes per hour per bec. Mr. Leroux, more recently, has computed that with an Alliance machine and a Serrin regulator in the most unfavorable circumstances—viz. where a steam-engine is employed exclusively to drive the generator—a light of 125 bees may be maintained ten hours per day at a cost of 1.725 francs per hour, or 1½ centimes per bec per hour, or a five hours' daily service at a cost of 2.57 francs per hour, or two centimes per bec per hour. Mr. Fontaine gives the following table:

Comparative Cost of Different Lights.

Kind of light.	Consumption per hour.	Cost per 1000 bees per hour.		Remarks.
		fr.	fr.	
Refined colza oil.	42 grams.	0.07	28.00	Price 1.70 per kilo at Paris.
Allaire neutral oil	39 "	0.06	24.00	" " " "
Oil of schist.	36 "	0.0468	18.72	" " " "
Petroleum	30 "	0.034	13.60	" " " "
Tallow candle.	83 "	0.141	56.40	" " " "
Wax candle.	66 "	0.53	132.00	" " " "
Stearine candle.	82 "	0.246	98.40	" " " "
Voltaic pile.		0.08	24.00	" " " "
Alliance machine.		0.024	9.60	9.60 hours per annum.
The same.		0.007	2.80	4000 "
Coal gas.	140 liters.	0.029	11.60	0.15 fr. pr. c. metre; 500 h. pr. an.
The same.		0.025	10.00	" " " "
The same.		0.030	12.00	" " " "
The same.		0.046	17.50	" " " "
Gramme machine.		0.0042	1.78	Steam-power; 500 "
The same.		0.0016	0.56	" " " "
The same.		0.001	1.60	Water-power; 500 "
The same.		0.0011	0.44	" " " "

On this table Mr. Fontaine remarks: "It shows that, for the same intensity, the normal Gramme machine, in the most unfavorable case, produces a light

- 75 times cheaper than the wax candle,
- 55 " " than the stearine candle,
- 16 " " than oil of colza,
- 11 " " than gas at 0.30 fr. pr. cub. mètre,
- 5½ " " than gas at 0.15 " " " "

Gas at 0.30 fr. per cubic mètre is equivalent to gas at 16 cents per 100 feet. The assumed prices of gas in the table are therefore much lower than the prices paid in American cities.

The foregoing table supposes the electric light to proceed from a Serrin regulator. With the Jablochhoff candle the economy is less, but this form of light is most available for ordinary uses. Fontaine found the intensity of each Jablochhoff light in the Avenue de l'Opéra at Paris to be equal in horizontal intensity to 58 Carcel bees. The opaline globe placed over the light to soften its dazzling brightness cuts off forty per cent. of its luminosity, reducing it to 34 bees. The lights, however, are placed so high that on the level of the sidewalk they produce an effect only equal to 17 bees. Mr. Th. Levy, engineer in the municipal service of Paris, shows that the cost per light per hour is 0.73 fr., which is equivalent to 4½ centimes per Carcel bec per hour, which the table shows to be about equal to the cost of coal-gas at 0.30 fr. per cubic mètre. In England a number of experiments have been made with the same form of light. For street-lighting the cost has been found to exceed that of gas. On the Holborn Viaduct in London, for example, 16 Jablochhoff candles were employed to replace 86 gas lamps. The city engineer, Lieut.-Col. Hayward, reported the cost of maintenance to be seven and a half times that of the gas replaced, but that the light furnished was seven times superior to the light of the 86 gas lamps. On the other hand, the large commercial and industrial establishments which have introduced the Jablochhoff light have found the change greatly to their advantage. In the magazines of the Louvre the substitution of this light in place of gas has reduced the cost of lighting 30 per cent.

The Brush Company of Cleveland, U. S., claim that with a machine of their construction, yielding sixteen to eighteen lights of 2000 candle-power (210 bees Carcel) each, with steam-power specially employed for the purpose, for 3000 hours per year, the cost per hour per light is only three cents, or less than 1½ mills per Carcel bec. If the power

can be spared from motors maintained for other purposes, this cost will be reduced one-fourth. (Further details on this subject must be sought in systematic treatises.)

The question as to the possible economy of small electric lights adapted to domestic purposes remains yet to be settled. It will probably soon be tested by the introduction into use of Mr. Edison's lamp by incandescence.

*Marine Electric Lights.*—No application of the electric light more strikingly illustrates the usefulness of this mode of illumination, or has been more unquestionably successful than its introduction into seacoast lighthouses on dangerous coasts. The first experiment of such application was made at Dungeness, the southern headland of the county of Kent, England, in 1862. This light was some time after transferred to the South Foreland, N. E. from Dungeness, on the Strait of Dover. The machines used are those of Holmes, a modification of the Alliance machine (see MAGNETO-ELECTRICITY), and the lamps are those of the same constructor. They are of more than 1500 candle- (160 Carcel bees) power; but the intensity of the concentrated illuminating beam exceeds that of 20,000 candles or 2100 bees. There are two lights, and each light has a double optical apparatus (one above the other), the second one being held in reserve to be used in case of accident or interruption to the first. For a similar reason, two lamps are provided for each optical apparatus, arranged on a shunting-table and railway to allow of the instantaneous substitution of one for the other. Within the last few years similar lights have been established at Souther Point in Northumberland, near the mouth of the Tyne, and at the Lizard, on the coast of Cornwall, the southernmost point on the coast of England. At the first of these, the power of the lamps is nearly 2000 candles (210 bees) each; at the other, 4125 candles (435 bees). In all of them arrangements are made by which the current from two machines united may be sent to one lamp, doubling the intensity of the light. This is done only in case of fogs or heavy weather.

An electric light was established at Cape La Hève, France, in 1803, and a second in 1805. Recently a third has been established at Cape Grisez. All these employ Alliance machines with Serrin lamps, and give a light equal to 200 Carcel bees. The electric light recently erected at Odessa on the Black Sea, and that at Port Saïd, Suez Canal, employ similar apparatus with somewhat inferior power.

*Sanitary Advantages of the Electric Light.*—In the ordinary modes of artificial illumination, whatever be the materials or apparatus employed, the luminous effect is ultimately the combustion of a gaseous hydrocarbon. The products of this combustion are aqueous vapor and carbonic acid. Both these products are formed at the expense of the oxygen of the air. The first is innocent, the second noxious. Powerful gaslights or lamps, or candles in large numbers, in an apartment of limited dimensions, vitiate the atmosphere, and are deleterious to health for a twofold reason; first, by exhausting the oxygen, which is the life-sustaining principle, and secondly, by generating a gaseous compound which is positively injurious. It is very much in favor of the electric light that it is free from these objections, or so nearly so that they need not be taken into account in regard to it.

It is another point in favor of this light that it does not, like gas light, sensibly heat the air of the apartment in which it is employed. This assertion may seem paradoxical, when it is remembered that the heat of the voltaic arch, or of an incandescent solid, exceeds immensely that of an ordinary gas flame; but it is to be considered that the amount of radiant heat emitted from any given source depends not only on the temperature, but on the mass of the body heated; and this mass in the electric lamp is very insignificant. Moreover, every gas-jet or candle-flame not only heats by radiation, but also by contributing to the surrounding air a great volume of vapor or gas which has made part of the flame itself, and has partaken of its temperature; while nothing of the kind occurs with the electric lamp. Hence the effect of such a lamp upon the temperature of the surrounding medium is inappreciable.

*Edison's Carbon Lamp.*—After this article had been electrotyped (Nov., 1879), Mr. Edison publicly announced that he had abandoned his platinum lamp, and had adopted a new construction in which the incandescent substance is a filament of carbon.

In his first experiments strips of cardboard, 5 centimeters long and 3 millimeters broad, and shaped like a horseshoe, were placed between plates of iron and carbonized by exposure to heat. The two ends were attached to platinum wires, and the loop was introduced into a glass bulb, in which the platinum wires were sealed. After the removal of the air the strip of carbon was rendered incandescent by a current of electricity. Later, filaments of bamboo were

substituted for the cardboard, and great care was taken to remove the air entirely from the bulb by the use of a Sprengel mercurial pump, and by heating the strip of carbon by an electrical current during exhaustion. The carbon filament is now made scarcely thicker than a horse-hair, and is attached to the platinum wires by a galvanoplastic deposit of copper. The lamps in their present condition are durable; the platinum is not liable to detach itself from the carbon, nor to cause the glass globe to crack. The arrangement for establishing connection between the lamp and the wires conducting the current to it is ingenious and somewhat complicated. These lamps can be provided with movable brackets, or even made, to a limited extent, transportable.

The lamp of Swan is in all essential respects similar to that of Edison. To Swan, however, belongs the credit of pointing out the necessity of employing as perfect a vacuum as possible, as otherwise, by the double process of chemical combination and dissociation, a trace of oxygen gradually destroys the carbon filament and deposits the carbon on the interior of the glass globe. The carbon filament of Swan is obtained by treating a cotton string with dilute sulphuric acid, that converts it into artificial parchment, which is then carbonized. These lamps give great satisfaction.

In Maxim's lamp the carbon filament has about the shape of an M, and is obtained in a peculiar way. The lamp is first furnished with a fine strip of carbon of the proper shape, made from cardboard, and is filled with the vapor of a hydrocarbon (gasoline) and an electric current passed through it. Portions of the carbon that conduct badly become unduly heated, decompose the gasoline, and become covered with a deposit of gas-coke; the current is thus strengthened. Other portions coat themselves, until finally the original filament is coated with a layer of gas-coke which renders it very durable. These lamps also have furnished excellent results.

In the lamps of Lane Fox a string of cotton or flax is carbonized and then heated in the vapor of a hydrocarbon as above described. Between the terminals of the carbon filament and the platinum wires short cylinders of gas-coke are inserted; mercury is also employed, to guard against possible leakage at the junction of the glass and the platinum wires.

During the International Electric Exhibition at Paris, in 1881, an extended investigation of incandescent lamps was made by a commission consisting of Messrs. Barker, Crookes, Hagenbach, Kundt, and Mascart, the main results of which are given in the following table:

	16-Candle power.				32-Candle power.			
	Edison.	Swan.	Lane Fox.	Maxim.	Edison.	Swan.	Lane Fox.	Maxim.
Candles.....	15.38	16.61	16.36	15.96	31.11	33.21	32.71	31.93
Ohms.....	137.4	32.78	27.40	41.11	130.03	31.75	26.59	39.60
Volts.....	89.11	47.30	43.63	56.49	98.39	54.21	48.22	62.27
Ampères.....	.0651	1.471	1.593	1.380	0.7585	1.758	1.815	1.578
Voltamperes.....	57.98	69.24	69.53	78.05	74.62	94.88	87.65	98.41
Kilogrammetres.....	5.911	7.059	7.089	7.939	7.604	9.67	8.936	10.03
Lamps per horse-power.....	12.73	10.71	10.61	9.48	9.88	7.40	8.47	7.50
Candles per horse-power.....	196.4	177.92	173.58	151.27	307.25	262.49	267.89	239.41
Lamps of 16 or 32 candles per horse-power.....	12.28	11.12	10.85	9.45	9.60	8.20	8.65	7.48

**AUTHORITIES.**—The literature of this subject is as yet to a large extent floating in the scientific and technical journals. The principal authority is Fontaine, *Éclairage à l'Électricité*, 2d ed., Paris, 1879. The work of Paget Higgs, *The Electric Light in its Practical Applications*, London, 1879, is next in importance. This author has also translated Fontaine's work. *Electric Lighting and its Practical Application* is a smaller treatise, by S. N. Shoobred, London, 1879, which gives a very good summary of the present state of progressive electric lighting. For electric sea-coast lights the fullest information may be obtained from the official report made to the Lighthouse Board of the U. S. by Maj. Geo. H. Elliot in 1874, and published as a Congressional document.

F. A. P. BARNARD.

**Electric Railways.** See APPENDIX.

**Electric Telegraph.** See TELEGRAPH.

**Electrodes** (plu.), [from *electricity* and the Gr. *ὅδῶς*, a "way"], the surfaces by which electricity passes into and out of different media. The poles of the voltaic battery or pile are especially termed *electrodes*. The so-called positive electrode is the "anode," and the negative is the "cathode."

**Electro-dynamic Engine**, a form of engine in which electro-magnetism is the motive-power. Immediately after the invention of the electro-magnet in 1827 by Prof. Henry, the instantaneousness with which, in this contrivance, force may be developed, destroyed, or reversed, led many persons of an inventive turn to attempt its application to some useful purpose in the arts. Many forms of vibrating and rotating apparatus were constructed by Prof. Henry and others to illustrate the principle; but the first electro-dynamic engine, properly so called, was the invention of Thomas Davenport of Vermont, by whom it was exhibited to Prof. Henry in 1835, and brought out publicly in New York a year or two later. In this machine a number of fixed electro-magnets were arranged, with poles presented inward, upon the circumference of a horizontal circle, within which an equal number, v-shaped in form, with their branches in the direction of radii, revolved. By a system of pole-changing thimbles the battery current in the revolving magnets was reversed at the moment of nearest approach of the fixed and movable poles, so that during approach they were attracted towards each other, and after the passage repelled. The success of a small machine of this construction was such as to encourage Mr. Davenport to attempt one on a scale sufficiently large, by calculation, to drive a power-printing-press; but this last proved a complete failure, and the engine was heard of no more. The discrepancy in this case, as in many others where similar disappointment has been encountered, between calculation and experimental results, was in great part owing to the fact that moving magnets, whether permanent or temporary, always generate, in closed conducting circuits in their neighborhood, secondary

or induced electric currents, which act in opposition to the primary currents, and tend in all electro-dynamic engines to diminish the effective energy of the magnets, whether they act by attraction or by repulsion. But had not this difficulty existed, the engine would hardly have been an economical success, since the materials consumed in the battery, metallic zinc and acids or salts, are products of industry prepared by the aid of heat; and the heat necessary for such preparation is capable, if directly applied to the production of steam, of performing a larger amount of work than would be derived from the electro-dynamic engine, even were it not subject to the disadvantage above mentioned. Indeed, it has long since been regarded as settled that motive-power derived from electro-magnetic combinations can only be secured at an expense which forbids its employment upon a large scale; but for many minor purposes, in which the consideration of cost is unimportant, the convenience of application of this power has secured for it an acceptance which in France and England is becoming every year more general.

The extensive introduction into families of the sewing-machine has created a special demand for small powers; and it is here that the electro-magnetic engine finds a field of usefulness to which it is peculiarly adapted. An engine of this kind, the invention of Mr. J. H. Cazal of Paris, was exhibited in the Universal Exposition of 1867, and received from the jury the distinction of an honorable mention. This is exceedingly compact, and as the driving machinery takes the place and has the appearance of the fly-wheel of the common sewing-machine, it adds nothing to the weight or to the seeming complication. It is formed of a thick disk of soft iron cut into the shape of a gear-wheel, a deep groove being afterwards cut down in the middle of the circumference, which is wound with insulated wire. The ends of the wire are soldered to insulated thimbles, which, by means of tangent-springs, introduce the battery current in the usual way. Surrounding this magnetic wheel is a heavy iron ring, indented on its interior surface in a manner to present elevations corresponding to the teeth or salient points of the wheel. This ring is fixed, and the whole apparatus is more or less concealed by a neat annular metallic envelope. When the teeth of the wheel pass before the prominent parts of the surrounding ring, there is a near approach to contact, and the attraction is strong. When these teeth are halfway between those points, the opposite attractions are balanced. At the moment of nearest approach the current is arrested; it is renewed again at the intermediate position. In the interval, while the current is not flowing, the magnetic wheel maintains the motion in the manner of a fly-wheel.

Another engine was exhibited in the same exposition by a company calling itself the Birmingham Electro-Magnetic Manufacturing Company, established at Birmingham in England. This engine is provided with four sets of fixed

electro-magnets of the U or horseshoe form, two sets at each end of an oscillating beam, by which the power is to be utilized. The magnets of each set are arranged in two tiers, one above the other. The armatures of these several magnets are carried by rods depending from the ends of the beam, but the rods pass freely through these armatures, without being fastened to them. When, therefore, an armature, in the descent of the rod, comes into contact with the magnet to which it belongs, the rod continues its motion, and leaves the armature resting there. In the return motion the rod lifts the armature again by means of a collar or enlargement which has been given to it at the place intended. Each armature has thus its collar, and these several collars have been so fixed upon the suspended rods that the armatures reach the faces of their respective magnets successively, and no two at the same time. In the action of the machine the battery current actuates the magnets on the side of the descent, while on the other side the current is cut off. The machine acts therefore only by attraction. The armatures are of soft iron. As these armatures approach their magnets successively, it will happen that whenever one becomes inefficient, by coming into contact with its magnet, the next will be in position to exert a very high attractive force. And this force increases until this next makes contact with its magnet in like manner. The arrangements of this machine, though extremely simple, are not unfavorable to the object of securing the largest amount of effective power from a given battery current.

A third motor of this class, which made its appearance at the same Exposition, was the invention of Kravog of Innsbruck in the Tyrol, and is described by Robert Sabine, Esq., member of the British commission to the Exposition, to be "a hollow heavy wrought-iron wheel, rotated by means of a permanent magnet creeping up inside it. In principle, the apparatus resembles exactly a treadmill. Inside the outer case of iron, in the centre of the section, is a circular tube of brass, and in the annular space between the two tubes three coils of insulated wire are wound at right angles to the tangents of the periphery, and connected with contacts properly placed at the axis. Inside the interior brass tube or ring is a magnet carried on anti-friction wheels, and occupying perhaps one-third of the whole circle. When a current is sent through the wire surrounding the magnet, the latter is deflected, or creeps up the ring on one side or the other according to the direction of the current, and by doing so displaces the centre of gravity of the whole system towards that side. In consequence, the wheel must turn slightly on its axis to compensate this displacement. But while it does so the magnet creeps up still farther, so that the wheel acquires a continuous rotatory motion. There is very little friction in this machine, and it is probably one of those in which the equivalent of mechanical force, gained by an expenditure of a unit of current, would be found the highest. This is not saying much, however, for in the best constructed machine this found value must fall far short of the theoretical equivalent." From this statement it appears that, whatever may be the coefficient of effective force in the machine described, the absolute amount of work which it is capable of performing must always be extremely limited, since at maximum it cannot exceed the weight of the magnet lifted through a space equal to that described by a point in the periphery of the wheel, taken at the mean distance of the magnet from the centre of motion. In the machine exhibited the magnet, though of course concealed from observation, could not, from the visible dimensions of the apparatus, have exceeded a pound or two in weight.

None of the motors above described possesses any important practical value. A really effective electro-dynamic engine has been brought into use in recent years, which is substantially a dynamo-electric generator reversed. It is by no means improbable that this may, under favorable conditions, become an advantageous substitute for steam.

F. A. P. BARNARD.

**Electro-Dynamics** is the science which treats of the phenomena of electric currents. (See **ELECTRICITY**.)

**Electrolysis.** See **APPENDIX**.

**Electro-Magnetism.** See **ELECTRICITY**.

**Electro-Metallurgy.** See **ELECTROTYPE**.

**Electrometer** [from *electricity* and the Gr. μέτρον, a "measure"] is sometimes used as the name of an instrument employed in detecting electric excitation, but more commonly called **electroscope**; but the term properly designates those instruments by which the attempt is made to measure the amount of the electric force. Coulomb's electrometer measures this force by the amount of twist it will give to a silken thread; others measure the arc through which a suspended pith ball is repelled by electricity.

**Electrophorus.** See **APPENDIX**.

**Electro-plating** is the covering of the surface of ar-

ticles formed of the cheaper metals with gold, silver, platinum, nickel, copper, or other costly metal by means of the electric current, on the same principle as that which is employed in electrotyping. German silver is one of the best substances to receive an electro-plate, though copper and its alloys are excellent. If iron, zinc, or pewter are to be used, they are first plated with copper, and they then readily take the electro-plate of gold or silver. All articles to be plated are most carefully cleaned and scoured. They are then dipped in a solution of nitrate of mercury, and receive therefrom a thin film of mercury, which causes the plate to adhere firmly. The bath of silver, gold, or platinum contains 100 parts of water, 10 of potassium cyanide, and 1 of the cyanide of the precious metal to be employed. The articles to be plated are suspended in this bath, and treated as described in the article **ELECTROTYPE** (which see). After removal, they are brushed and burnished. The above account is necessarily very general, for though the principle is simple, there are in practice many details which require careful attention in order to secure success. This process is of great importance in the arts, one of its latest applications being the operation of **NICKEL-PLATING** (which see.)

**Electroscope** [from *electricity* and the Gr. σκοπέω, to "see"], an instrument for the detection of the presence of electricity. Suspended balls of pith or slips of gold-leaf, from their extreme lightness, will readily diverge from each other; and this, or some similar device, is the essential element of most electroscopes. They depend for their action on the elementary law, that bodies charged with like electricity repel, while those charged with unlike electricity attract each other. The electroscope most used is Benet's gold-leaf electroscope. This consists of a glass shade with a wide mouth, which is closed by a wooden stopper which can be taken out and replaced at pleasure. A glass tube passes vertically through the centre of the wooden stopper, while a metallic rod is fixed in the centre of the glass tube. The lower end of the rod terminates in a small flat plate, to the sides of which two narrow strips of gold-leaf are soldered, and are thus attached opposite each other; and the upper end of the rod is furnished either with a circular horizontal plate or with a brass knob. If an electrified body be brought near to the top of the instrument, the top becomes electrified oppositely to the body presented, and the gold leaves similarly. As they are both charged with the same kind of electricity, they repel each other, and diverge more or less in proportion to the strength of the charge and to the nearness of the electrified body; and thus show us the presence of free electricity. Besides Benet's electroscope, there are the single gold-leaf electroscope, Volta's condensing electroscope, and Bohnenberger's electroscope.

**Electrotint**, an art by which drawings are made with any substance insoluble in the solution of sulphate of copper. When the design is completed the plate is immersed in the solution, and a reverse made by the electro-coppering process, called **electrotype** or **voltatype**.

**Electrotype** [from *electricity* and *type*] is the name given to the cast of an object procured by the gradual deposition of a metal from a solution by means of a current of electricity. When two pieces of clean platinum are put into a solution of sulphate of copper, no change takes place. But if an electric current is transmitted through the solution by means of these platinum plates, copper is at once precipitated upon the platinum, which forms the cathode, the anode remaining clean. If the current be reversed, the copper will be transferred from the platinum plate on which it had been deposited to the clean plate. By thus reversing the direction of the current the copper may be sent backward and forward, being always deposited upon the negative pole, or that surface by which the electric current leaves the electrolyte or solution that is undergoing decomposition. By continuing the electric currents, and keeping up the strength of the solution by adding fresh portions of the salt of copper, the metallic film on the cathode may be made of any required thickness, and afterwards peeled off the platinum surface. The texture of the copper deposited varies with the battery-power employed and with the strength and temperature of the solution, and may be hard, brittle, and crystalline, or tough and malleable, according to the management of the operator. A current of low intensity, a moderately strong solution of sulphate of copper acidulated with sulphuric acid, and a temperature not below 60°, are the most favorable circumstances for obtaining the best deposit of copper. When the negative pole or cathode is irregular (like a coin or medal), instead of being a plane surface of platinum, an exact impression of the device may be taken off on the precipitated copper. Gold and other metals may be substituted for copper by proper management, or if the pre-

capitated metal be left upon the surface on which it is thrown down, gilding, silvering, etc. may be done extensively and with fine effect. This art is called electro-plating. Proficiency in electrotyping or the galvano-plastic art requires but little apparatus, and involves no great expense. A medal may be either copied directly, and an inverted impression obtained from which a second electrotype can be taken, or a cast of the medal may be first made in stearin or plaster. In the latter operation, which is the most generally used, the mould, if of plaster, must be first soaked in oil, tallow, or melted spermaceti, so as to render it impervious to water. It must then be made a conductor of the current, and this is done by thoroughly brushing black lead over the surface which is to be reproduced. In case the medal itself is used, in order to prevent the deposition of copper which would take place upon the edges and upon the reverse of the medal, those parts should be covered with sealing-wax, varnish, or shell-lac. The introduction of this valuable art has been ascribed to different persons. Daniell is said to have been the first to notice the deposition of metallic copper by electricity while working with his battery; Jacobi of St. Petersburg first published in 1839 a practical application of this fact, which publication called out announcements from Spencer and Jordan, two Englishmen, who were both working independently at the same object as Jacobi. Messrs. Elkington soon after applied the process to the gilding and plating of goods on a large scale. Electrotyping has to some extent superseded the old stereotype process for making plates for printers' use, especially for the reproduction of engravings and where large numbers are to be printed. (See ELECTRICITY for the explanation of the electrolytic action and apparatus employed. For a summary of the various processes used by printers in the departments of stereotyping and electrotyping, see PRINTING.)

**Electrum**, the Latin name of AMBER (which see); also a natural alloy of gold and silver, in the proportion of two of gold and one of silver. It is found in Siberia, Norway, and California, and occurs in tabular crystals or imperfect cubes of a silver-white color.

**Electuary** [Lat. *electuarium*, from the Gr. *εκ*, "out," and *λεγω*, to "lick," because designed to be licked with the tongue from the spoon], in pharmacy, a variety of confection thinner than a conserve, and composed of powdered

drugs mingled with honey, syrup, glycerin, or other vehicle. Electuaries are not now recognized in the U. S. and British pharmacopœias.

**Elegy** [Lat. *elegia*; Gr. *ἐλεγία*; Fr. *élegie*; Ger. *Elegie*], the name given by the ancient Greeks and Romans to poems of various kinds, being applied to the martial lyrics of Tyrtæus, the aphorisms of Theognis and Solon, the melancholy effusions of Mimnermus, and the erotic poems of Ovid, Catullus, and Tibullus. In modern times the name is applied chiefly to poetical compositions of a melancholy character.

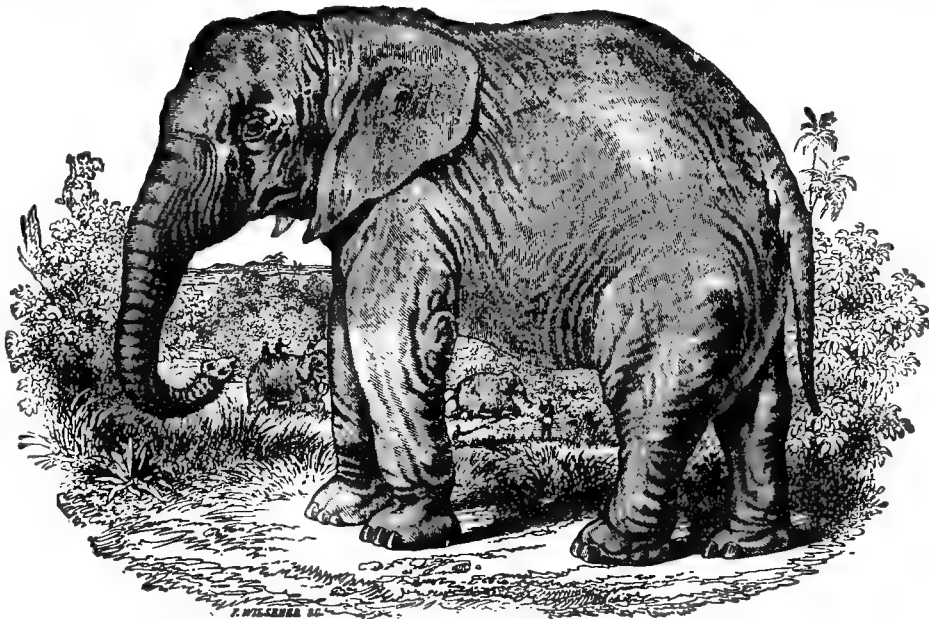
**Element** [Lat. *elementum*; Fr. *élément*], a term used in various senses; a first principle; a rudiment; a constituent part of a compound; sometimes the proper state or sphere of a person or an animal. In the plural, the first principles or rules of a science or art; also the bread and wine in the Eucharist. Ancient philosophers applied this term to fire, air, earth, and water, each of which, in their several systems, was supposed to be the first principle of all things. The elements of the alchemists were sulphur, mercury, and salt. As a modern scientific term, *element* signifies a simple substance, or one which chemists have not yet decomposed.

**Elements**, in astronomy, are the data required in order to compute the place of a planet, satellite, or comet; those numerical quantities, etc. which are employed in the construction of tables exhibiting the motions of the moon and planets. They comprise the greatest, least, and mean distances of the planets from the sun, the eccentricity of their orbits, their mean motions, daily and annual, their masses, densities, etc.

**Elements, Chemical.** See CHEMISTRY, by PROF. GEORGE F. BARKER, M. D.

**El'emi**, the name of a fragrant resinous substance procured from several species of trees of the natural order Amyridaceæ. It exudes from incisions made in the bark, is at first soft, but becomes hard and brittle. It is generally pale yellow, semi-transparent, and soluble in alcohol except a residue called *elemia*. It is obtained from the *Leica Icacariba*, which grows in Brazil; from *Elaphrium elemiferum*, of Mexico; and from *Canarium commune*, of Manila. El'emi is used in the preparation of ointments and plasters.

**El'ephant** [Gr. *ἐλέφας*; Lat. *elephas*, gen. *elephantis*],



African Elephant.

a gigantic animal of the order Proboscidea, is the largest and heaviest of existing quadrupeds, and is celebrated for sagacity and docility. The genus is characterized by having grinders composed of alternating vertical plates of ivory, enamel, and cæmentum; and two ivory tusks in the upper jaw. Elephants are the only living Mammalia that have a proboscis or trunk longer than the head. Cuvier included the genus *Elephas* and the extinct mastodon in a family of pachyderms, which he called Proboscidiæ. The proboscis is a very remarkable feature, and presents an astonishing combination of flexibility and strength. It is an

organ of touch, is four or five feet long, has neither bone nor cartilage; and this constitutes the peculiarity of its mechanism. Two tubes or canals, which are prolongations of the nostrils, extend through its whole length. The mechanism of the trunk is unique among animal structures, and renders it capable of performing operations as different as picking up a pin and tearing up a tree by its roots. The animal uses his trunk to convey food and drink into his mouth, but he rarely uses it as a weapon. As an organ of touch the trunk is exquisitely fine. The elephant has so high an opinion of the importance of its trunk that when



attacked by a tiger or exposed to other danger he carries it high in the air. The tusks, which correspond to the canine teeth of other quadrupeds, sometimes measure nine feet in length and weigh 150 pounds each, but the average weight is not over 100 pounds. The tusks are formidable defensive and offensive weapons. The curvature of the tusks is subject to great variations. Some of the Indian elephants have their tusks varying from a projecting horizontal but rather elevated curve to a form almost straight. Others resemble in shape the letter S. Although the substance of which they are composed, called ivory, is different from the bone of other teeth, it is formed, like other teeth, by successive secretions from a pulpy root. The tusk has no adhesion to this root, but is held in its alveole (socket) as a nail is held in a plank. The elephant feeds on vegetable food exclusively, and the construction of its grinding teeth is a striking example of the adaptation of the teeth of every animal to its peculiar mode of subsistence. The duration of the teeth of quadrupeds is in proportion to their ordinary term of existence. To an animal that feeds on grass, leaves, etc. the destruction of the teeth involves a speedy death. Each grinder is composed of vertical laminae covered with enamel, and joined together by a substance like ivory. This latter, being much softer than the enamel, wears away faster, so that the enamel remains higher, and the surface of each grinder always presents several ridges. When the molar teeth of the elephant are worn out they drop from the jaw, and are replaced by others which have been forming behind them; in this way elephants shed their teeth six or seven times in the course of their lives. According to Pliny and Aristotle, the elephant is capable of living 200 years.

Besides many species which are extinct, the genus *Elephas* comprises only two species now living—namely, the Asiatic or Indian elephant (*Elephas Indicus*) and the African (*Elephas Africana*). The former has small ears and a concave forehead, and its skull is higher in proportion to its other dimensions. The forehead of the African species is somewhat convex, and it has enormous ears, which cover the shoulders. The ear is the most conspicuous external character by which the two species may be distinguished. The height of the Indian elephant from the ground to the top of the shoulder seldom exceeds ten feet. The African is larger, and sometimes measures twelve feet high. F. Cuvier and others regard it as of a distinct genus, and name it *Loxodonta Africana*.

A large elephant weighs about 7000 pounds. The ordinary period of gestation is twenty months and some days; only one calf is produced at a birth. The quantity of food consumed daily by a full-grown elephant is enormous, probably not less than 300 pounds. The skin is hard, thick, and nearly naked, or furnished with a few scattered hairs.

The Asiatic species is found in all the southern countries of Asia and in the adjacent islands. The African abounds in nearly all parts of the continent S. of the Desert of Sahara. Both species live in large herds, reigning the almost exclusive occupants of immense forests, and marshy plains covered with long grass and jungle. Their favorite habitat is in well-watered regions and plains or lowlands where the vegetation is luxuriant. It is stated that more than 1000 have been seen in one herd. "A herd of elephants," says Pringle, "browsing in majestic tranquillity amidst the wild magnificence of an African landscape, is a very noble sight." The people of Africa do not tame the elephant or use it as a beast of burden, but they kill great numbers for the sake of the ivory, which they sell, and the flesh, which they esteem as food. "There were periods in the history of the refined nations of antiquity when the destruction of the elephant was as great as in modern times; when Africa yielded her tribute of elephants' teeth to the kings of Persia; when the people of Judæa built ivory palaces (Psalm xiv. 8); when the Etruscan attributes of royalty were sceptres and thrones of ivory; when the ancient kings and magistrates of Rome sat in ivory seats (*sellæ curules*); and when colossal ivory statues of their gods were raised by the Greeks of the age of Pericles." (*Library of Entertaining Knowledge*.) The ancient Carthaginians and other nations employed elephants in war, not only as beasts of burden, but as combatants. These animals formed part of the army which Hannibal led across the Alps, and they are said to have decided the victory at the battle of Trebia. For a long period the elephant was as important an arm of war as the artillery of modern nations. The Asiatic species was also employed for this purpose, and Seleucus is said to have had more than 100 elephants at the battle of Ipsus.

The African hunters shoot them in the head or heart with rifles, and sometimes disable them by cutting the hamstring or tendon of the hind leg with a sword. Two hunters, naked, mounted on the back of the same horse, will approach an elephant, and when he assumes the offensive will

retreat in a circuitous course with many devious turns. At length, one of the men, armed with a sword, alights on the ground near the elephant, and while the horseman occupies his attention in front the footman cuts the tendon just above the heel. At this critical moment the horseman wheels, takes his companion up behind him, and rescues him from the enraged animal by riding off at full speed. The chase of the elephant is attended with great danger, and many hunters have been killed in it. It appears that no people of Africa now capture elephants alive, or avail themselves of their services in a domesticated state, but in Asia large numbers of them are caught and tamed. The various modes of capturing wild elephants in India have prevailed without much change for centuries, and are practised in several Asiatic countries where elephants are required to maintain the splendor of Oriental luxury and figure in the pomp and pageantry of monarchs. In 1794 the nabob of Oude went upon a hunting expedition with 1000 elephants. The rudest mode of capturing them is by digging a pit which is covered with loose boards or with boughs and grass, and a tame elephant decoys a herd of them to tread on the trap. Pliny, who mentions the taking of elephants in pits, says the companions of one who has been thus entrapped will endeavor to liberate him by throwing materials into the pit. In other methods of capturing them man avails himself of the docility of tame female elephants, who serve as decoys and display a treacherous ingenuity as well as a desire to assist their masters in this business. While the female by her caresses diverts the attention of a wild animal, one hunter fetters his fore legs with a strong rope, and another ties his hind leg to a tree. If no tree is near in the first instance, they fasten to his leg a long cable, which trails behind him when he moves, until he comes near a large tree, to which he is secured. He is kept bound in that position until his rage is exhausted, and he is left to the further operation of hunger until he is subdued into docility. Among the animals which will attack an elephant are the tiger and rhinoceros. The animals to which the elephant is most nearly allied are the horse, pig, and rhinoceros.

According to Pliny, it was not uncommon at Rome to see tame elephants hurl javelins in the air and catch them with their trunks, and then execute a pyrrhic dance. They also danced upon a rope. This feat of dancing or walking on a rope is confirmed by other ancient writers. One of the strongest instincts of the elephant is that which impels him to try the stability and strength of any structure or surface which he is required to cross, before he will expose himself to the risk of breaking it down with his weight.

Remains of extinct species of elephant have been found in many parts of Europe, North America, and Siberia. Among them is the mammoth (*Elephas primigenius*), which occurs in the post-pliocene deposits. An entire specimen was discovered in 1799 in the frozen soil at the mouth of the river Lena in Siberia. (See MAMMOTH.) In the cave of Kirkdale, Yorkshire, England, the bones of elephants were found by Prof. Buckland, mixed with those of the rhinoceros and hyæna. Many of these fossils have also been dug up in the U. S., near the Ohio River and at other places. "There is not a canton in Siberia," says Pallas, "which does not possess fossil bones of elephants." Their tusks are there so abundant as to be an important article of commerce.

WILLIAM JACOBS.

**Elephan'ta**, an island of British India, in the harbor of Bombay, 7 miles from that city, derived its name from a gigantic stone figure of an elephant which formerly stood on the shore. The island is 6 miles in circumference. Here are several remarkable ancient cave-temples excavated out of the native rock, and adorned with numerous sculptured figures of the Hindoo mythology. The largest of these cave-temples is about 133 feet long, and is supported by twenty-six pillars.

**Elephant Bay**, an inlet of the Atlantic, in Benguela, Africa, is in lat. 13° 14' S., lon. 12° 33' E. It affords good anchorage, but no fresh water.

**Elephantiasis** [from the Gr. *ἐλέφας*, an "elephant," because it was fancied that the legs of those who suffered with it resembled those of an elephant], as at present used, designates the disease anciently known as *elephantiasis Arabum*, the "elephantiasis of the Arabians," so called to distinguish it from the *elephantiasis Græcorum*, the "elephantiasis of the Greeks," which was probably identical with leprosy. Elephantiasis is rare in Europe and North America, though not unknown in either. It is endemic in the Levant and the East and West Indies. The foot and leg, or sometimes other parts, become greatly enlarged and enormously increased in density and hardness, the skin assuming a remarkable roughness and usually a darkness of hue. The prognosis is usually grave, very few cases recovering, though many cases remain completely station-

ary after the disease is once established. In fatal cases suppuration and erysipelas are the active symptoms. The treatment is thus far unsatisfactory. The use of iron, iodine and quinia, with bandaging, is recommended.

**Elephan'tiné**, an island of the river Nile, on the boundary between Egypt and Nubia, is opposite to Asswân (the ancient *Syene*). It is 1 mile long, and is partly occupied by gardens and houses interspersed among ruins of ancient temples erected by the Pharos. Among its monuments is the Nilometer mentioned by Strabo, and designed to record the height of the inundations of the Nile. It was long an independent city with its own kings. This island was garrisoned by the ancient Persians and Romans. It is now inhabited by Nubians.

**Elephant Seal** (*Macrorhinus proboscideus*), sometimes called the **Proboscis Seal** and **Sea Elephant**, is by far the largest of the Phocidæ or seal family, being sometimes thirty feet in length, and having a circumference at the thickest part of nearly eighteen feet. The color is generally bluish-gray, but occasionally dark brown. Its body is unevenly covered with short hair, the tail not more than six inches long, the swimming paws very large and strong, and having five nails; the hind paws, which are constructed like the webbed foot of a bird, are without even the rudiments of nails. The head is large, the eyes large and prominent, and there are no external ears. The canine teeth resemble tusks in their size and massiveness; the nose of the male is prolonged into a proboscis about a foot long, which, however, does not serve the same purpose as that of the elephant. The skin is very thick and strong, and is of great value for harness-making; the flesh is dark and unwholesome, the tongue only being prized as food. These seals are found in the Falkland Islands, South Georgia, Kerguelen's Land, etc. They are hunted to a great extent for their oil, which is of excellent quality and yielded in great quantity, one seal sometimes affording seventy gallons. They migrate to the south early in the summer, and northward in the beginning of winter. They feed chiefly on cuttlefish and other cephalopods.

**Elephant's Foot** (*Testudinaria elephantipes*), a plant sometimes called "Hottentots' bread," belongs to the order Dioscoriaceæ, having a large, fleshy root-stock, abruptly truncated at the end. This root-stock is eaten by the Hottentots. It is covered with a soft, rough bark, from which springs a climbing stem, bearing the leaves and flowers. The same name is also given to a genus of the order Compositæ (*Elephantopus*), of which two species are found in the southern Atlantic States.

**Eletz**, a town of Russia, in the government of Orel, 220 miles S. S. E. of Moscow, on the Sosna. It has many factories, and has a large trade in wheat flour. Pop. in 1881, 30,540.

**Elusine**, a genus of grasses (Graminaceæ), comprises several species which are natives of India and other warm climates, and are cultivated for food. *Elusine Coracana* is extensively cultivated for its large farinaceous grain in India, China, and Japan. The grain called *tocusso* in Abyssinia is produced by the *Elusine Tocusso*. The *Elusine Indica* is naturalized about dooryards, etc. in the U. S.

**Eleusin'ia**, or **Eleusin'ian Mysteries** (Gr. Ἐλευσίνια), an annual festival celebrated in ancient Greece in honor of Demeter (Ceres) and Persephone (Proserpine). The worship of Demeter originally took place at Eleusis only, but after the conquest of that city by the Athenians feasts were celebrated in her honor in various Grecian cities. The origin of these mysteries is uncertain, but the popular tradition was that Demeter herself, while searching for her daughter Persephone, came to Attica, where she taught the inhabitants the use of corn and instituted the mysteries. The festival consisted of the greater and the lesser mysteries. The lesser feast was held in the month of Anthesterion at Agræ, on the Ilissus, and was only a preparation for the real or greater mysteries. The latter took place in the month of Boëdromion, beginning on the 15th and ending on the 23d. On the first day, called ἀγνῶρις (the "assembling"), the mystæ—i. e. those who had been initiated in the lesser Eleusinia—assembled at Athens. On the second they walked to the sea in procession and were purified. The third day appears to have been a day of fasting, and, according to some authorities, sacrifices of fish and cakes of barley from the Rarian plain were offered. On the fourth day the procession of the sacred basket (κάλαθος πάθος) took place. This basket contained pomegranates and poppy-seeds, and was drawn on a cart by oxen, and followed by women bearing mystic cases. The fifth day appears to have been known as the torch-day, and probably symbolized the search of Demeter for Persephone. The mystæ walked with torches to the temple of Demeter at Eleusis, where they seem to have remained all night. The sixth day, called Iakchos, from a son of Demeter, was

the most solemn of all. A decorated statue of Iakchos was carried from Athens to Eleusis, where the votaries again passed the night and were initiated into the last mysteries. Under an awful oath of secrecy they were admitted into the inner sanctuary, where they were allowed to see the sacred things, after which they were called *epoptæ*—i. e. "contemplators." On the seventh day they returned to Athens with jests and music, resting at the bridge over the Cephissus, where they ridiculed all who passed. The eighth day is supposed to have been added to the original number, so that those might be initiated who had been unable to attend on the sixth day. On the ninth and last day two vessels filled with wine or water were emptied—one towards the east, the other towards the west—by the priests, who at the same time uttered some mystical words. Besides these ceremonies there were several others, of which the Eleusinian games, supposed to have taken place on the seventh day, and to have been the most ancient in Greece, were the chief. Nothing certain is known respecting the doctrines revealed to the initiated, but they are supposed to have contained comforting assurances with regard to a future state. Distinctions of class were abolished at the Eleusinia, and with this view Lycurgus forbade any woman to ride in the procession in a chariot, under penalty of a heavy fine.

**Eleu'sis** (Gr. Ἐλευσίς or Ἐλευσίν), an ancient and celebrated city of Greece, was situated in Attica, near the northern shore of the Gulf of Salamis, and about 12 miles N. W. of Athens. It was the chief seat of the worship of Ceres, whose mystic rites, called **ELEUSINIAN MYSTERIES** (which see), were here performed annually with great pomp. Here was a large temple of Ceres. The site of Eleusis was near the modern village of Levsina. (See WORDSWORTH, "Greece," 1853.)

**Eleu'thera**, one of the Bahama Islands, in the Atlantic Ocean, is about 50 miles N. E. of New Providence. It is 80 miles long and about 10 miles wide. The soil is rather fertile, and produces pineapples, oranges, cascarilla bark, etc. Lat. of the northern point, 25° 34' N., lon. 76° 43' W.

**Eleuthe'ria** [from the Gr. Ἐλευθερία, "free"], a national festival of the ancient Greeks, instituted in 479 B. C. to commemorate their deliverance from the Persian armies which had invaded Greece. It was celebrated annually at Platæa in the early part of autumn.

**Eleva'tion** [Lat. *eleva'tio*, from *el'vo*, *eleva'tum*, to "lift up" or "raise"], the act of raising to a higher level or place; the act of exalting in rank; altitude; height above the surface; sometimes exaltation of mind or style; a hill or elevated ground. In engineering and architecture, a geometrical representation of a building or other object, as if *projected* (hence also styled a *projection*) upon a vertical plane by perpendicular lines drawn through its defining lines or points. It differs from a true *pictorial* representation or perspective view in this, that the projecting lines in the latter converge to the eye, as do visual rays; from a *section*, in that the latter represents, instead of the *visible exterior*, what would be exposed to the eye were all that part of the object in *front* of an intersecting vertical plane removed.

**ELEVATION**, in astronomy, the angular height or the altitude of a celestial object above the horizon, measured by the arc of a vertical circle passing through it and the zenith. Thus, the elevation of the pole denotes the arc of the meridian intercepted between the pole and the horizon, and is always equal to the latitude of the observer. The greatest elevation of a star occurs when that star is on the meridian.

**ELEVATION** in gunnery is the inclination of the axis of the cannon or gun above the object aimed at, to counteract the effect which the force of gravity causes. It varies with the range.

**Elevation of the Host** (*eleva'tio hos'tiæ*), in the Roman Catholic ritual of the mass, is the lifting up of the elements after consecration for the adoration of the people, and forms one of the most solemn and awful features of the whole Roman Catholic liturgy.

**Elf**, plu. **Elves** [Ang.-Sax. *ælf*; Ger. *El'fe*; Swed. *elf*; Dan. *alf*]. Elves are a class of imaginary beings whose existence is especially believed in among the peasantry of Scandinavia and North-western Europe, in whose mythology they had a prominent place. They were of two kinds, the good and bad elves, and their exploits gave origin to a great number of marvellous tales. It appears that the elves were celebrated among Germanic peoples, and especially among the Norse, while fairies were described in Celtic legends; but in England, at least, the names were confounded.

**Elf Arrow-heads**, called also **Elf Stones**, etc., the popular name in Great Britain of the flint arrow-heads which were used by the pre-historic inhabitants. Accord-

ing to a prevailing superstition, they were shot at human beings and cattle by the fairies or elves. These stones are worn as a talisman against witchcraft and poison.

**El'gin**, a royal burgh of Scotland, the capital of the county of Moray or Elgin, is on the river Lossie, 5 miles from the sea and 118 miles N. of Edinburgh, with which it is connected by a railway. It is beautifully situated in a fertile valley, has ten churches, a hospital, and an institution which Gen. Anderson endowed with £70,000 for the education of orphans. Elgin has the ruins of a cathedral founded in 1224. These are the most extensive and beautiful of ancient Scottish remains. Here are the ruins of a castle which was the residence of the earls of Moray. Elgin has iron-foundries and woollen-factories. Pop of parliamentary burgh in 1881, 6733.

**Elgin**, a city and R. R. centre, Kane co., Ill. (see map of Illinois, ref. 2-F, for location of county), on Fox River, 36 miles W. by N. from Chicago, has a fine water-power and more than twenty manufacturing concerns, including a large woollen-mill, mower-and-reaper manufactory, engine and boiler works, and a wringer-factory. It is the seat of the National watch-factory, employing 1000 skilled operators, the Northern Insane Asylum, costing \$500,000, and the Borden milk-condensing factory. It has an excellent academy. One of the chief industries is cheese and butter making in factories. Pop. in 1870, 5441; in 1880, 8787.

**Elgin** (JAMES BRUCE), EIGHTH EARL OF, born in London July 20, 1811, was educated at Oxford. He succeeded his father in 1841. This earldom was a Scottish peerage, which did not admit him into the House of Lords. He became governor of Jamaica in 1842, and of Canada in 1846. Canada prospered under his administration, which lasted eight years. He was created a peer of the United Kingdom in 1849, was sent on a mission to China in 1857, and negotiated the treaty of Tien-Tsien (1858). In 1859 he was postmaster-general, and in 1861 was appointed governor-general of India. Died Nov. 20, 1863. (See "Letters and Journals of James, Eighth Earl of Elgin," edited by WALROUD and corrected by his brother-in-law, DEAN STANLEY; "Narrative of the Earl of Elgin's Mission to China and Japan," by LAURENCE OLIPHANT, his private secretary; and for his Indian administration, "The Friend of India," 1862-3.)

**Elgin** (THOMAS BRUCE), SEVENTH EARL OF, the father of the preceding, was born in Scotland July 20, 1766. He obtained the rank of general in the army, and was sent as envoy extraordinary to Berlin in 1795. In 1799 he was appointed ambassador to Constantinople. He expended a large sum of money (about £50,000) in the removal of statues, bas-reliefs, and other remains of ancient art from the Parthenon and Acropolis of Athens to England. (See ELGIN MARBLES.) Died Nov. 14, 1841.

**Elgin Marbles**, a collection of sculptures taken from the Acropolis, mainly from the Parthenon at Athens. They are so called from the earl of Elgin, who, by permission of the Porte, brought them to England, from 1808 to 1812. The government bought them in 1816 for £35,000, a little more than two-thirds of the cost of excavating and transporting them. They consist of colossal statues and pieces of statues, bas-reliefs, caryatides, bits of column, urns, etc. The marbles from the Parthenon exhibit Greek art in its highest perfection. Their influence on English art has been very great. The students of art in America have them in the form of casts. Lovers of plastic art are grateful to Lord Elgin, instead of indignant with him, for bringing within their reach these masterpieces of beauty. (See LYON, "Outlines of the Elgin Marbles," 1816; "The Elgin Marbles from the Temple of Minerva at Athens," 1816; LAWRENCE, "Elgin Marbles from the Parthenon at Athens," 1818; and ELLIS, "The Elgin and Phigalian Marbles," 2 vols., 1836.)

**El'ginshire**, a county of Scotland, is bounded on the N. by the German Ocean, on the E. by Banffshire, on the S. by Inverness, and on the W. by Nairn. Area, 473 square miles. It is divided into two separate parts by a part of Inverness-shire. The climate is mild and dry, and the soil open, sandy, and gravelly, and very fertile in the N. The chief products are wheat, oats, and other kinds of grain. It was formerly called the granary of Scotland. Here are some manufactories of woollen goods. The chief articles of export are cattle, salmon, grain, and timber. It sends, together with Nairnshire, one member to Parliament. Pop. in 1881, 43,788. Chief town, Elgin.

**Elia**. See LAMB (CHARLES).

**Eli'as Levi'ta**, a learned Jewish rabbi, born in 1472, was probably a native of Italy. He taught Hebrew at Rome and Venice, was distinguished as a grammarian, and published numerous works, among which are a "Hebrew Grammar," a "Chaldaic, Talmudic, and Rabbinical Lexi-

con," and "Massorah," containing critical notes on the text of the Bible. Among his pupils were Sebastian Münster (who translated several of his works into Latin), Fr. Buxtorf, Cardinal Egidio of Viterbo (in whose house he lived for many years, and whom he aided in unravelling the enigmas of the Cabala), Dr. Eck, and others. He was neither a deep nor an original spirit, but he was learned and sound. He first set forth the views that the canon of the Old Testament was formed by Ezra and the great synagogue, and that the vowels of the Hebrew language are of late origin—later, even, than the Talmud. Died at Venice in 1549.

**Élie de Beaumont** (JEAN BAPTISTE ARMAND LOUIS LÉONCE), a French geologist, born at Canon (Calvados) Sept. 25, 1798. He was educated in the Polytechnic School, and became professor of geology in the College of France in 1832, chief engineer of mines in 1833, and a member of the Institute in 1835. Among his works are "Lectures on Geology" (3 vols., 1845 *et seq.*) and a "Treatise on the Mountain Systems," giving his theories on the elevation of mountain-ranges (1852). He succeeded Arago as perpetual secretary of the Academy of Sciences in 1853. Died Sept. 21, 1874.

**Elijah**. See APPENDIX.

**Elim** (a "place of fountains and palm trees"), the second mentioned in the march of the Israelites after crossing the Red Sea (Ex. xv. 27). It has been identified with *Ghurundel*, about halfway between Suez and Sinai.

**Elimination** [from the Lat. *elim'ino*, *elimina'tum*, to "send out" (from *e*, "out" or "out from," and *li'men*, *li-minis*, a "threshold" or "limit")], in mathematics, is the process of causing a quantity or letter which is common to two or more equations to disappear by framing out of the two a new equation in such a way as to omit the quantity in question. In other kinds of reasoning, not mathematical, elimination "is the extrusion of that which is superfluous or irrelevant." The term "to eliminate" is frequently but incorrectly used in the sense of "to elicit."

**El'iot** (ANDREW), D. D., was born Dec. 28, 1718, and graduated at Harvard in 1737. He became pastor of the New North church, Boston, Mass., in 1742, and filled that position till his death, Sept. 13, 1778. He was elected president of Harvard University, but declined the honor.

**Eliot** (CHARLES WILLIAM), LL.D., born Mar. 20, 1834, at Boston, Mass., educated at the Boston Public Latin School (1844-49) and at Harvard College (1849-53), was tutor in mathematics at Harvard College (1854-58), assistant professor of mathematics and chemistry (1858-61), of chemistry (1861-63), professor of chemistry in the Massachusetts Institute of Technology (1865-69), became president of Harvard College (May 19, 1869). He has published, with F. H. Storer, sundry chemical investigations, a manual of chemistry, and a manual of qualitative chemical analysis.

**Eliot** (GEORGE). See EVANS (MARIAN C.).

**Eliot** (JOHN), a minister of Roxbury, Mass., called "the apostle to the Indians," was born in England about Nov., 1604. He was educated at Cambridge, and came to Boston in 1631. He acquired the language of the Indians, and from 1646 he devoted himself to improving their condition and converting them to Christianity. He travelled extensively among them, enduring great privations and passing through many dangers. He succeeded in acquiring great influence over them, and many of them embraced the Christian faith. He translated the Bible into the Indian tongue (1661-63), published an Indian grammar (1666), and a number of other works, mostly relating to his missionary labors. Died May 20, 1690.

**Eliot** (JOHN), D. D., an American preacher and biographer, born in Boston May 31, 1754, graduated at Harvard in 1772. With Jeremy Belknap, he founded the Massachusetts Historical Society. He was the author of a "New England Biographical Dictionary" (1809) and other works. Died Feb. 14, 1813.

**Eliot** (SAMUEL), LL.D., an American historian, born in Boston Dec. 22, 1821, graduated at Harvard in 1839. Having visited Rome and travelled in Europe, he projected a "History of Liberty," a part of which he published in 1849, two volumes, entitled "The Liberty of Rome." "The Early Christians" (2 vols., 1858) is the second part of the same work. Among his writings is a "Manual of United States History from 1492 to 1850" (1856). He was president of Trinity College, Hartford, in 1860-64.

**Eliot** (SAMUEL ATKINS), a merchant of Boston, was born Mar. 5, 1798, and graduated at Harvard in 1817. He was father of President C. W. Eliot of Harvard College, was mayor of Boston (1837-39), a prominent State politician, member of Congress (1850-51), and was treasurer of Harvard College. Died Jan. 29, 1862.

**Eliot** (THOMAS D.), born in Boston, Mass., Mar. 20, 1808, graduated with honors at Columbian College, D. C., in 1825, and was admitted to the bar. He was a Republican member of Congress (1854-69), and took a prominent part in "reconstruction" and in business relative to the freedmen after the late civil war. Died June 12, 1870.

**Elis** [Gr. Ἠλῆς; Fr. *L'Élide*; the local form of the name was *Vales* or *Valeia*, which probably meant "low-land"], a small state of ancient Greece in the N. W. part of the Peloponnesus, was bounded on the N. by Achaia, on the E. by Arcadia, on the S. by Messenia, and on the W. by the Ionian Sea. It is intersected by the rivers Alpheus (now *Rouphia*) and Peneus (*Gastuni*). The surface is diversified by hills and fertile plains and valleys. Elis was divided into three districts—Hollow Elis, Pisatis, and Triphylia. The chief towns were Elis, Cyllene, Pylos, and Olympia. The Olympic games, the greatest national festival of the Greeks, were celebrated at Olympia. Elis now forms with Achaia a nomarchy of the kingdom of Greece.

**Elis**, an ancient city, the capital of the above state, was on the river Peneus, about 10 miles from its mouth. It is mentioned as a town of the Epeii by Homer ("Iliad," ii.). It had an acropolis on a hill nearly 500 feet high, and was the only fortified town in the country. It contained several fine temples, a theatre, and the largest gymnasium in Greece. All the athletes who contended at the Olympic games were required to undergo one month's previous training in this gymnasium. When Pausanias visited Elis (about 175 A. D.) it was one of the most splendid and populous cities of Greece. The site is occupied by the modern *Paléopoli* or *Kaloscopi*.

**Elisæus** [Armenian *Egîshe*], a celebrated Armenian historian and theologian from the fifth century, died as bishop of Amatunik in 480. He was educated by Sahab and Mesrob; entered the service of the Armenian prince, Varban, as whose private secretary he acted during the rebellion against the Persians; was afterward elected bishop of Amatunik, and was present at the great national synod of Ardusbad, in 449. His principal work is a history of the Persian persecution when Yazdegerd II. actually attempted to extinguish Christianity in Armenia. He narrates these events as an eye-witness, and all official sources of information were at his disposal. The book was first printed in Constantinople (1764); the best edition of it is that of Venice (1852). It was translated into English by Neumann (London, 1830). He also wrote commentaries on various books of the Old Testament, sermons, etc., of which a collected edition appeared in Venice (1838).

**Elisha**. See APPENDIX.

**Eli'sors**. These are persons named by the court to return a jury when the sheriff and coroners are incompetent. They are two in number, and, according to Lord Coke, are named from the fact that they are *chosen* by the court (*ab eligendo*). Against their return no challenge can be taken to the array of jurors, though there may be a challenge to individual jurors or to the polls.

**Elizabeth, N. C.** See ELIZABETHTOWN.

**Elizabeth**, city and R. R. centre, capital of Union co., N. J. (see map of New Jersey, ref. 3-D, for location of county), is situated on Staten Island Sound and Elizabeth River. It has communication with New York, distant 14 miles, by several railroads, and also by steamboats. Elizabeth contains an orphan asylum, costing \$60,000, besides several other public institutions. It is remarkable for the number of New York business-men who reside here with their families. The city, though not largely engaged in manufactures, has a number of such. The most notable is the extensive establishment of Singer's Sewing Machine Company. There are, besides, extensive oil-cloth factories and several foundries. The census of 1880 shows 149 manufacturing, capital, \$2,453,180; average number of hands employed, 3849; wages paid, \$1,740,456; value of products, \$6,828,027. The city has an electric fire-alarm telegraph, several parks, and is surrounded by some of the finest and richest farming country in the State. Elizabeth was formerly the capital of New Jersey, and ceased to be such in 1790. Pop. in 1880, 28,229; in 1885, 32,149.

**Elizabeth, West Va.** See APPENDIX.

**Elizabeth**, from 1558 to 1603 the ruler of England, and the last sovereign of the House of Tudor, was born at Greenwich on the 7th of Sept., 1533. She was a daughter of Henry VIII. and Anne Boleyn. Her childhood was passed in comparative retirement, and she was educated by persons who favored the Reformed religion. She learned the Latin, Greek, French, and Italian languages of the famous Roger Ascham. In 1554 she was confined in the Tower by order of Queen Mary, who regarded her with jealousy because she was the favorite of

the Protestant party. It appears that Elizabeth narrowly escaped death, and that some of the bishops and courtiers advised Mary to order her execution. After she had passed several months in the Tower, she was removed to Woodstock, and appeased Mary by professing to be a Roman Catholic.

On the death of Queen Mary (Nov. 17, 1558) Elizabeth ascended the throne, and the majority of the people rejoiced at her accession. She appointed William Cecil secretary of state, and Nicholas Bacon keeper of the great seal. She retained several Roman Catholics in her privy council, but she refused to hear mass in the royal chapel. The Protestants were the majority in the Parliament which met in 1559, abolished the mass, adopted the Thirty-nine Articles as the religion of the state, and recognized the queen as the head of the Church. "Thus," says Hume, "in one session, without any violence or tumult, was the whole system of religion altered by the will of a young woman." She declined an offer of marriage made to her by Philip II. of Spain. Her foreign policy was pacific. She waged no war for conquest, but to promote the stability of her throne she aided the Protestant insurgents in Scotland, France, and the Netherlands with money and troops. In 1563 the Parliament, anxious that she should have an heir, entreated her to marry, but she returned an evasive answer, and would neither accept the hand of any of her suitors nor decide in favor of any claimant of the throne. Among her suitors were the French duke of Anjou, the archduke Charles of Austria, and Robert Dudley, earl of Leicester, who was for many years her chief favorite. William Cecil, Lord Burleigh, was her prime minister and most trusted adviser during the greater part of her reign, the prosperity of which is ascribed to his prudence and influence.

Mary queen of Scots, fleeing from her rebellious subjects, took refuge in England in 1568, and was detained as a prisoner by Elizabeth. The latter regarded Mary as a dangerous rival, because the English Catholics wished to raise her to the throne of England, and formed several plots and conspiracies for that object. (See MARY STUART.) Mary was beheaded Feb. 8, 1587. Philip II. of Spain had long meditated a hostile enterprise against Queen Elizabeth, who had offended him by aiding his revolted Dutch subjects and by persecuting the English Catholics. For the invasion of England he fitted out the Invincible Armada, which consisted of about 130 vessels, with over 19,000 soldiers, and sailed in May, 1588. A violent storm dispersed the Spanish ships, many of which were wrecked, and the rest were encountered by the English fleet, mostly consisting of small but excellently equipped vessels, under Admiral Howard, and thoroughly beaten, Aug. 8, 1588. The disastrous failure of this expedition did not terminate hostilities between England and Spain. An English fleet took Cadiz in 1596. After the earl of Leicester died (1588) the earl of Essex was the queen's favorite courtier. The Puritans were severely persecuted in the latter part of her reign. She died Mar. 24, 1603, and was succeeded by James VI. of Scotland, who became James I. of England. Her reign is considered one of the most prosperous and glorious in English history, and she displayed superior abilities as a ruler, but her personal character is deformed by serious faults. She was vain and selfish, and was more feared than loved by her attendants. The Elizabethan age was almost unequalled in literature, and was illustrated by the genius of Shakespeare, Spenser, Bacon, Sidney, and Raleigh. (See FROUDE, "History of England," vols. vii. to x.; HUME, "History of England;" CAMDEN, "History of Queen Elizabeth," 1625; DR. THOMAS BIRCH, "Memoirs of the Reign of Queen Elizabeth," 1754.)

**Elizabeth** (PHILIPPINE MARIE HÉLÈNE), a French princess, a sister of Louis XVI., was born in 1764. She was commonly styled Madame Elisabeth. In the Reign of Terror she was exposed to dangers and sufferings which she endured with fortitude. She was imprisoned in Aug., 1792, and guillotined in May, 1794.

**Elizabethan Architecture**, a term applied to a style of architecture which appeared in England on the decline of the Gothic, and mostly prevailed during the reigns of Elizabeth and James I. It is sometimes called the *Tudor* style, a name more correctly applied to the Latest Gothic. It is characterized by a rich but cumbrous style of ornament, both within and without, by apartments and galleries of vast extent, and by enormous square windows. It is regarded as a debased style, and was chiefly employed in domestic architecture. Its later form is called Jacobean.

**Elizabeth Christina**, queen of Prussia, born at Brunswick Nov. 8, 1715, was a daughter of the duke of Brunswick-Wolfenbüttel. She was married to Frederick the Great in 1732. She had a high reputation for virtue and piety. Died Nov. 13, 1797.

**Elizabeth City**, capital of Pasquotank co., N. C. (see map of North Carolina, ref. 2-J, for location of county), is situated 20 miles W. of the Atlantic, on R. R. and the Pasquotank River. It has a fine harbor, safe and sufficiently deep for large vessels. It has steam grist- and saw-mills, also shingle-factories and planing-mill. It is surrounded by a cotton, corn, and wheat growing country, is 46 miles S. of Norfolk, Va., with which it communicates by R. R. and the Dismal Swamp Canal, and is connected by steamship with Newberne, N. C. Pop. in 1870, 930; in 1880, 2315.

**Elizabethgrad**, a town of Russia, in the government of Kherson, 160 miles N. E. of Odessa. It is a military settlement, with 63,064 inhabitants.

**Elizabethine Nuns**, a congregation of monastic women in the Roman Catholic Church, belonging to the third order of St. Francis. The name Elizabethines was at first applied to voluntary associations of women who imitated the zeal of Saint Elizabeth of Hungary, without taking monastic vows or retiring from the world. But from the tradition that Saint Elizabeth belonged to the third order of Saint Francis, the name is sometimes given to Franciscan nuns. It is probable, however, that the Franciscan nuns of the third order were not established till 1395.

**Elizabeth Islands**, a group of sixteen small islands belonging to Dukes co., Mass., lying between Vineyard Sound and Buzzard's Bay. They constitute since 1864 the township of Gosnold. Pop. 152, principally on Cuttyhunk. The islands were once densely populated. Cuttyhunk was the seat of Bartholomew Gosnold's first colony in "Virginia," founded in 1602, but abandoned the same year, on account of troubles of the colonists with each other and with the Indians. The islands are a favorite resort for fishing and yachting. The islands, in the order of their size, are Naushon, Nashawena, Pasque, Cuttyhunk, Nonamisset, Uncatena, Penikese, and several small islets. Cuttyhunk Light, near the southern point of this group, is in lat. 41° 24.8' N., lon. 70° 56.7' W. One of the islands, Penikese or Pune, was presented in Mar., 1873, by John Anderson of New York, to Prof. Agassiz, for the purpose of establishing a school of natural history upon it. Mr. Anderson also gave \$50,000 in money towards the endowment of the school, which was indirectly connected with the Museum of Comparative Zoology at Cambridge, Mass. The school was opened in the summer of 1873. The island contains 100 acres of land.

**Elizabeth Petrovna**, empress of Russia, born in Dec., 1709, was a daughter of Peter the Great and Catherine I. She was dissolute in morals, and appears to have been unambitious, as she made little effort to obtain the throne. Ivan, an infant, was proclaimed emperor in 1740, but the French surgeon Lestocq and other partisans of Elizabeth conspired against Ivan with success, and she became empress in 1741. As an ally of Austria and France, she waged war against Frederick the Great in the Seven Years' war. Her army gained a victory at Kunersdorf, and entered Berlin in 1760. She had several children by Count Rasumovski, who was first her servant, subsequently her chamberlain, and was at length secretly married to her. She died Jan. 5, 1762, and was succeeded by her nephew, Peter III.

**Elizabeth**, SAINT, of Hungary, a daughter of Andrew II., king of Hungary, was born at Presburg in 1207. She became in 1221 the wife of Louis, landgrave of Thuringia, who died in 1227 at Otranto, on his way to the Holy Land (the third crusade). His eldest brother (Henry) seized his possessions, and banished his widow and children. The knights of Thuringia restored her son Herman to the throne, and Elizabeth received as a dower the city of Marburg, where she retired with her daughters, and spent the remainder of her life in what became one continued penance. "Of all" (says Mrs. Jameson) "the glorified—victims must I call them, or martyrs?—of that terrible but poetical fanaticism of the thirteenth century, she was one of the most remarkable; and of the sacred legends of the Middle Ages hers is one of the most interesting and most instructive." She died Nov. 17, 1231. (See CHARLES DE MONTALEMBERT, "Vie de S. Elizabeth de Hongrie," 1836, which has been translated into English; also CHARLES KINGSLEY's "Saint's Tragedy.")

**Elizabeth Stuart**, queen of Bohemia, a daughter of James I. of England, was born Aug. 19, 1596. She was married in 1613 to Frederick V., elector palatine, who was chosen king of Bohemia in 1619 by the Protestant party. She is said to have been beautiful, and is considered a heroine. Her husband was defeated in battle in 1620, and she passed the remainder of her life in exile and adversity. She was the mother of the famous Prince Rupert and numerous other children. Died Feb. 13, 1662. George I. of England was her grandson. (See Miss BINGER, "Memoirs of Elizabeth Stuart," 1825.)

**Elizabethton**, on R. R., capital of Carter co., Tenn. (see map of Tennessee, ref. 5-K, for location of county), on the Watauga River, about 300 miles E. of Nashville. Pop. in 1870, 321; in 1880, 362.

**Elizabethtown**, capital of Hardin co., Ill. (see map of Illinois, ref. 11-F, for location of county), on the Ohio River, 90 miles above Cairo. There are rich lead-mines in the vicinity. Pop. in 1880, 484.

**Elizabethtown**, R. R. junction, capital of Hardin co., Ky. (see map of Kentucky, ref. 3-F, for location of county), 42 miles S. by W. from Louisville. Pop. in 1870, 1743; in 1880, 2526.

**Elizabethtown**, capital of Essex co., N. Y. (see map of New York, ref. 2-J, for location of county), on Bouquet River, about 125 miles N. of Albany. It has a court-house and jail, and the township has extensive iron-mines and iron-works. Pop. in 1880, 445.

**Elizabethtown**, capital of Bladen co., N. C. (see map of North Carolina, ref. 4-H, for location of county), on Cape Fear River, 50 miles above Wilmington. Pop. in 1870, 62; in 1880, 212.

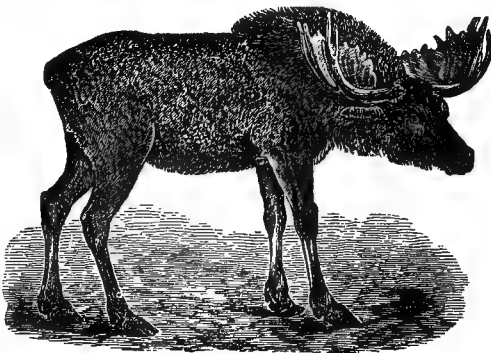
**Elizabethtown**, on R. R., Lancaster co., Pa. (see map of Pennsylvania, ref. 6-H, for location of county), 18 miles N. W. of Lancaster City, the county-seat, is at equal distance, 18 miles, from the county-seats of four counties—Lancaster, Dauphin, Lebanon, and York. It has a farming-implement manufactory and a machine-shop. Pop. in 1870, 558; in 1880, 980.

**Elizabetopol**, a government of Transcaucasia, is bounded on the N. by Tiflis, on the E. by Baku, on the S. by Persia, and on the W. by Erivan. Area, 17,038 square miles. The government consists in the W. of high mountains, while the E. is more level. It is drained by the Kur and numerous other small streams. Chief town, Elizabetopol. Pop. 503,282.

**Elizabetopol**, or **Gandscha**, the capital of the government of the same name, in Russian Transcaucasia, is situated 90 miles S. E. of Tiflis. It has a number of churches, mosques, and fruit-gardens. Silkworms are raised here. Pop. 18,505.

**Elk** (*Alces malchis*), a species of deer, is a native of the northern parts of Asia and Europe. It is one of the largest animals of the deer family or Cervidae, is about six feet high, and sometimes weighs 1200 pounds. It has a short, compact body raised on long, still-like legs, a short, thick neck, and a large, narrow head, nearly two feet long. The neck is covered with a short thick mane. The antlers of the full-grown elk are flattened, displaying a broad blade with numerous snags on each horn. The tail is only four or five inches long. The color of its hair is brownish black. Elks can run with great speed. They frequent marshy districts and swampy forests, feeding on lichens, leaves, and branches of trees. Their flesh is esteemed for food.

The true American elk, commonly called the moose (*Alces Americanus*), so closely resembles the above species that



Elk or Moose.

some writers regard them as identical. But the differences are now generally considered sufficiently great to justify the opinion that the two are specifically distinct. The moose is still found in Maine and Northern New York, and north-westward. It is much hunted for its flesh and skin in winter, when the frozen crust of the snow, not strong enough to bear the animal's weight, seriously impedes its progress, its great speed at other times making its capture difficult. When brought to bay, a blow with its fore foot or horns is a serious matter for the huntsman. It is the largest known animal of the deer family now existing.

The beast generally known in America as the elk is the wapiti (*Cervus Canadensis*), an animal nearly as large as



the moose. It goes in large herds, and is hunted for its flesh, and especially for its skin, which is highly prized. Several other large species of deer (as in Ceylon) or of antelope (as in South Africa) are known locally as elks. The true elks have a broad hairy muzzle, with a bald spot between the nostrils, horns large and palmated, with no basal snag; true deer have a basal snag, and more or less rounded horns; the muzzle is bare and moist.

**Elk, Irish** (*Megaceros Hibernicus*), the name given to a fossil deer found in the pleistocene strata, distinguished from other deer by the great size and peculiar form of its antlers. The beam of the antler is wide and flattened into a palm, and in one specimen the distance between the extreme tips was nearly eleven feet. There is a brow snag, as in the fallow deer, and also a back snag. The weight of the antlers in one specimen was eighty-one pounds. These fossils, though most abundant in Ireland, are met with in England and on the Continent.

**El Ka'der**, on R. R., capital of Clayton co., Ia. (see map of Iowa, ref. 3-J, for location of county), on Turkey River, about 50 miles N. W. of Dubuque. Pop. in 1870, 697; in 1880, 851.

**El Khar'geh**, a town of Upper Egypt, capital of the Great Oasis; lat. 25° 28' N., lon. 30° 40' E. Here are ruins of a temple and an ancient necropolis. El Khar'geh is also the name of the Great Oasis itself, which is 80 miles long and 10 miles broad, and was anciently larger than at present. It abounds in acacia and doum-palm trees, and has many ruins, chiefly Macedonian and Roman. There are many warm and cold springs and a stream of water; and rice is here cultivated.

**Elkhart**, city and R. R. centre, Elkhart co., Ind. (see map of Indiana, ref. 2-E, for location of county), on the Elkhart River, 100 miles E. by S. from Chicago. It contains a large T-rail rolling-mill, a machine-shop, and a round-house of the railroad company. In the works are employed more than 800 men. Here are also paper-mills, machine-shops, flour and starch mills, besides other factories. The combined water-power is estimated at 8300 horse-power. The town has a school-house which cost \$50,000. Pop. in 1870, 3265; in 1880, 6953.

**Elkhorn**, R. R. junction, capital of Walworth co., Wis. (see map of Wisconsin, ref. 7-E, for location of county), 65 miles due N. W. from Chicago, Ill., and 45 miles S. W. from Milwaukee. It has a court-house, a beautiful park of six acres of large oaks, and a fine Union school-building. It is in one of the richest farming districts in the State. Pop. in 1870, 1205; in 1880, 1122.

**Elkhorn River**, Nebraska, rises in the N. E. part of the State, flows nearly south-eastward through the counties of Madison, Stanton, Cuming, Dodge, and Douglas, and enters the Platte in the western part of Sarpy county. Length, estimated at 250 miles.

**Elko**, capital of Elko co., Nev. (see map of Nevada, ref. 2-E, for location of county), is on Humboldt River and the Central Pacific R. R. It has the State university, silver-smelting works, and manufactures of farming tools. Here are hot mineral springs of great value for bathing purposes. Pop. in 1880, 752.

**Elk Point**, R. R. junction, capital of Union co., Dak. (see map of Dakota, ref. 8-G, for location of county), on the Missouri River, about 30 miles S. W. of Sioux City (Ia.). Pop. in 1880, 719.

**Elk Riv'er**, of West Virginia, flows nearly westward through Braxton and Clay counties, and enters the Great Kanawha at Charleston. Length, nearly 150 miles.

**Elk River**, capital of Sherburne co., Minn. (see map of Minnesota, ref. 8-E, for location of county), 38 miles N. W. from the capital of the State, and situated on R. R. and the Mississippi and Elk rivers. It has a number of manufactories, a large brick school-house capable of holding 500 scholars, and four different grades of schools. Principal business, lumber, grain, and stock. It is in a good farming-region. Pop. in 1880, 635.

**Elk'ton**, capital of Todd co., Ky. (see map of Kentucky, ref. 5-E, for location of county), about 50 miles N. W. of Nashville (Tenn.). Pop. in 1880, 874.

**Elkton**, on R. R., capital of Cecil co., Md. (see map of Maryland, ref. 1-G, for location of county), 52 miles E. N. E. from Baltimore, and at the head of navigation on the Elk River. It has an academy and a public school. There are flour, iron, and paper mills in the vicinity. Elkton was settled by the Swedes in 1694. Pop. in 1870, 1797; in 1880, 1752.

**Ell** [Lat. *ulva*; Fr. *aune*; Ger. *Elle*; Dutch *elvi*], a measure of length adopted from the length of a man's fore arm. The English ell is 3 feet 9 inches, and the Flemish is equal to 27 inches, or three-fourths of a yard.

**Ellag'ic Acid**, a constituent of certain animal concretions, as the bezoar-stones of the antelope; also produced by the decomposition of gallic acid.

**El'laville**, capital of Schley co., Ga. (see map of Georgia, ref. 5-G, for location of county), about 44 miles E. S. E. of Columbus. Pop. in 1870, 157; in 1880, 182.

**El'lenborough** (**EDWARD LAW**), LORD, an able English lawyer, born in Cumberland Nov. 16, 1750. He was engaged in 1785 as the leading counsel for the defence in the trial of Warren Hastings, for whom he pleaded with success. He became attorney-general in 1801, and lord chief-justice of the king's bench in 1802. In the same year he was created Baron Ellenborough. He was a Tory in politics. Died Dec. 13, 1818.

**Ellenborough** (**EDWARD LAW**), EARL OF, a statesman, a son of the preceding, was born Sept. 8, 1790, and succeeded his father as baron in 1818. He was lord privy seal in 1828-29, and gained distinction as an orator in the House of Lords. In 1841 he was appointed governor-general of India, but he was recalled in 1844 by the East India Company, and then received the title of earl and viscount. He was first lord of the admiralty in 1846 for a short time in the cabinet of Peel. On the formation of a new Tory ministry in Feb., 1858, he became president of the board of control. One of his despatches censuring Viscount Canning for his conduct in India offended the public, and he had to resign in 1858. Died Dec. 22, 1871. By his death the earldom and viscountcy became extinct.

**Ellendale**, Dak. See APPENDIX.

**El'lensburg**, capital of Curry co., Or. (see map of Oregon, ref. 8-A, for location of county), on the Pacific Ocean at the mouth of Rogue River, about 200 miles S. by W. of Salem. Pop. not in census of 1880.

**Ellensburg**, W. T. See APPENDIX.

**Ellenville**, Wawarsing township, Ulster co., N. Y. (see map of New York, ref. 7-J, for location of county), 30 miles W. of the Hudson River, on R. R. and the Delaware and Hudson Canal. It is situated in a beautiful and fertile valley at the foot of the Shawangunk Mountains, and is a very beautiful and thriving place. Its waterworks cost \$40,000; it has many handsome public and private buildings, graded public schools, a glass-manufactory, cutlery-works, stoneware pottery, bluestone quarries, and manufactories of leather and boats. It is a favorite summer resort, and is the seat of Ulster Seminary. Pop. in 1880, 2750.

**Ellery** (**WILLIAM**), an American patriot, born at Newport, R. I., Dec. 22, 1727. He was a merchant in his youth, and began to practise law in 1770 at Newport. Having gained a high reputation for integrity and wisdom, he was chosen a delegate from Rhode Island to the national Congress of 1776, in which he signed the Declaration of Independence. He was re-elected, and remained in Congress until 1785. In 1790 he was appointed collector of Newport. He supported the Federal party. D. Feb. 15, 1820.

**El'let** (**CHARLES**), an American engineer, born at Penn's Manor, in Bucks co., Pa., Jan. 1, 1810. Destined by his father to the life of a farmer, his own strong brain led him to mathematical and engineering pursuits. First as a rodman, then as a voluntary, and subsequently as a paid assistant, on that great work of early American engineering, the Chesapeake and Ohio Canal, he acquired knowledge and pecuniary means to visit Europe and complete his self-education in Paris, following the course of the Ecole Polytechnique. Subsequently an engineer on the Utica and Schenectady Railroad, then on the Erie, then chief engineer of the James River and Kanawha Canal, he was author of an "Essay on the Laws of Trade" (devoted to works of internal improvement in the U. S.) and of other works of a similar character. He shares with Roebling the honor of being a pioneer of wire suspension bridges, building in 1842 the bridge across the Schuylkill at Fairmount (on the site of the famous "Colossus" wooden bridge destroyed in 1838 by fire), "the first structure of its kind in this country, and considered at the time a triumph of engineering skill." In 1845 he affirmed that a bridge might be built across the Niagara below the Falls, secure and fitted for railroad uses; and he was in 1847 the designing and constructing engineer of the preliminary wire suspension bridge (a light foot-bridge), intended as a service bridge for the construction of the main work. Among his most noteworthy labors was his investigation of the hydraulics of the Ohio and Mississippi rivers, and his work, published by the Smithsonian Institution, he regarded as "the crowning conception of his professional career." He was among the first to advocate the use of "steam-rams," suggesting a plan to the Russian government by which to destroy the allied fleet before Sebastopol, and soon after urging the matter upon our government. He was unheeded until the event of the famous Monitor and Merrimack battle in

Hampton Roads, when he was commissioned by the war department to do what he could to protect the Mississippi gun-boat squadron against a fleet of hostile rams understood to be coming up the river. He hastily equipped a fleet of nine river steamboats as "rams," of which he was given the command. In a subsequent battle (June 6, 1862), terminating in a decisive defeat of the Confederate squadron, three of their vessels were sunk outright by two of his rams; but he received a wound, from which his already enfeebled frame rapidly gave way, and he died at Cairo, Ill., on the 21st of June. A great engineer, his power as such was worthily devoted to the maintenance of the integrity of his country, and with it his life; thus in his death uniting in one, the engineer, the soldier, the patriot.

J. G. BARNARD.

**Ellet** (CHARLES RIVERS), M. D., son of the above, was born at Philadelphia in 1841. When the civil war broke out he entered the army as a surgeon, became colonel, and commanded with success a marine brigade of steam "rams," etc. on the Mississippi. Died Oct. 29, 1863.

**Ellet** (ELIZABETH FRIS), an American authoress, born at Sodus Point, N. Y., in Oct., 1818. Her maiden name was LUMMIS. She produced a volume of poems (1835), "Women of the American Revolution" (1848), "Summer Rambles in the West" (1853), "Queens of American Society" (1865), and numerous other works. Died June 3, 1877.

**Ellet** (WILLIAM HENRY), M. D., an American chemist, born in New York about 1804, was the husband of the preceding. He obtained a chair in Columbia College (of which he was a graduate) in 1832, and became professor of chemistry in South Carolina College in 1835. He invented a method of preparing gun-cotton. Died Jan. 26, 1859.

**Ellezelles**, *él'zel'*, a town of Belgium, in the province of Hainaut, 16 miles N. E. of Tournay. It has manufactures of linen, a salt refinery, and breweries. Pop. 5527.

**Ellicott** (ANDREW), an American civil engineer, born in Bucks co., Pa., Jan. 24, 1754. He founded Ellicott's Mills in Maryland, and removed to Baltimore. He was a friend of Dr. Franklin and of Washington. In 1790 he was employed by the Federal government to survey and lay out the capital of the U. S. He was appointed surveyor-general of the U. S. in 1792, and became professor of mathematics and engineering at West Point in 1812. Died at West Point Aug. 29, 1820.

**Ellicott** (CHARLES JOHN), D. D., since 1863 bishop of Gloucester and Bristol, was born at Whitwell, near Stamford, England, Apr. 25, 1819. In 1859 he was appointed Hulsean lecturer, and in 1860 Hulsean professor of divinity, at Cambridge. His commentaries on the Epistles of Saint Paul, which began to appear in 1854, have put him into the front rank of biblical scholars. His "Historical Lectures on the Life of our Lord Jesus Christ" (1860) were the Hulsean Lectures for 1859. His first work was a "Treatise on Analytical Statics" (1842).

**Ellicott City**, capital of Howard co., Md. (see map of Maryland, ref. 2-E, for location of county), situated on the Patapsco River and the Baltimore and Ohio R. R., 10 miles from Baltimore and 31 miles from Washington. It has two cotton-factories, one flouring-mill, turning out 400 barrels of flour per day, one large barrel-factory, machine-shop and foundry, and three colleges, one of which is for females. Pop. in 1870, 1722; in 1880, 1784.

**Ellicottville**, Cattaraugus co., N. Y. (see map of New York, ref. 6-C, for location of county), is on R. R. and the Great Valley Creek, about 44 miles S. by E. from Buffalo. It has a large steam saw-mill, a flouring-mill, and a large union school. Pop. in 1870, 579; in 1880, 748.

**El'lijay**, capital of Gilmer co., Ga. (see map of Georgia, ref. 1-G, for location of county), on El'lijay River, about 75 miles N. of Atlanta. Pop. in 1880, 200.

**El'liot** (GEORGE HENRY), born at Lowell, Mass., Mar. 28, 1831, graduated at West Point in 1855 as a lieutenant of artillery; served on the frontier of Texas, and in 1857 was transferred to the engineers; was engaged in the construction of fortifications on the Pacific until 1870; was a member and the engineer secretary of the lighthouse board, 1870-74, and chief engineer of the Washington aqueduct 1870-71. He was engaged in an inspection of European lighthouse systems from May to Sept., 1873, and 1874-82 assistant to the chief of engineers; major of engineers 1867; lieut.-col. 1882. Geo. C. SIMMONS.

**El'liot** (GEORGE THOMSON). See APPENDIX.

**El'liott** (CHARLES), D. D., LL.D., a Methodist minister, born in the county of Donegal, Ireland, May 16, 1792. He emigrated to Ohio, where he edited the "Western Christian Advocate" and other journals. He was a professor of languages at Madison College, Uniontown, Pa. (1827-31), and was president of Iowa Wesleyan University (1856-60

and 1864-67). He was the author of "A Treatise on Baptism," "Life of Bishop Roberts," "Delineation of Roman Catholicism," 2 vols. 8vo; "Sinfulness of American Slavery," "History of the Great Secession," "The Bible and Slavery," etc. Died Jan. 3, 1869.

**El'liott** (CHARLES LORING), an American portrait-painter, born in Scipio, N. Y., in Dec., 1812. He worked in the city of New York, and painted the portraits of several eminent men. His works are commended for fidelity of likeness. Died in Albany, N. Y., Aug. 25, 1868.

**El'liott** (CHARLES WYLLYS), descended from John Eliot, "the apostle of the Indians," was born in Guilford, Conn., May 27, 1817. Author of "St. Domingo" (1855), a "History of New England from the Discovery of the Continent by the Northmen in 986 to 1776" (1857), besides other works.

**El'liott** (CHARLOTTE), sister to the author of the "Horæ Apocalypticæ." She has written many excellent hymns; amongst others, "Just as I am, without one plea."

**El'liott** (EBENEZER), an English poet, called the "Corn-law Rhymer," was born near Rotherham, Yorkshire, Mar. 17, 1781. He was not liberally educated, and was considered a dull boy at school. In early youth he worked in an iron-foundry, in which his father had been employed. He produced in 1798 "The Vernal Walk," a poem. After he had worked for many years in the foundry, he married, and removed in 1821 to Sheffield, where he engaged in the iron-trade on his own account, and was successful. His most popular poems are "The Corn-law Rhymes," which promoted the repeal of the corn laws, and were much admired. He afterwards wrote "The Village Patriarch" (1829), "Byron and Napoleon" (1831), "Love," and other poems. His works are commended for their energy and the sympathy with the poor which they exhibit. Died Dec. 1, 1849.

**El'liott** (EDWARD BISHOP), an English clergyman, was born about 1795, and educated at Cambridge. He is best known as author of the "Horæ Apocalypticæ," 4th ed. 1851; 5th ed. 1862.

**El'liott** (EZEKIEL BROWN), born in Sweden, Monroe co., N. Y., July 16, 1823, graduated at Hamilton College in 1844; was for some years a teacher, afterwards for a time superintendent of certain telegraph lines; later (1855-56) an actuary in a life insurance company in Boston, Mass.; in 1863 a member of the International Statistical Congress at Berlin; in 1871 entered the civil service reform commission. Mr. Elliott is the author of a number of important papers, among which are the following: Life, annuity, and other useful tables, based on Prussian, English, Belgian, Massachusetts, and other data, and published with the proceedings of the American Association for the Advancement of Science at its sessions in Albany, 1856, and in Montreal, 1867; a statistical report to the Sanitary Commission, made in 1862, on the mortality and sickness of the U. S. volunteers; a memoir on the "Military Statistics of the United States," published in the proceedings of the International Statistical Congress at Berlin, 1862; a second table of Prussian mortality, prepared in 1864 and published in the "Zeitschrift" of the Royal Statistical Bureau of Prussia; "Letters to the Secretary of the Treasury on the Credit of the U. S. Government, as indicated by Market-prices of its Securities," published in 1871 and 1872; life and annuity tables, based on the U. S. census of 1870, in comparison with corresponding data for other countries.

**El'liott** (JESSE DUNCAN), an American commodore, born in Maryland July 14, 1782. He gained the rank of lieutenant in 1810, and was second in command under Com. Perry at the battle of Lake Erie, in Sept., 1813. Congress voted him a gold medal for his conduct in this action. He became a captain in 1818. Died Dec. 10, 1845.

**El'liott** (JONATHAN) was born in England in 1784, emigrated to the U. S. about 1802, and fought in New Granada under Bolivar. In 1814 he went to Washington, where he was for thirteen years editor of the "Washington Gazette." He was author of "The American Diplomatic Code" (1827) and other works. Died Mar. 12, 1846.

**El'liott** (ROBERT WOODWARD BARNWELL), S. T. D. See APPENDIX.

**El'liott** (SAMUEL MACKENZIE). See APPENDIX.

**El'liott** (STEPHEN), LL.D., an American naturalist, born at Beaufort, S. C., Nov. 11, 1771, graduated at Yale College in 1791. He was professor of natural history in the medical college at Charleston, and president of the Bank of South Carolina. He wrote for the "Southern Review," and published "The Botany of South Carolina and Georgia" (2 vols., 1821-24), a work of merit. Died Mar. 28, 1830.

**El'liott** (STEPHEN), D. D., son of the preceding, and professor of sacred literature in South Carolina College, was born at Beaufort, S. C., Nov. 13, 1805. He became bishop of Georgia in 1841. Died Dec. 21, 1866.

**Elliott** (STEPHEN, JR.), a brigadier-general in the Confederate army, born at Beaufort, S. C., 1832. On the outbreak of the civil war he organized and equipped the battery known as the Beaufort Artillery. He commanded at Pinckney Island Aug., 1862, and was promoted for gallant conduct; was in command of Fort Sumter during the protracted bombardment to which it was subjected; and in 1864 was severely wounded by the mine explosion near Petersburg, which incapacitated him from further active service for the remainder of the war. In 1865 he subscribed to the oath requiring him to support the Constitution of the U. S. and his own State. Received the nomination for Congress. Died at Aiken, S. C., Mar. 21, 1866.

**Elliott** (WASHINGTON L.). See APPENDIX.

**Elliott** (WILLIAM) was born at Beaufort, S. C., April 27, 1788. He was a member of the legislature of that State, and opposed nullification in 1832. He wrote against secession about 1851, and was the author of "Fiesco," a tragedy (1850). Died in Feb., 1863.

**Ellipse** (Gr. *ἔλλειψις*, "omission" or "defect," so called because the square of the ordinate is less than, or differs in defect from, the rectangle under the parameter and abscissa), a hypotrochoid curve of the second order, one of the conic sections, found by cutting a cone by a plane passing obliquely through the opposite side of the cone. If two fixed points be taken in a plane, and a third point be conceived to move around the two fixed points in such a way that the sum of the distances of the moving point from the fixed point shall always be the same, the moving point will describe an ellipse. The fixed points are the foci of the ellipse, and a point in the same straight line with the foci, and equally distant from each, is the centre. That axis of the ellipse which passes through the foci is the transverse or major axis; an axis perpendicular to the transverse is the conjugate or minor axis.

If a moving circle roll along the concavity of the circumference of a fixed circle in the same plane, the radius of the former circle being half that of the latter, any given point in the plane of the rolling circle, within or without, will describe an ellipse. Various instruments for marking the ellipse have been devised on this principle.

**Ellis** (ALEXANDER JOHN). See APPENDIX.

**Ellis** (GEORGE EDWARD), D.D., LL.D., a Unitarian minister and author, born in Boston Aug. 3, 1814, graduated at Harvard in 1833. He was ordained pastor at Charlestown about 1838. He wrote for Sparks's "American Biography" lives of William Penn and others. In 1857 he became professor of theology in the Divinity School at Cambridge. Among his works is a "Half Century of the Unitarian Controversy" (1857).

**Ellis** (HARVEY W.) was born in Kentucky. He settled in Tuscaloosa, Ala., where he was repeatedly elected to the legislature of that State. He died in 1842.

**Ellis** (THEODORE G.), born in Boston, Mass., in 1830, began business as a civil engineer in New England, was subsequently engaged in mining surveys in Mexico, and in 1861 settled in Hartford, Conn. In 1862 he accompanied the Fourteenth Connecticut Volunteer regiment to the battle-field as its adjutant, and was breveted a brigadier-general for his bravery. He was a member of the American Society of Civil Engineers, and its president from 1873 to 1877. At the time of his death (1884) he had charge of the government works on the Connecticut River.

**Ellisville**, on R. R., capital of Jones co., Miss. (see map of Mississippi, ref. 8-G, for location of county), on the Tallahalla River, 132 miles N. E. of New Orleans. Pop. in 1880, 37.

**Ellore**, *ἑλλορ*, a town of India, presidency of Madras, 38 miles N. of Masulipatam, is a British military station. It is reported to be populous. The climate is unhealthy.

**Ellora**, Hindostan. See ELORA.

**Ellsworth**, city, capital of Ellsworth co., Kan. (see map of Kansas, ref. 5-E, for location of county), is on R. R., 223 miles from Kansas City and 415 miles from Denver. It is one of the leading markets for Texas cattle in the State, not less than 150,000 head being distributed from this point every year. It has a brick school-house costing \$20,000. The country adjoining is unsurpassed for grazing. Pop. in 1880, 929.

**Ellsworth**, on R. R., a city and port of entry, capital of Hancock co., Me. (see map of Maine, ref. 8-E, for location of county), on the navigable Union River, 2 miles from its mouth and 30 miles S. E. of Bangor. Several bridges cross the river here. Its trade is considerable, and its main industries are lumbering, shipbuilding, and coeage. It has fifteen saw-mills, two steam-mills, and a public library. Pop. in 1870, 5257; in 1880, 5052.

**Ellsworth**, capital of Pierce co., Wis. (see map of

Wisconsin, ref. 4-A, for location of county), 40 miles S. E. of St. Paul, Minn., has a steam saw-mill and a stave-mill. Pop. in 1880, 432.

**Ellsworth** (EPHRAIM ELMER), an American officer, born in Mechanicsville, Saratoga co., N. Y., April 23, 1837, became a resident of Chicago. He organized a well-disciplined body of Zouaves before the civil war, and in Mar., 1861, he escorted President Lincoln to Washington. In April he became colonel of a Zouave regiment of New York firemen. When the government troops (May 24, 1861) took possession of the shores of the Potomac (including the city of Alexandria) opposite Washington, to Col. Ellsworth's regiment was assigned the seizure and occupation of that city. Observing a secessionist flag flying over the "Marshall House" (a hotel kept by one Jackson), he ascended to the roof himself and took it down. Descending with it in his hand, he was met and shot dead by the innkeeper, who immediately encountered a similar fate from the attendant soldiers.

**Ellsworth** (HENRY LEAVITT), born at Windsor, Conn., Nov. 10, 1791, graduated at Yale in 1810, and studied law at Litchfield. He resided mostly in Connecticut, but was for some time a resident commissioner of the U. S. with the South-western Indians, and from 1845 to 1857 lived in Lafayette, Ind. He was (1836-45) U. S. commissioner of patents. He published a series of valuable agricultural reports from the patent office; also a "Digest of Patents" (1840). Died Dec. 27, 1858.

**Ellsworth** (OLIVER), LL.D., chief-justice of the U. S., was born in Windsor, Conn., April 29, 1745, and graduated at Princeton in 1766. He studied law, was admitted to the bar in 1771, and elected a delegate to the Continental Congress in 1777. In 1784 he was appointed a judge of the superior court, and in 1787 was a member of the convention which framed the Federal Constitution. Having joined the Federal party, he was elected in 1789 to the Senate of the U. S., in which he gained distinction as a debater and supported Washington's administration. He was appointed chief-justice of the Supreme Court by Washington in 1796. In 1799 he was sent as envoy extraordinary to Paris, where he and his colleagues negotiated a treaty with France. He resigned the office of chief-justice in 1800. Died Nov. 26, 1807.

**Ellsworth** (WILLIAM WOLCOTT), LL.D., was born at Windsor, Conn., Nov. 10, 1791, and graduated at Yale in 1810, became a lawyer, was professor of law in Trinity College, Hartford, Conn. (1827-68), member of Congress (1829-33), governor of Connecticut (1838-42), and a justice of the State supreme court (1847-61). Died at Hartford Jan. 15, 1868.

**Ell'wangen**, a town of Württemberg, on the Jaxt, 45 miles E. N. E. of Stuttgart. It has a cathedral, a castle, a hospital, and a gymnasium; also tanneries and bleach-works. Pop. in 1881, 4392.

**Ell'wood** (THOMAS), an English writer, born in Oxfordshire in 1639, was a minister of the Society of Friends. His friend Isaac Penington procured for him in 1662 the position of reader to the poet Milton, who was then blind and lived in London. "I went," says Ellwood, "every day in the afternoon (except on the first days of the week), and sitting by him in his dining-room, read to him in such books in the Latin tongue as he pleased to hear." After he had passed six weeks in this occupation, Ellwood went to the country for the sake of his health, which was impaired. He visited Milton at Giles-Chalfont in 1665, when the poet showed him the manuscript of "Paradise Lost," and requested him to take it home and read it. On returning the manuscript, Ellwood suggested to Milton the idea of "Paradise Regained," by asking, "What hast thou to say of Paradise Found? He made no answer, but sat some time in muse." Among Ellwood's works are a "Sacred History" (1705), a poem called "Davidis" (1712), and "Memoirs of his own Life" (1714). Died Mar. 1, 1713.

**Elm** [Lat. *ul'mus*; Ger. *Ul'me*; Fr. *orme*], a genus of trees of the order Ulmaceae, natives of Europe and North America, with alternate serrate leaves, which are oblique or unequally heart-shaped at the base. The ovary is 2-celled, with a single anatropous ovule. The fruit is a 1-celled membranaceous samara, winged all round. This genus comprises numerous species, five or more of which are indigenous in the U. S. The most remarkable of these is the *Ul'mus Americana* (white or American elm), a large ornamental tree, usually with spreading branches and drooping, pendulous boughs. It grows rapidly, often attains the height of 100 feet, and is considered one of our most noble and beautiful forest trees. Its favorite habitat is in moist woods where the soil is rich, and in the vicinity of rivers and creeks. The trunk sometimes ascends without branches fifty or sixty feet, and then separates into a few primary limbs, which gradually diverge and present

long arched pendulous branches floating in the air. The wood of this tree is used for making hubs of wheels. Another species native of the U. S. is the slippery elm (*Ulmus fulva*), a smaller tree with a very mucilaginous inner bark, which is used in medicine as a demulcent. Among the important trees of this genus is the common English elm (*Ulmus campestris*), which grows in many parts of Europe, and is extensively planted in Great Britain. It is one of the chief ornaments of English scenery. The wood of this tree is compact, fine-grained, very durable in water, and is used for various purposes by wheelwrights, machinists, joiners, and shipbuilders. It has a mucilaginous bark, which is esteemed as a medicine. The *Ulmus montana*, or wych elm, is a native of Scotland, and a tree of rapid growth, valuable for timber, which is used for the same purposes as the English elm. Europe also produces the cork-barked elm (*Ulmus suberosa*), a tall tree extensively planted in England, and named with reference to the corky ridges or wings on its branches. A valuable fine-grained wood is obtained from the *Ulmus alata*, winged elm or wahoo, which grows wild in the Southern U. S.

**El Mahdi.** See MAHDI, EL.

**Elmer** (LUCIUS Q. C.), LL.D., born at Bridgeton, N. J., in 1793, graduated at Princeton in 1824, was a prominent lawyer and State politician, a member of Congress from New Jersey (1843-45), attorney-general of the State (1850-52), and a judge of the State supreme court (1852-59). He published a "Digest" of New Jersey laws (1838). Died Mar. 11, 1883.

**Elmhurst**, on R. R., Du Page co., Ill. (see map of Illinois, ref. 2-G, for location of county), 16 miles W. N. W. of Chicago. Pop. in 1870, 329; in 1880, 723.

**Elmi'na**, a fortified town and seaport of Africa, the former capital of the Dutch possessions on the Guinea coast, is in lat. 5° 5' N., and lon. 1° 23' W. It is defended by a strong fort. Elmina was taken from the Portuguese by the Dutch in 1637. Pop. estimated at 15,000. On April 6, 1872, it was ceded, with the Dutch possessions in Guinea, to Great Britain. In 1873 it was burned by the British troops on account of its sympathy with Ashantee.

**Elmira**, a city and R. R. centre, capital of Chemung co., N. Y. (see map of New York, ref. 6-F, for location of county), 274 miles by rail N. W. by W. of New York City. It is on the Chemung River, and is the largest city in that part of the State. There is one rolling-mill and one blast-furnace, each with \$1,500,000 capital, and in full operation; one woollen-mill, ten shoe-and-boot factories, three iron-foundries, a manufactory of steam fire-engines, besides machine-shops and other like industries, including the large shop of the Pullman Car Company for the manufacture and repair of cars. The large shops of the Erie R. R. and the principal shops of the Northern Central R. R. are situated here. The census of 1880 shows 263 manufactories; capital, \$2,698,762; average number of hands employed, 2728; wages paid, \$1,024,161; value of products, \$4,877,300. The State Reformatory is an imposing structure. The Elmira Female College (Presbyterian) is large and well endowed. The public-school system is excellent. Many of the school-houses are very fine. The city has a fine court-house, a jail, a water-cure, a surgical institute, an orphans' home, a home for the aged, an industrial school, etc. There are a steam fire department, street railways, and water-works with a storing reservoir holding 120,000,000 gallons of water. The future of the city is full of promise. Its trade with the surrounding country is very extensive. The township, outside of the city, is very fertile and has several stone-quarries. The city was incorporated in 1865. It was during the late civil war a great recruiting rendezvous, and immense barracks were erected here, which have since been removed. It was also the site of a military prison, where many Confederate prisoners were confined. Pop. in 1870, 15,863; in 1880, 20,511. ED. OF "ADVERTISER."

**Elmore**, Ottawa co., O. (see map of Ohio, ref. 1-E, for location of county), on R. R. and Portage River, 20 miles from Lake Erie, and 16 miles S. E. of Toledo. Pop. in 1870, 1131; in 1880, 1044.

**Elmore** (FRANKLIN HARPER), an American lawyer and financier, born in South Carolina in 1799. He became a member of Congress in 1837, and president of the Bank of the State of South Carolina in 1840. He was elected to the U. S. Senate in 1850, and died May 29 of the same year.

**Elmore** (RUSH), a son of Gen. John Elmore, was educated for the bar, served in the Mexican war, and was, in 1854, by President Pierce, appointed a judge of the U. S. court in Kansas. He died during the war.

**El'mo's Fire, Saint** [*Elmo* is an Italian form of the name *Elijah*], an electrical light which at sea sometimes attaches itself to the ends of masts and spars. When two

such lights are seen it is called Castor and Pollux, and is considered by sailors a sign of fair weather and good luck; one ball of light, called Helena, is regarded as a bad omen.

**Elms'horn**, a town of Germany, in the Prussian province of Sleswick-Holstein, on the river Krückau and on the Kiel and Altona Railway, about 22 miles N. W. of Hamburg. It has an active trade in grain and manufactures of shoes, etc. Pop. in 1881, 7956.

**Elm'wood**, on R. R., Peoria co., Ill. (see map of Illinois, ref. 4-D, for location of county), 163 miles S. W. of Chicago. Pop. in 1870, 1476; in 1880, 1504.

**Éloge**, *á'lozh'*, a French term signifying "eulogy," is applied in France to the panegyric orations pronounced in honor of eminent deceased persons, and particularly of members of the French Academy and Institute. The duty is now performed by the new member elected as the successor of the deceased. Fontenelle was one of the first who excelled in this species of composition.

**Elonga'tion** [from the Lat. *e*, "out," and *longus*, "long"], in astronomy, is the apparent angular distance of a planet from the sun. The greatest elongation of Mercury amounts to about 28° 30', that of Venus to about 47° 48', and that of the superior planets may have any value up to 180°.

**El'oquence** [Lat. *eloquentia*; *e*, "out," and *loquor*, to "speak"] is the expression of thought or emotion in such a manner as to produce conviction or corresponding emotion in others. The term was originally applied to public speaking alone, but the rules for that art being generally applicable to writing, it was used in a wider sense. In Greece in the age succeeding Pericles arose a school of rhetoricians, who sought to graft upon eloquence the subtleties of logic. Gorgias and Isocrates belonged to this school, and in this age Grecian eloquence attained its highest perfection in Demosthenes. Soon after this it declined rapidly, and the names of Athenæus and several others have been preserved from oblivion chiefly by the writings of Longinus. When the liberal arts began to flourish at Rome by the exertions of Greeks, the senate in the year of the city 592 decreed the banishment of all rhetoricians. But the Romans a few years later were so charmed with the eloquence of Carneades, Diogenes, and Critolaus, the ambassadors from Athens to Rome, that they made the study of oratory part of a liberal education.

**Elo'ra or Ellora**, a decayed town of Hindostan, near Dowlatabád; lat. 20° 5' N., lon. 75° 13' E. Here are numerous remarkable cave-temples, which surpass in magnitude all others in India, and are adorned with statues and other sculptures. Besides the cave-temples hewn out in the slope of a rocky hill, there are vast edifices or pagodas carved out of solid granite hills, so as to form magnificent monoliths, having an exterior as well as interior architecture, richly decorated. They are among the most stupendous monuments ever raised by man. The most remarkable of these is the temple called *Kailasa*, which is about 145 feet long and 100 feet high, and is supported by four rows of pilasters with colossal elephants beneath. In the court which surrounds the temple of Kailasa are several obelisks, sphinxes, and colonnades. Many mythological figures are carved on the walls. The date of the construction of these temples is not known. According to Mr. Fergusson, they were executed not later than 200 B. C. (See Fergusson, "Handbook of Architecture.")

**El Paso**, a city and R. R. junction of Woodford co., Ill. (see map of Illinois, ref. 4-E, for location of county), 17 miles N. of Bloomington and 33 miles E. of Peoria. A coal-shaft has been sunk here. Two large mills, five grain-elevators, one carriage-manufactory, and two agricultural-implement works are among the business industries of the place. Pop. in 1870, 1564; in 1880, 1390.

**El Paso**, R. R. junction, cap. of El Paso co., Tex. (see map of Texas, ref. 3-B, for location of county), on the Rio Grande, near lat. 31° 42' N. Near this place the river passes through a gap in a mountain called El Paso del Norte ("North Pass"), which is the chief thoroughfare between Mexico and New Mexico. Pop. in 1880, 736.

**El Pa'so del Nor'te** ("the pass of the north"), a fertile valley in the Mexican state of Chihuahua, on the Rio Grande, about 350 miles S. by W. from Santa Fé. Here are produced wine and brandy, which are called Pass wine and Pass brandy.

**Elphinstone** (Hon. MOUNTSTUART), a British historian, born in 1778, was a younger son of Lord Elphinstone. He was sent as ambassador to the court of Cabool in 1808, and became governor of Bombay in 1819. Bishop Heber expressed the opinion that he was "in every respect an extraordinary man," and that his Indian policy was wise and liberal. Mr. Elphinstone resigned in 1827, and returned to

England. He published an "Account of the Kingdom of Cabool" (1815) and a "History of India: the Hindoo and Mohammedan Periods" (2 vols., 1841), both of which are highly esteemed. Died Nov. 20, 1859.

**El Rosario**, a town of the Mexican state of Cinaloa, 55 miles E. of Mazatlan. Here were rich gold-mines, which are no longer worked. It is an entrepot of trade between Mazatlan and the interior. Pop. 5000.

**Elsass** [*i. e.* "the country of the Sassen" (settlers) on the Ill; Lat. *Alsotia*; Fr. *Alsace*], now a part of the German empire, but for centuries an apple of contention between France and Germany, the French always trying to push their eastern frontier to the Rhine as the natural boundary line, and the Germans to prevent them, is bounded on the E. by the Rhine, on the S. by Switzerland, and on the W. by the Vosges Mountains, which separate it from France. Area, about 3350 square miles. It was ceded to France by the emperor of Austria in 1648, and became a province of that country. After the division of France into departments, about 1790, it formed the departments of Haut Rhin and Bas Rhin (Upper and Lower Rhine), which in 1866 contained a population of 1,119,255. Chief towns, Strasburg, Colmar, and Mülhausen. After the German armies had defeated and captured Napoleon III. in 1870, Bismarck and his king insisted on the annexation of Elsass to Germany as one of the conditions of peace. The French therefore continued to fight for it, but at last they were compelled to cede it (with the exception of the fortress Belfort and its *rayon*) by the treaty of May 10, 1871. The total population, according to the census of 1871, was 1,059,279, a decrease of about 60,000 since 1866.

**Elsasser** (F. A.), a German landscape-painter, born in 1810, went to Italy in 1832, where he lived chiefly in Rome. Italian history and scenery form the subjects of his most celebrated works, among which are "The Campo Santo near Pisa by Moonlight," "The Siren Grotto in Tivoli," and "The Imperial Palace in Rome." Died in 1845.

**Elsass-Lothringen** [Fr. *Alsace-Lorraine*], the name of a new German country formed of those portions of Alsace and Lorraine which in 1871 were ceded by France to Germany. It has not been annexed to any particular German state, but it is a Reichsland (imperial land), immediately subject to the emperor. Area, 5580 square miles. It is divided into three districts (Bezirke)—Ober-Elsass, Unter-Elsass, and Lothringen. The first corresponds to the former French department of Haut Rhin, the second to the former French department of Bas Rhin, while the third contains all the territory which has been ceded of the French departments of Moselle, Meurthe, and Vosges. The districts have been subdivided into circles (Kreise), which in extent do not correspond to the former French arrondissements. Ober-Elsass contains seven, Unter-Elsass eight, and Lothringen eight circles. Pop. 1,564,670.

It is estimated that about six-sevenths of the population (about 1,340,000) speak the German language, and 210,000 French. Of the latter, 180,000 belong to Lothringen, and 15,000 to Ober-Elsass and Unter-Elsass each. About 81 per cent. of the population belongs to the Roman Catholic religion, which in Elsass-Lothringen is more predominant than in any other German state; Bavaria, the next in order, numbering only 71 per cent. of Catholics. The legislative functions are exercised by the German Reichstag, in which Elsass-Lothringen will, until Jan. 1874, not be represented. At the head of the administration is an Oberpräsident, who is subordinate to the imperial chancellor; the imperial chancery has a special division for the affairs of Elsass-Lothringen. The revenue and expenditure amounted for 1883 to 46,830,713 marks each. The new country is as yet without a public debt. At the time when the country was ceded to Germany 770 kilometers (1 kilometer = 0.62 English miles) of railroads were in operation, which, with a few exceptions, belonged to the Société des Chemins de Fer de l'Est, from which the German empire bought them for 325,000,000 francs. The navigable rivers are the Rhine, Ill, Moder, Saar, and Moselle. The soil is fertile, and rich in mines of iron, copper, and coal. The chief productions of the soil are grain, wine, beet-root, tobacco, madder, and linseed. Mülhausen (Mulhouse) is the seat of important manufactures of cotton prints, muslins, flowered silk stuffs, linen damasks, etc. Capital, Strasburg.

**El-Seewah** (anc. *Ammonium*), the most northerly of the five Egyptian oases, about 440 miles W. N. W. of ancient Thebes. It is six miles long and three broad. The oasis abounds in salt and alum, which were anciently exported in great amount. Dates, pomegranates, and other fruits are produced in surprising quantities. Sheep and cattle are bred in great numbers. It abounds in fresh-water springs, and is in part rather marshy. The ruins of the

temple of Ammon and of other ancient buildings are still in existence. Pop. about 8000. Chief town, Kebir.

**Elsheimer** (ADAM), a skilful German landscape-painter, born at Frankfurt-on-the-Main in 1574, was called *Le Tenebro* (*i. e.* "the German") by the Italians. He worked in Rome, where he died in 1620. His works are highly finished. He excelled in chiaroscuro. He studied nature and painted after nature. All people wondered that after visiting a town once he could paint it, not forgetting a single tree or omitting any striking architectural feature. He died, however, in want.

**Elsinore** [Dan. *Helsingör*], an old and interesting town and seaport of Denmark, is on the island of Seeland and on the western shore of the Sound (here only 2½ miles wide), 24 miles N. by E. of Copenhagen; lat. 56° 2' N., lon. 12° 37' E. It is defended by the castle of Kronborg, which commands the Sound at its narrowest part. It has a cathedral, a custom-house, and a royal palace called Marienlist, from which is obtained a magnificent view of the Sound and of Helsingborg in Sweden. At Elsinore the Sound dues were formerly collected from foreign vessels navigating the Sound. It has an active trade, and some manufactures of arms, brandy, hats, etc. Here was laid the scene of Shakespeare's "Hamlet," and a mile from the city Hamlet's grave is shown. Pop. 8379.

**El'ssler** (FANNY), a German dancer, born at Vienna in 1811. She performed with success in Berlin, Paris, and London. With her sister Therese, who was also a danseuse, she visited the U. S. in 1841. She retired from the stage with a large fortune in 1851. D. Nov. 28, 1884. Her sister Therese was united in morganatic marriage with Prince Adalbert of Prussia in 1850, and was made *Frei-frau von Barmm* by the king in the same year. D. 1878.

**El'ster, Black**, a river of Germany, rises in Saxony, flows north-westward, and enters the Elbe 8 miles E. of Wittenberg. Length, 105 miles.

**Elster, White**, a river of Germany, rises near the north-western frontier of Bohemia, flows northward, and after a course of 110 miles enters the Saale 3 miles S. of Halle (Prussia).

**El'ton**, a shallow saline lake of Russia in the basin of the Caspian, government of Astrachan, about 49° 15' N. lat., and 46° 30' E. lon., 150 miles S. E. of the town of Saratof. It is 14 miles long, and has an area of 78 square miles. About 100,000 tons of salt are annually procured from it. In the summer it presents an appearance as if it were covered with snow.

**El'ton** (ROMEO), D.D., LL.D., was born at Bristol, Conn., in 1790, and graduated at Brown University in 1813. He was ordained as a Baptist minister in 1817, and was (1825-43) professor of ancient languages in Brown University. He resided for a time in England (1845-69). He published sermons, biographical works, etc. Died Feb. 5, 1870, leaving \$20,000 to Brown University, and the same amount to Columbian College, D. C.

**Elutria'tion** [from the Lat. *elutrio*, *elutria'tum*, to "cleanse"], the process of preparing earths and pigments by washing them in large quantities of water, so that the heavier particles sink to the bottom, and the finer particles, remaining longer suspended, are gradually deposited. This operation is a very important one in preparing clay for the porcelain manufacture and some ores of iron and other metals for the furnace. The apparatus used for this purpose is a vat in which grinding wheels revolve, and into which a stream of water flows, but there are many special adaptations of the process.

**El'vas** [Sp. *Ilheas* or *Yelvas*], a fortified frontier city of Portugal, in the province of Alemtejo, is about 125 miles E. of Lisbon and 12 miles W. of Badajoz (Spain). It stands on a steep hill, is enclosed by walls, and is said to be the strongest fortress in Portugal. It contains many antique Moorish buildings, also a cathedral, several convents, a theatre, an arsenal, and a college. Elvas is supplied with water by a large Moorish aqueduct with several tiers of arches rising to the height of 250 feet. Its bishop is a suffragan of the archbishop of Evora. Pop. 11,088.

**Elves**. See **ELF**.

**Ely**, *ce'le*, an episcopal city or cathedral town of England, is in the country of Cambridge, and on the river Ouse, 72 miles N. N. E. of London and 16 miles N. N. E. of Cambridge. It is situated in the fen country called the Isle of Ely. A monastery was founded here in 670, but it was destroyed by the Danes in 870 and not restored till a century later on, by Bishop Ethelwald of Winchester. Henry I. elevated Ely into a bishopric in 1107; and when the monasteries were dissolved, under Henry VIII., the conventual church was transformed into a cathedral. So far as the interior is concerned, it is one of the most beautiful



of English cathedrals, but its exterior makes a somewhat unquiet and half-finished impression, on account of the singular mixture of various styles of architecture which it displays. The nave, which was completed in the middle of the twelfth century, is Late Norman. The galilee, or western porch, which was erected by Bishop Eustace (1198-1215) is Early English. The choir was originally Early Norman, but its Norman apse was pulled down and the church extended eastward by six more arches, in the middle of the thirteenth century. The lady-chapel was begun by Bishop Hotham, who also rebuilt the Norman tower, much enlarged, in the form of an octagon, and crowned with a lofty lantern. The tower, as well as the lady-chapel, was designed by Alan of Walsingham. The total length of the whole structure from E. to W. is 525 feet; the height of the western tower is 220 feet. Another fine building is Trinity church, a handsome structure founded in 1321. Ely contains many interesting monuments. Pop. in 1881, 8171.

**Ely, Isle of**, a level, fenny tract of England, in Cambridgeshire, is the southern part of the Bedford Level. It is bounded on the S. by the river Ouse. It was formerly in great part covered with water, but has been drained and reclaimed by numerous canals and ditches. Aquatic birds and marsh plants abound here. The soil is fertile, and produces good crops of hemp, flax, wheat, oats, etc.

**Ely** (SMITH, JR.). See APPENDIX.

**Elyria**, R. R. centre, capital of Lorain co., O. (see map of Ohio, ref. 2-G, for location of county), is beautifully situated at the confluence of the E. and W. branches of Black River, 25 miles W. of Cleveland and 7 miles S. of Lake Erie. It has a public library, telegraph college, a gas-factory, and valuable water-power. The manufacturing and sale of cheese, grindstones, building-stone, tobacco, confectionery, and screws are the chief businesses. Pop. in 1870, 3038; in 1880, 4777.

**Elysium**, or **The Elysian Fields** [Gr. *ἡλύσιον πεδῖον*; Fr. *Élysée* or *Champs Élysées*], in classic mythology, the place to which the souls of the virtuous were supposed to be transported after death. Elysium was variously represented as a part of Hades or as an island in the Western Ocean. Some of the ancients imagined that the kingdom of Pluto was divided into two regions—Tartarus, in which the wicked were punished, and Elysium, the abode of the good.

**El'ze** (KARL FRIEDRICH), a German philologist, born in 1821, became professor at the gymnasium in Dessau. He wrote, among other works, "The English Language and Literature in Germany" (1864), "Sir Walter Scott" (1864), "Lord Byron" (1867), and published editions of English and American authors. He also edits (since 1868) the "Yearbook" of the German Shakespeare Society.

**El'zevir**, or **Elzevir**, the name of a family of Dutch printers who lived at Amsterdam, Leyden, and other places, and were celebrated for the accuracy and beauty of their typography. They published excellent editions of several classic authors between 1583 and 1681. The first eminent printer of the family was Lewis or Lodewijk, who was born about 1540. He lived at Leyden, and died about 1617, leaving four sons—Matthew, Lewis, Gilles (or Ægidius), and Bonaventure, who were all publishers. The business was continued by Abraham, a son of Matthew, and his partner Bonaventure, who published duodecimo editions of the classics which are still highly prized for their beauty and correctness. The Greek New Testament is among their masterpieces. A press was established in Amsterdam in 1638 by Lewis Elzevir (a grandson of Lewis first mentioned), who published good editions of numerous authors. Several other members of the family were distinguished printers.

**Emanation** [from the Lat. *e*, "out," and *ma'no*, *manatū*, to "flow"], in the religions of India, of ancient Persia, in Neo-Platonism, and in Gnosticism, a theory of ontology and of cosmogony which ascribes the origin of the universe and of all inferior beings to an outflow from the Deity. The name has also been applied to the good and evil influences which the heavenly bodies were formerly believed to send forth, and which were thought to determine the destinies of men.

**Emancipation** [from the Lat. *eman'cipo*, *emancipa'tum*, to "liberate" (from *e*, "from," and *mancip'ium*, a "slave")], the act of freeing from subjection of any kind. In Roman law a son was regarded as the slave of his father, and could by a fiction of that law be freed by being sold (*mancipatus*) three times by the father. This enfranchisement was termed emancipation. Different modes of emancipation were afterwards recognized by Roman jurisprudence. In countries where that law prevails the word signifies the exemption of the son from the power of the father,

either by express act or implication of law. By the civil law of France, majority (and emancipation) are attained at twenty-one, and a minor is emancipated by marriage. The word emancipation is used in a general sense to signify the liberation of a slave, or the admission of certain classes to the enjoyment of civil rights, as CATHOLIC EMANCIPATION (which see).

**Emancipation, Proclamation of**, the most important document ever issued by a President of the U. S., was issued by President Lincoln Sept. 22, 1862, as a notice to the Confederates to return to their allegiance, emancipation being proclaimed as a result which would follow their failure so to return. The real Proclamation of Emancipation was the supplementary document of Jan. 1, 1863. This act was simply a war-measure, based solely upon the President's authority as commander-in-chief of the army and navy.

#### PROCLAMATION OF EMANCIPATION.

I, Abraham Lincoln, President of the United States, and Commander-in-chief of the Army and Navy thereof, do hereby proclaim and declare that hereafter, as heretofore, the war will be prosecuted for the object of practically restoring the constitutional relation between the United States and the people thereof in those States in which that relation is, or may be, suspended or disturbed; that it is my purpose upon the next meeting of Congress to again recommend the adoption of a practical measure tendering pecuniary aid to the free acceptance or rejection of all the Slave States, so called, the people whereof may not then be in rebellion against the United States, and which States may then have voluntarily adopted, or thereafter may voluntarily adopt, the immediate or gradual abolishment of Slavery within their respective limits, and that the effort to colonize persons of African descent, with their consent, upon the continent or elsewhere, with the previously obtained consent of the government existing there, will be continued; that on the first day of January, in the year of our Lord one thousand eight hundred and sixty-three, all persons held as slaves within any State, or any designated part of a State, the people whereof shall then be in rebellion against the United States, SHALL BE THEN, THENCEFORWARD, AND FOR EVER FREE; and the military and naval authority thereof will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for actual freedom; that the Executive will, on the first day of January aforesaid, by proclamation, designate the States and parts of States, if any, in which the people thereof respectively shall then be in rebellion against the United States; and the fact that any State, or the people thereof, shall on that day be in good faith represented in the Congress of the United States by members chosen thereto, at elections wherein a majority of the qualified voters of such State shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such State and the people thereof have not been in rebellion against the United States.

That attention is hereby called to an act of Congress entitled "An act to make an additional article of war," approved March 13, 1862, and which act is in the words and figures following:

"Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That hereafter the following shall be promulgated as an additional article of war for the government of the Army of the United States, and shall be observed and obeyed as such:

"ARTICLE —. All officers or persons of the military or naval service of the United States are prohibited from employing any of the forces under their respective commands for the purpose of returning fugitives from service or labor who may have escaped from any persons to whom such service or labor is claimed to be due; and any officer who shall be found guilty by a court-martial of violating this article, shall be dismissed from the service.

"Sec. 2. And be it further enacted, that this act shall take effect from and after its passage."

Also to the ninth and tenth sections of an act entitled "An act to suppress insurrection, to punish treason and rebellion, to seize and confiscate property of Rebels, and for other purposes," approved July 17, 1862, and which sections are in the words and figures following:

"Sec. 9. And be it further enacted, that all slaves of persons who shall hereafter be engaged in rebellion against the Government of the United States, or who shall in any way give aid or comfort thereto, escaping from such persons and taking refuge within the lines of the army; and all slaves captured from such persons or deserted by them, and coming under the control of the government of the United States, and all slaves of such persons found on (or being within) any place occupied by Rebel forces and afterwards

occupied by the forces of the United States, shall be deemed captives of war, and shall be for ever free of their servitude and not again held as slaves.

"Sec. 10. And be it further enacted, that no slave escaping into any State, Territory, or the District of Columbia, from any of the States, shall be delivered up, or in any way impeded or hindered of his liberty, except for crime or some offence against the laws, unless the person claiming said fugitive shall first make oath that the person to whom the labor or service of such fugitive is alleged to be due, is his lawful owner, and has not been in arms against the United States in the present rebellion, nor in any way given aid or comfort thereto; and no person engaged in the military or naval service of the United States shall, under any pretence whatever, assume to decide on the validity of the claim of any person to the service or labor of any other person, or surrender up any such person to the claimant, on pain of being dismissed from the service."

And I do hereby enjoin upon, and order all persons engaged in the military and naval service of the United States to observe, obey, and enforce within their respective spheres of service the act and sections above recited.

And the Executive will, in due time, recommend that all citizens of the United States who shall have remained loyal thereto throughout the rebellion, shall (upon the restoration of the constitutional relation between the United States and their respective States and people, if the relation shall have been suspended or disturbed) be compensated for all losses by acts of the United States, including the loss of slaves.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this twenty-second day of September, in the year of our Lord one thousand eight hundred and sixty-two, and of the Independence of the United States the eighty-seventh.

By the President: ABRAHAM LINCOLN.  
WM. H. SEWARD, Secretary of State.

#### SUPPLEMENTARY PROCLAMATION.

Whereas, On the twenty-second day of September, in the year of our Lord one thousand eight hundred and sixty-two, a proclamation was issued by the President of the United States, containing among other things the following, to wit:

That on the first day of January, in the year of our Lord one thousand eight hundred and sixty-three, all persons held as slaves within any State, or any designated part of a State, the people whereof shall then be in rebellion against the United States, shall be thenceforward and for ever free, and the Executive Government of the United States, including the military and naval authority thereof, will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for their actual freedom:

That the Executive will, on the first day of January aforesaid, by proclamation, designate the States and parts of States, if any, in which the people thereof respectively shall then be in rebellion against the United States, and the fact that any State, or the people thereof, shall on that day be in good faith represented in the Congress of the United States by members chosen thereto at elections wherein a majority of the qualified voters of such State shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such State and the people thereof are not then in rebellion against the United States:

Now, therefore, I, Abraham Lincoln, President of the United States, by virtue of the power in me vested as Commander-in-chief of the Army and Navy of the United States, in time of actual armed rebellion against the authority and Government of the United States, and as a fit and necessary war-measure for repressing said rebellion, do, on this first day of January, in the year of our Lord one thousand eight hundred and sixty-three, and in accordance with my purpose so to do, publicly proclaim for the full period of one hundred days from the day of the first above-mentioned order, and designate, as the States and parts of States wherein the people thereof respectively are this day in rebellion against the United States, the following, to wit: Arkansas, Texas, Louisiana, except the parishes of St. Bernard, Plaquemine, Jefferson, St. John, St. Charles, St. James, Ascension, Assumption, Terre Bonne, Lafourche, St. Mary, St. Martin, and Orleans, including the city of New Orleans, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Virginia, except the forty-eight counties designated as West Virginia, and also the counties of Berkeley, Accomac, Northampton, Elizabeth City, York, Princess Ann, and Norfolk, including the cities of Norfolk and Portsmouth, and which excepted parts are, for the present, left precisely as if this proclamation were not issued.

And by virtue of the power and for the purpose afore-

said, I do order and declare that all persons held as slaves within said designated States and parts of States are, and henceforward shall be, free; and that the Executive Government of the United States, including the military and naval authorities thereof, will recognize and maintain the freedom of said persons.

And I hereby enjoin upon the people so declared to be free, to abstain from all violence, unless in necessary self-defence, and I recommend to them, that in all cases, when allowed, they labor faithfully for reasonable wages.

And I further declare and make known that such persons of suitable condition will be received into the armed service of the United States to garrison forts, positions, stations, and other places, and to man vessels of all sorts in said service.

And upon this, sincerely believed to be an act of justice, warranted by the Constitution, upon military necessity, I invoke the considerate judgment of mankind and the gracious favor of Almighty God.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this first day of January, in the year of our Lord one thousand eight hundred and sixty-three, and of the Independence of the United States of America the eighty-seventh.

By the President: ABRAHAM LINCOLN.  
WILLIAM H. SEWARD, Secretary of State.

**Emanuel I.** (THE HAPPY), king of Portugal, born May 3, 1469, died Dec. 13, 1521, ascended the throne after the death of John II., Oct. 27, 1495. Under him Portugal rose to the highest pitch of prosperity which it has ever reached. Vasco di Gama doubled the Cape of Good Hope and found the passage to India; Alvarez de Cabral discovered Brazil; and inexhaustible fields of commerce and colonization were thus opened to the Portuguese.

**Emarginate** [from the Lat. *emargino*, *emargina'tum*, to "take away the edge"], a botanical term applied to leaves which are notched or indented at the apex.

**Em'ba**, or **Jem**, a river of Asia, in Toorkistan or the Kirgheez territory. It flows south-westward, and enters the Caspian Sea. Length, about 250 miles.

**Embalming** [remotely from the Gr. *ên*, "in," and *βάλασμα*, "balm," "resin," alluding to the ancient process], the preservation of dead bodies from decay by the application of antiseptic drugs or of suitable chemical reagents. This art early attained great perfection in Egypt. It appears to have arisen from belief in a future life and in the resurrection of the body. It was practised in various ways. In the most expensive method the brain and viscera were removed, their places being filled with bitumen and aromatic substances; the body was washed in the oil or tar of cedar, bound up in linen smeared with spices, asphalt, and various gums; and the whole was placed in a solution of natron (saltpetre or sodium nitrate) for seventy days. This process cost a silver talent, nearly \$2000. The cheap methods dispensed with the evisceration, and yet many mummies (embalmed bodies) are found completely preserved by the inferior methods. It appears also that salt was freely used; and some authors believe that heat was also employed in the process. Embalming was also practised to some extent by the Jews, Assyrians, and ancient Persians, as also by the early Christians, who embalmed the bodies of some of the martyrs, probably by the simple application of aromatics. Throughout mediæval Europe rude embalming was practised upon the bodies of princes, and during the present century many improvements have been made in the process, which no longer aims at rendering bodies imperishable, but merely preserves them indefinitely. Various methods are now used. In some, arsenical liquids are injected into the blood-vessels. The chlorides of zinc, mercury, and aluminium, various other salts of aluminium, solutions of creasote from wood-tar, preparations of phenol or carbolic acid and of cresol or cresylic acid from coal-tar, etc., are successfully employed. Some of the very best methods are said to be secret.

**Embankment**, a mound of earth for a pier or quay, for defence against the sea or streams, or for carrying a roadway. In building embankments the slopes should be of a permanent nature, and the weight of the bank should not be so great as to force out the foot. The materials should be placed according to that angle at which they would begin to move if left to themselves. Gravel or hard stone may be laid at 34°, while clay is liable to slip if the materials are dressed to an angle of more than 26°. If required to resist the pressure of water on one side, the slope towards the water had better be 34°, and that towards the country 26°. The tendency of the subsoil of an embankment to be compressed under the load brought upon it

may be resisted by filling the core with light materials and by widening the base. The best way to counteract this tendency is to isolate the foundation by driving piles.

Care should be taken to free the seating of an embankment from any water that may filter through it. Covering the slopes with turf is a useful precaution, but this cannot be done when the bank is formed of gravel.

Among the greatest embankments of modern times are one of 1,750,000 yards on the Ulm and Augsburg Railway, and the Oberhäuser embankment of 2,500,000 yards cube on the Augsburg and Lindau line.

**Embar'go** [a Spanish word signifying "arrest," "impediment"], a restraint or prohibition imposed by the government of a country on merchant-vessels or other vessels to prevent their leaving its ports. Embargoes are usually imposed in time of war, or when war is believed to be impending. They may sometimes prohibit the arrival as well as the departure of vessels. In Dec. 1807, the Congress of the U. S., at the request of President Jefferson, laid an embargo as an offset or retaliation against the British "Orders in Council." This embargo was repealed by Congress in Feb., 1809. (See INTERNATIONAL LAW No. II, by Pres. T. D. WOOLSEY, S. T. D., LL.D.)

**Embassador.** See AMBASSADOR.

**Em'bassey** [for etymology see AMBASSADOR; Fr. *ambassade*; Ger. *Gesandtschaft*; Lat. *legatio*], a diplomatic mission; the function of an ambassador. In a technical or limited application, embassy signifies a mission presided over by an ambassador; that is, a diplomatic agent of the highest rank. The term is sometimes applied to a company of persons sent on a mission, including one or more envoys, secretaries, etc. The practical difference between these two kinds of diplomatic missions is absolutely nothing, but the difference in appearance and external trappings is enormous, as an ambassador actually represents the person of his sovereign, and must be treated accordingly, while the envoy is only a commissioner.

**Em'ber Week** [Lat. *quatuor tempora*, the "four seasons" (from this the English is probably a corruption); Fr. *quatre-temps*; Ger. *Quatember*; Dutch *temper*], a name given in the calendars of the Anglican and Roman Catholic churches (1) to the week after the first Sunday in Lent; (2) to the week after Whitsunday; (3) to that after the 14th of September; and (4) to that after the 13th of December. The Wednesday, Friday, and Saturday of these weeks are "ember days," fasts for imploring the Divine blessing on the fruits of the earth and upon the ordinations which are performed at these times. The fasts are said to have been instituted by Pope Calixtus I. in 229 A. D., but the times were fixed by Gregory VII., and confirmed by the Council of Placentia (1095).

**Embez'zlement**, in criminal law, is the act of fraudulently appropriating to one's own use property held under some fiduciary relation, such as that of clerk or servant. It is not to be confounded with larceny. The definition of this offence is rigid, so that this branch of the criminal law is entangled with perplexing distinctions. Larceny is defined to be "the felonious taking and carrying away the personal property of another." The word "taking," as here employed, has been closely interpreted by the courts, and generally considered not to include the case of property held in trust, particularly where it came into the possession of the trustee without first having passed into the possession of the real owner. There must have been a taking equivalent to a trespass. It became a maxim that without a trespass there could be no theft or larceny. So refined a distinction as the following has been maintained: Should a clerk or servant authorized to sell goods actually sell them, and, having received the price, convert the money to his own use, there is no larceny, because the master never had the possession of the money, and so the clerk could not be said to have "taken" it from him. On the other hand, if the clerk had put the money received on the sale into the master's money-drawer, and had afterwards fraudulently abstracted it, he would have committed larceny, for the act of depositing the money in the drawer would have placed it constructively in the master's possession. The moral quality of the two acts is substantially the same, yet by the common law the one is a crime, and the other is a simple breach of trust, for which the servant is responsible in a mere action for damages.

This imperfection in the law led, many years ago, to a statute in England, which created a new form of crime called "embezzlement." The early English statutes only included the case of misappropriation by clerks or servants of individuals or private corporations. This form of legislation was copied in this country. There is now in England a much more comprehensive scheme. (See 24 and 25 Vict., c. 96.) The present act not only includes the former cases, but embraces a great variety of cases of

breach of trust, such as that by factors, brokers, agents, trustees of charitable societies, officers of cities, and public servants generally. The range of each enactment of this kind is very comprehensive, including not only positive wrongs, but all forms of wilful or fraudulent neglect of duty. It is by no means necessary under this legislation that the officer should appropriate the funds of a city to his own use. It is enough if he fraudulently appropriates or permits them to be appropriated to any other use than that to which they rightfully belong. The punishment is severe. The crime is made a felony, punishable by not more than fourteen nor less than three years of penal servitude, or else by imprisonment at hard labor for a fixed period. In the civil law embezzlement is recognized as a wrong, subjecting him who commits it to an action for damages or other proceeding by way of reparation. A salvor may forfeit his share of salvage compensation by "embezzlement;" the forfeited share accrues, not to the other members of his class, but to the owner of the property saved.

T. W. DWIGHT.

**Emb'ioticidæ.** See APPENDIX.

**Embla'zonry**, pictures and figures on shields and coats-of-arms. Emblazoning is the art of adorning with ensigns armorial. (See BLAZONRY.)

**Em'blem** [Gr. *εμβλημα* (from *εν*, "in," and *βάλλω*, to "cast," to "put"), literally, "something inserted," Lat. *emblem'ma*; Fr. *emblème*, probably applied originally to a symbolical figure inserted in a shield or coat-of-arms], a figurative representation which by the power of association suggests to the mind some idea not expressed to the eye; a symbol; a type; thus, a balance is an emblem of justice. In bibliography, the term "book of emblems" means a book containing a series of plates or pictures of emblematic subjects, with explanations, as the poems of Jacob Cats.

**Em'blements** [Norman Fr., probably from the Fr. *blé*, "grain," with the particle *en*, "in" or "on," prefixed], a term applied to the growing crops of cereal grains and vegetables raised by a tenant. By the law of England a tenant for life, whose estate depends on an uncertain event, or other tenant is entitled to the emblements, although his lease may terminate before harvest-time. If a tenant for life die, his personal representatives may after his death claim the products of his labor. But if a term be brought to a close by the voluntary act of the tenant, he is not entitled to the emblements.

**Em'blica Officina'lis** [the generic name is of Malay origin], a species of trees of the natural order Euphorbiaceæ, is a native of India and the Malay Archipelago. It produces a small round fruit, which is very acid, has medicinal properties, and is used to make pickles. The wood is hard and valuable. The bark is used for tanning and for dyeing cotton black.

**Em'bolism** [Gr. *εμβολισμός*, from *εν*, "in," and *βάλλω*, to "throw"], in the calendar, is an intercalation of a day, as the 29th of February in leap-year, or of a lunar month, as in the Greek and Hebrew calendars.

**Embolism**, in pathology, is the presence of a clot (*em'bolus*) in the arteries or veins. Some writers also apply the name to the fixed venous clot (*thrombus*). Embolism in the brain is a recognized cause of apoplexy. An extensive embolism of the lungs may lead to sudden death; a smaller one may lead to local pneumonia, abscess, pyæmia, or gangrene. Embolism, though frequently fatal, is sometimes followed by recovery. The best treatment is the frequent administration of concentrated food and stimulants, keeping the patient in fresh air, and allaying irritation by opiates. Besides the above, some emboli appear to originate from a precipitation of pigmentary matter. Such cases are the result of disease.

**Embolite**, a chloro-bromide of silver, found in the silver ores of Mexico and Chili.

**Embos'sing** [from *boss*, a "protuberance"], in sculpture, carving, and architecture, is the forming in relief of any figure. The figures are said to be in high, middle, or low relief (*alto, mezzo, or basso rilievo*).

**Embouchure** [Fr., from *emboucher*, to "empty," literally, to "put into the mouth" or to "put the mouth to"], the mouth of a river; also that part of a wind musical instrument to which the lips of the performer are applied.

**Embra'cary**, in law, the offence of endeavoring to corrupt or bribe a jury or to influence a jury by any corrupt motive. To use indirect means to cause one's self to be chosen a jurymen is also embracery. This offence is punishable by fine and imprisonment.

**Embra'sure** [etymology doubtful], in fortification, an opening made in the parapet of a fortified place or the breastwork of a battery through which the guns are pointed. The embrasures are usually made about two feet wide at the interior extremity or neck, and half as thick as the

parapet at the exterior crest. The sole or lower surface is at the height of about two and a half feet above the platform on which the carriage of the gun is placed. The object of such embrasures is to shield as much as possible the interior of the place, and yet leave space for the free action of the gun.

**Embroidery** [from the Fr. *broder*, to "embroider," probably from the Gaelic *brod*, a "goat," "something pointed"] is the art of working figures with a needle and thread on muslin and other fabrics. Embroidery on heavy materials is generally executed with silk, wool, or gold and silver thread, and is used for banners, church vestments, furniture covers, etc. Muslin embroidery is performed mostly with cotton, and employed for collars, caps, and various other articles of apparel. Embroidery with the common needle consists usually of a combination of ordinary stitches. A machine has recently been introduced into England and the Continent by which the most complicated patterns can be accurately executed by one person with 130 needles, all moving at once. One of these machines performs daily the work of fifteen hand-embroiderers. Several kinds of sewing-machines can be used for embroidering. The art of embroidery is of very ancient origin, and was brought to great perfection by the women of Greece and Sidon. It was extensively practised in mediæval times in Europe. The women of some barbarous races, like the North American Indians, often exhibit a marked degree of skill in embroidery.

**Em'bryo** [Gr. *ἐμβρυος*, "budding inwardly," from *ἐν*, "within," and *βρύω*, to "swell like a bud" before blooming], in animal anatomy and physiology, is the immature germ of the future organism; an account of the development of which is given in the article EMBRYOLOGY.

In botany, the embryo is the rudimentary plant found in the seed of phanerogamous plants. It consists of a radicle or undeveloped stem; of one, two, or more cotyledons or future seed-leaves; and the plumule, an incipient leaf or bud at the summit of the radicle. The dodders, and perhaps a few other dicotyledonous (or more strictly exogenous) plants, have no cotyledons, but only a spirally coiled, thread-like embryo inside the albumen, with sometimes a few plumule scales. (See GERM, by W. W. BAILEY, A. M.)

**Embryology** [from the Gr. *ἐμβρυον*, "something that grows or sprouts internally," and *λόγος*, a "discourse"], the history of the development of the young animal before birth. Embryology proper includes the description of all the changes, both anatomical and physiological, which take place in the body of the imperfect young, within either the uterus or the egg, in all classes of animals. The present article, however, will be devoted more especially to the embryology of the Vertebrata, or those animals having a bony skeleton, since the general plan of development is the same throughout this class, and is particularly important as illustrating the development of the embryo in the human species.

In all cases the development of the young animal begins from an *ovum*, or egg. The ova exist originally in the interior of the body of the female parent, where they are produced in certain organs contained in the cavity of the abdomen, termed *ovaries*. The ovaries, containing ova, are thus characteristic of the female organization, and form an essential part of its original structure. The ova, after being produced in the ovaries, at a certain period arrive at maturity, and are spontaneously discharged. If fecundated at this time by the influence of the male, they become developed into embryos; if not, they lose their vitality after a short period and perish. Thus the production of the embryo depends upon the concurrence or combination of two sexual elements—namely, the ovum produced by the female, and the fecundating material or sperm produced by the male.

In some kinds of animals, such as birds, batrachians, and most of the reptiles and fishes, the egg is first discharged from the body of the female, and the development of the embryo takes place within it subsequently, the young animal being at last hatched from the egg externally; such animals are called *oviparous*, or egg-laying animals. In other instances, as in some fishes and reptiles, all the true quadrupeds, and the human species, the ova are retained within the body of the female while the development of the embryo is going on; so that at last the fully formed embryo is produced alive; such animals are called *viviparous*, because they produce living young, instead of laying eggs like the former. Nevertheless, the process is essentially the same in both cases, and differs only in the time during which the ovum is retained within the body of the female parent.

The ovum in its simplest form consists of a globular mass of albuminous matter mixed with oleaginous granules, and invested by a transparent, colorless, homogeneous membrane. The oleo-albuminous mass is termed the *vitellus*, or yolk; the investing layer is called the *vitelline membrane*.

Of these two, the vitellus is the essential part of the ovum. It is that which yields the material for the first formation of the body of the embryo. The vitelline membrane is simply a covering intended to protect the vitellus, to maintain its shape, and to regulate for a short time the absorption of fluids. The vitellus, while still remaining in the ovary, contains a delicate, transparent vesicle, termed the "germinative vesicle," marked with a minute dot, called the "germinative spot." These names have been given to the bodies in question from the idea that they might have something to do with the commencement of growth or germination of the embryo, but it is doubtful whether they have any such significance; and it is generally believed that they are rather connected with the growth and maturity of the ovum itself before impregnation has occurred.

In the human species and in the quadrupeds generally the ovum, as above described, forms a little sphere about  $\frac{1}{30}$  of an inch in diameter. It is therefore nearly invisible to the naked eye, and requires examination by the microscope in order to distinguish its characters.

In the quadrupeds this minute form and simple structure are amply sufficient, since the impregnated ovum is retained within the body of the female during the development of the embryo, and abundantly supplied with nourishment from the parent organism. But in the oviparous classes, where the development of the embryo takes place outside the body of the parent, the egg is larger in size and more complicated in structure, and contains a store of nutritious material, as well as certain additional protective envelopes. In the common fowl, for example, the vitellus or yolk, which is the only part of the egg produced in the ovary, is nearly an inch in diameter, and contains a great abundance of oleaginous as well as albuminous material. After its discharge from the ovary, and during its downward passage through the generative canal, the size of the egg is still further increased by the deposit around the yolk of a layer of pure albumen, secreted by the lining membrane of the canal, and forming the so-called "white of egg." In the lower portion of the generative passage there are added to the outside of the albumen two fibrous membranes, called the "shell-membranes;" and lastly, the calcareous shell, formed of a consolidated layer of the salts of lime. These fibrous and calcareous envelopes serve to protect the embryo, while the albumen and the yolk supply it with the requisite nourishment during its formation in the egg.

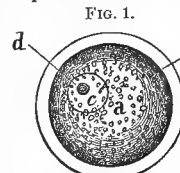


FIG. 1. Ovum of the rabbit, from the ovary, magnified 90 diameters: a, vitellus; b, vitelline membrane; c, germinative vesicle; d, germinative spot.

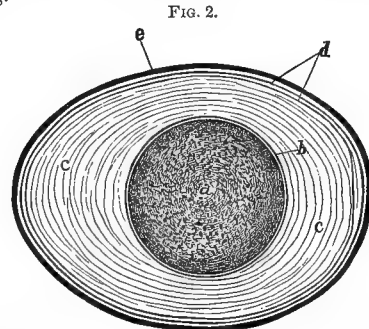


FIG. 2. a, yolk; b, vitelline membrane; c, albumen; d, shell-membranes; e, egg-shell.

In all instances, without exception, the first indication of the commencing formation of the embryo in the ovum is what is called the spontaneous division or *segmentation* of the vitellus. This process consists in the separation of the globular vitellus into two smaller globules or hemispheres by the appearance of a furrow running round the vitellus like an equator, which gradually deepens until it has completely separated the two hemispheres from each other. At the same time, or a little later, a second furrow, placed at right angles to the first, runs round the vitellus in another direction; and thus the two secondary globules are divided into four. By a repetition of this process the vitellus, which had originally the form of a simple sphere, becomes converted into a mulberry-shaped mass of minute globules, called the "vitelline spheres." These globules become condensed into the form of organized cells; and from these cells, in the simplest cases, the body of the embryo is directly formed, without the production of any accessory organs.

In the vertebrate animals the vitelline spheres, resulting from the segmentation of the vitellus, when converted into organized cells, form a cellular layer or continuous mem-

brane upon the surface of the impregnated ovum. This membrane, formed exclusively of similar flattened cells, adherent to each other by their edges, is called the *blasto-*



FIG. 3. Segmentation of the vitellus and formation of the embryo in *Ascaris acuminata*, a parasitic worm.

*dermic membrane.* It is the first appearance of a truly organized structure in the interior of the impregnated ovum, and forms the basis for the formation of the body of the embryo. In some instances, in the lower orders of the vertebrate class, where the impregnated eggs are laid in the water, and where an abundance of warmth, oxygen, and nutritious fluid is supplied by the surrounding medium—as, for example, in the frog—the subsequent process is very simple, or at least is not complicated with the formation of any accessory organs. In these cases the whole of the vitellus, and consequently the whole of the blastodermic membrane, is directly converted into the body of the embryo. The plan upon which this development takes place is as follows:

An elongated oval spot appears upon a certain part of the blastodermic membrane, where the tissue of the membrane is thicker, denser, and more opaque than elsewhere. This spot, which is the first sketch of the actual form of the future embryo, is called the *embryonic spot*. Its anterior extremity will subsequently become the head, and its posterior extremity the tail. As the cells of the embryonic spot become more numerous, smaller, and more closely amalgamated, its appearance changes towards its central portions, where, instead of being opaque, it becomes homogeneous and pellucid in appearance. The central area or space in which this change occurs is called the *area pellucida*; and finally there appears, in the middle of this transparent space, a longitudinal line or trace, indicating the position of the future spinal column, and known by the designation of the *primitive trace*.

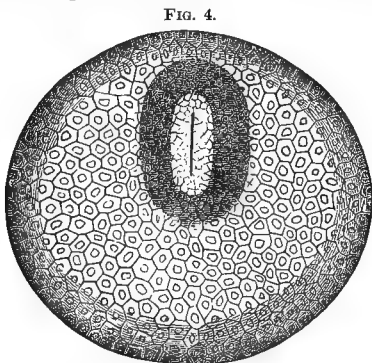


FIG. 4. Impregnated ovum of the rabbit, showing the blastodermic membrane formed of cells, the embryonic spot, the area pellucida, and the primitive trace.

In this way is determined the location of the fundamental part of the structure of the vertebrate animal, for the spinal column is the most important portion of the whole skeleton, and the formation of all the remaining parts of the body takes place with reference to it.

In every vertebrate animal the subsequent development of the body goes on simultaneously in two different directions—namely, from before backward, and from behind forward. From the edges of the primitive trace, on the right and left sides, the substance of the blastodermic membrane becomes thickened and elevated into two longitudinal and parallel ridges, which of course include between them a longitudinal furrow. These ridges are called the *dorsal plates*. As they increase in growth their upper edges approach each other, and the furrow between them becomes deeper and more like a canal. In this canal, which is still open along the back, are formed the spinal cord and the brain. But the dorsal plates, constantly approaching each other, at last meet, and unite by their edges along the median line of the back; thus converting the furrow which existed between them into a closed cavity, in which are now contained the brain and spinal cord. Thus, the dorsal plates, by their union with each other along the median line, complete the formation of the external parts of the body in

a posterior direction, and the brain and spinal cord are enclosed in an elongated cavity situated behind the column of the bodies of the vertebræ.

At the same time a similar condensation and growth extends from the edges of the primitive trace in a direction outward and forward. These growing portions are called the *abdominal plates* of the blastodermic membrane; and they continue to extend forward until they embrace the abdominal cavity in front, just as the dorsal plates embraced the spinal canal behind. At last they also unite with each other by their edges, and the external parts of the body are then cicatrized and consolidated upon the median line, both anteriorly and posteriorly. The alimentary canal and its accessory organs are thus enclosed by the abdominal plates in an abdominal cavity, situated in front of the column of the bodies of the vertebræ.

As thus far described, the process of development relates to the growth of the external portions of the body, and that part of the nervous system which corresponds with them—namely, the brain and spinal cord, and the nerves derived therefrom. The dorsal and abdominal plates, as they grow thicker and more condensed, begin to show in their substance the distinction of the various tissues. The external integument, the tissue of the voluntary muscles, the cartilages and bones, the organs of special sense, the nerves of sensation and voluntary motion, and the white and gray matter of the brain and spinal cord, are thus formed in the substance of the growing material. All the organs and tissues just enumerated, notwithstanding their different functions, are closely related to each other in one respect; that is, they are destined to bring the animal body into relation with the external world by means of sensation, consciousness, volition, voluntary movement, and the mechanical reception and expulsion of nutritious or effete materials. They are accordingly known as the “organs of animal life;” and they are all formed from the original cells of the *external layer* of the blastodermic membrane.

There is also, however, an *internal layer* of the blastodermic membrane; and from this layer are formed the alimentary canal and its glandular appendages, or the organs in which digestion, absorption, and secretion are to be carried on, and in which the muscular actions are involuntary and unconscious. They may, therefore, be regarded as the “organs of vegetative life.” The alimentary canal is at first an oval sac, enclosed on all sides by the external abdominal walls. But subsequently two openings are formed, one at its anterior and one at its posterior extremity—namely, the mouth and the anus; and the original sac is thus converted into a true canal, open at both ends. At the same time the alimentary canal grows very rapidly in the direction of its length, thus becoming converted into a comparatively long, narrow, and convoluted tube, and afterwards showing the distinctions between the œsophagus, the stomach, and the different parts of the small and large intestine.

These are the general features of the development of the embryo in all vertebrate animals. There are other details which relate to the special growth of particular parts, and to the so-called metamorphoses or transformations which take place in particular species, and which are nothing more than the successive appearance and disappearance of particular organs, which are adapted to the life of the animal at different stages of growth. Thus, in the young tadpole, when first hatched from the egg, the mouth is a round orifice provided with a suctorial apparatus and adapted for feeding on vegetable matters; respiration is entirely aquatic, and is performed by means of gills; there are no limbs, but voluntary movement is accomplished by a large and muscular tail, the animal living altogether under the surface of the water. Afterwards the mouth enlarges into a wide transverse opening, adapted for the seizure of living prey; the gills disappear and lungs are developed, while the mode of respiration changes from aquatic to aerial; and finally, anterior and posterior legs grow from the corresponding parts of the body, becoming powerful organs for both swimming and leaping, while the tail ceases to grow, becomes atrophied, and disappears. Thus, the tadpole grad-



ually acquires the organs and the appearance of a perfect frog. This change, in the case of the tadpole, is called a "transformation," because it happens after the young animal has escaped from the egg; but equally important changes take place in the embryo of the higher animals while they are still retained within the egg or in the uterus of the female parent.

Besides the essential and general features of embryonic development detailed above, there are, in all the higher classes, certain secondary or accessory organs developed during embryonic life, which will require a further description.

The first of these is known as the *umbilical vesicle*. In the process of development, as already described, the abdominal walls, growing together upon the median line, enclose directly the whole of the vitelline cavity, which subsequently, of course, becomes the cavity of the intestine. But in many of the fishes and reptiles, and in all birds and quadrupeds, the abdominal walls approach each other before they have embraced the whole of the vitellus, so that the vitelline cavity is thus separated, by a kind of constriction, into two parts. The internal part, which is fully embraced by the abdominal walls, is, as before mentioned, the cavity of the intestine; but the external part, which is left by this constriction outside the abdomen, is the *umbilical vesicle*. This name is given to it because it is really a vesicle, containing some of the remains of the vitellus, and because it still communicates with the cavity of the intestine through the umbilicus or navel. This communication is at first short and wide; but as development proceeds, the umbilical vesicle gradually retreats farther from the abdomen, while the passage of communication becomes converted into a comparatively long and narrow canal. In many of the quadrupeds and in the human species the walls of this canal even coalesce with each other at an early period, so that the umbilical vesicle then forms a separate cavity or sac, connected with the abdomen only by a slender solid pedicle. One or two minute blood-vessels run out along this pedicle, and ramify upon the surface of the umbilical vesicle. The umbilical vesicle is undoubtedly at first a reservoir of nutritious material, and remains so throughout embryonic life in all those species where the vitellus was originally of large size; but in the quadrupeds it very early loses its importance, and is superseded by other sources of nourishment. In the human subject it is difficult to distinguish it after the third month of embryonic existence.

The next accessory organ of the embryo is the *amnion*. This is a delicate and transparent membrane, which turns up from the edges of the abdominal walls over the back of the embryo, and thus envelops it in a secondary cavity. This is called the "cavity of the amnion;" the albuminous liquid which it contains, and in which the embryo is bathed, is called the "amniotic fluid." The amnion is accordingly an extension of the outer layer of the blastodermic membrane, and is continuous with the integument of the embryo. In other words, the external layer of the blastodermic membrane in these cases is developed into two different parts. That which immediately invests the body of the embryo is its integument, and part of its permanent structure; that which turns backward at the edges of the abdominal opening is the amnion, and an organ of embryonic life. The amnion at first closely embraces the body of the embryo, but afterwards it expands more rapidly, and the amniotic fluid increases in quantity, so that the young animal may move freely within its cavity when the muscular system begins to exhibit signs of activity.

The third and last accessory embryonic organ is the *allantois*. It is so called from the Greek *ἀλλας*, *ἀλλαντος*, a "sausage," because in many cases it is a sac or bag of an elongated cylindrical form. In all instances it is an outgrowth from the lower part of the intestine. It shows itself at first as a small bud or diverticulum, shaped somewhat like the finger of a glove, which protrudes from the abdominal opening in front, and then rapidly expands in every direction until it has entirely enveloped the embryo, as well as the amnion, in a second exterior covering. Its walls are exceedingly vascular, their vessels being derived from those of the intestine, of which the allantois itself is an offshoot. Thus, when the allantois has become completely formed, the external surface of the embryonic mass is a continuous vascular membrane, in which the blood-vessels of the embryo ramify in great abundance.

This anatomical feature will serve to indicate the usefulness and the function of the allantois. It is the organ of nourishment and respiration for the embryo. In the fowl's egg, the allantois, which is placed immediately underneath the calcareous shell and shell-membranes, is very active during the latter half of the period of incubation. It absorbs oxygen from the external air through the porous egg-shell, and exhales carbonic acid, thus serving to renovate and

arterialize the blood, as the lungs will do in the young chick after being hatched. In the viviparous animals, as the quadrupeds, the action of the allantois is still more important. The ovum in these animals being of minute size, without any abundant store of nutritious material, and being retained, after fecundation, within the body of the female parent, the young embryo is entirely dependent upon the maternal system both for respiration and nourishment. The vascular allantois here, enveloping the embryo, comes in contact with the vascular lining membrane of the uterus, and thus the blood-vessels of the embryo constantly absorb from the blood-vessels of the mother the substances requisite for its nourishment and growth. In many kinds of animals the allantois even contracts a more or less intimate adhesion with the lining

FIG. 5.

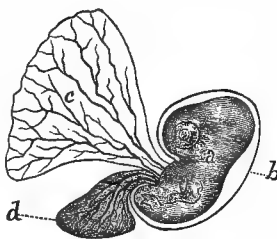


FIG. 5. Embryo of the chick on the seventh day of incubation: *a*, body of the embryo; *b*, amnion; *c*, a portion of the umbilical vesicle; *d*, commencing growth of the allantois.

contact with the vascular lining membrane of the uterus, and thus the blood-vessels of the embryo constantly absorb from the blood-vessels of the mother the substances requisite for its nourishment and growth. In many kinds of animals the allantois even contracts a more or less intimate adhesion with the lining

FIG. 6.

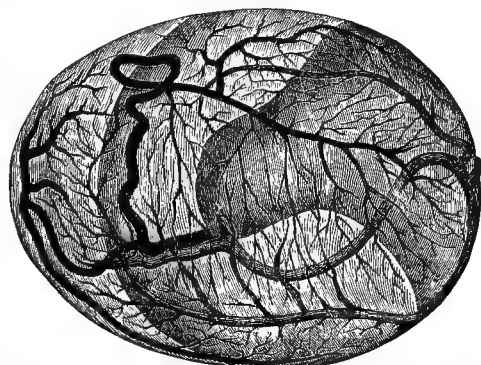


FIG. 6. Egg of fowl on the twelfth day of incubation. The shell and shell-membranes have been removed, showing the vascular allantois, which has grown so as to envelop all the remaining portions of the egg.

membrane of the uterus at particular spots, where the process of absorption and transudation is carried on with greater rapidity.

In the human species the allantois commences its growth in the same manner as in the inferior animals, but exhibits certain modifications in its subsequent development which have caused it to be known by another name. It does not present the form of an elongated cylindrical sac, but is, on the contrary, irregularly globular in form, corresponding to the shape of the cavity of the uterus in which the embryo is developed. It forms, however, a complete envelope or external tunic for the embryo, consisting of a continuous vascular membrane of more or less fibrous consistency and texture. It has accordingly received the name of the *chorion*. The human embryo, therefore, is enveloped in two distinct membranes—namely, the chorion externally and the amnion internally. Both these membranes are vascular, but the blood-vessels of the amnion are derived from the integument of the embryo, those of the chorion from the intestinal canal.

Another important modification of the human chorion is that at an early period it becomes shaggy or velvety by the growth of a multitude of minute filamentous projections or "villousities" upon its outer surface. These villousities become branched and divided, forming so many tufted filaments, by which the power and activity of absorption by the chorion is greatly augmented. Soon after the first month, however, these villousities cease their growth over about three-quarters of the surface of the chorion, which thus becomes smooth and bald, while over the remaining quarter they grow more rapidly than before, become excessively developed both in numbers and in ramification and vascularity, so that the chorion here becomes converted into a thickened and spongy mass of villousities, which are penetrated everywhere with an abundance of looped and ramifying blood-vessels. When this portion of the chorion is fully developed, it forms a distinct organ, which is known by the name of the *placenta*. The placenta, accordingly, in the human species, is the especial organ of nourishment for the embryo. It has become well developed, and easily

distinguishable from the remaining portions of the chorion, by the end of the third month of embryonic life.

The amnion and the chorion, therefore, although they are termed the "membranes" and the "appendages," are in reality a part of the body of the embryo—as much so as any other of its external or internal organs. The placenta, however, includes also a portion of the tissues of the mother; for at the same time that the chorion is becoming excessively shaggy and vascular at the spot which is afterwards to be the placenta, the lining membrane of the uterus also assumes, at the corresponding point, a similar increased development. In both cases it is the blood-vessels which preponderate over the remaining tissues, becoming adherent to each other, and mutually interpenetrating through the entire thickness of the organ. Thus, the placenta, when fully formed, is a double organ, containing both embryonic and maternal vessels, and presenting an extensive vascular surface for reciprocal absorption and exudation. There is at no time any actual communication between the cavities of the two sets of vessels, but the nutritive materials transude through the thin vascular walls, and in this way supply to the embryo everything essential to its growth.

When the development of the embryo is complete the muscular walls of the uterus contract, the membranes are ruptured, the placenta is separated from its attachments, and the whole expelled from the uterine cavity. The placenta is then no longer available as an organ of nourishment, and is cast off as a useless appendage. But in the mean time the lungs and the alimentary canal have been gradually becoming developed by internal growth, and are now capable of performing their natural functions. After birth, accordingly, the act of respiration and the absorption of nourishment are accomplished in the young infant independently by the aid of internal organs, while during embryonic life they were performed by the placenta, supplied in great part for this purpose by the blood of the mother.

J. C. DALTON.

**Em'bury** (EMMA CATHERINE), an American writer whose maiden name was MANLEY, was born in New York in 1806, and was married in 1828 to Daniel Embury, Esq., of Brooklyn. Among her works are "Guido and other Poems," "Constance Latimer, or the Blind Girl," and "Nature's Gems, or American Wild Flowers." Died Feb. 10, 1863.

**Embury** (PHILIP), recognized as the "founder of American Methodism," was born at Ballygarane, Ireland, Sept. 21, 1728 or 1729. He became a member and "local preacher" of Wesley's society at Court-Matress, Ireland. In 1760 he emigrated to New York. He began to preach there in 1766 in his own house, mostly to his own countrymen. Later he preached in an old rigging-loft, and at last erected "Old John street church." Embury, being a carpenter, worked on it himself. He built with his own hands its pulpit, and on the 30th of Oct., 1768, preached from it the dedicatory sermon of the humble structure—the first Methodist chapel of the New World. Embury afterwards settled in Salem, N. Y., in 1769, where also he founded his denomination, and where it grew into the prosperous Troy conference, and where he died Aug., 1775. His church commemorates these by a monument.

**Em'den, or Emb'den**, a fortified seaport-town of Prussia, in the former kingdom of Hanover, is on the N. shore of the Dollart, near the mouth of the Ems, about 70 miles W. N. W. of Bremen; lat. 53° 22' N., lon. 7° 12' 38" E. It is intersected by several canals, which are crossed by about thirty bridges. It is well built, and contains a handsome town-hall, an exchange, a custom-house, a gymnasium, a school of navigation, and a deaf and dumb asylum. Here are manufactures of linen fabrics, hosiery, hats, sailcloth, starch, soap, etc. The port of Emden has shallow harbors, outer and inner, but the roadstead is deep enough for large ships. Pop. in 1881, 13,667.

**Em'erald** [Gr. *σμάραγδος*; Fr. *émeraude*; Sp. *esmeralda*; Ger. *Sma'ragd*], a beautiful green precious stone, a variety of beryl, a silicate of alumina and glucina. It occurs in six-sided prisms, which are highly prized as ornamental gems. Its color, which is perhaps the most beautiful of all the varieties of green, is ascribed to the oxide of chromium that it contains. It is stated that a perfect specimen of this gem has been sold for \$5000. Its value depends chiefly on its color. The largest emeralds occur in Siberia on the river Tokowioia; one in the Royal collection weighs sixteen and three-fourths pounds Troy, another six pounds. The finest modern emeralds are found in South America, especially at Muzo in Colombia. Emeralds of inferior quality are procured at Canjargum in Hindostan, and in the Henbach Valley near Salzburg. F. Cailliaud rediscovered (about 1818), in Mount Zabarah in Upper Egypt, the emerald-mines from which the ancients obtained many emeralds. Nero, who was near-sighted, looked at the combats of

gladiators through an eye-glass of emerald, and eye-glasses of that kind were highly esteemed among the ancients. A rare green variety of sapphire is sometimes called Oriental emerald. Emerald copper is a synonym of diopside; emerald nickel for zaraitite, a compound of carbonate and hydrate of nickel, found at the chrome-mines of Texas, Pa.

**Emerald Bird of Paradise** (*Paradis'ea ap'oda*), [that is, the "footless," so called from the old fable that the



Emerald Bird of Paradise.

bird of paradise has no feet, but always flies without resting], the best known and most elegant of the birds of paradise, is a native of the Aru Islands, W. of New Guinea (Papua), where it is killed in great numbers for its beautiful plumage, which brings a high price in the market.

The skins with the plumage are used in the East for ornamenting turbans, and in Europe and America for adorning ladies' head-dresses. About 1500 or 2000 are annually imported into Europe, chiefly by way of Batavia. The back part of the neck is of a pale gold color, the throat and fore part of the richest changeable golden green, the breast a deep purple, the body and tail a fine chestnut. The body feathers are frequently dyed to improve the natural tint. The female is said to furnish the most highly prized feathers, though during life, at least, it appears that the male is by far the more splendid bird, being provided with conspicuous floating plumes of astonishing beauty.

**Em'er'sion** [Lat. *emer'sio*, from *emer'go*, *emer'sum*, to "emerge or rise into view"], in astronomy, is the reappearance of the sun, moon, planet, or star from behind the celestial body by which it was hidden in an eclipse or occultation. The phenomena of immersion and emersion, especially of Jupiter's first satellite, are useful in determining the longitude of places.

**Emerson** (GEORGE BARRELL), LL.D., an American teacher and writer, born in Kennebunk, Me., Sept. 12, 1797. He lived in Boston for many years, and was president of the Boston Society of Natural History. He was the first head-master (1821-23) of the Boston English High School for boys. Among his works are "Lectures on Education" and a "Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts" (1846).

**Emerson** (REV. JOHN S.), missionary, was born at Chester, N. H., in 1801, graduated at Dartmouth in 1826, and at Andover in 1830. He went to the Sandwich Islands, and aided in preparing an "English Hawaiian Dictionary." Died Mar. 28, 1867.

**Emerson** (RALPH WALDO), LL.D., an American poet and essayist. Lord Clarendon said of Lord Falkland, secretary of state to Charles I., that, as his house was within ten miles of Oxford, "the most polite and accurate men of that university frequently resorted and dwelt with him, as in a college situated in purer air; so that his house was a university in less volume, whither they came not so much for repose as study."

There seems still to be some benignant Fate which provides suitably for the suburbs of university towns. Within ten miles of Harvard College there has been for many years one modest roof which has afforded to "the most polite and accurate men" of that university some such "college in purer air;" for it has been the residence of Ralph Waldo Emerson.

Mr. Emerson was born in Boston, Mass., May 25, 1803, and was the son of Rev. William Emerson and Ruth (Haskins) Emerson. He had a minister for an ancestor in every generation for eight generations back, either on the paternal or maternal side. He was fitted for college at the public schools of Boston, and graduated at Harvard College in

1821. He was not among the very highest scholars of his class, but in his junior year won a "Bowdoin prize" for a dissertation on the "Character of Socrates," and another in his senior year for an essay on "The Present State of Ethical Philosophy." He also won a "Boylston prize" for declamation, and he was "class poet." For five years after leaving college he taught school, chiefly in Boston, where he assisted his elder brother, William, in conducting a successful school for girls. In 1826 he was "approved to preach," though his name does not appear among the graduates of the Harvard Theological School. In March, 1829, he was ordained as colleague to Rev. Henry Ware of the Second Unitarian church in Boston. In 1832 he resigned his pastoral charge, having announced in a sermon his unwillingness longer to administer the rite of the Lord's Supper. This sermon was never published, but copies of it exist in manuscript. In Dec., 1832, he sailed for Europe, remaining absent nearly a year. Soon after returning he began his career as a lecturer before the Boston Mechanics' Institute, his subject being "Water." He gave also three other lectures—two on "Italy," and one on the "Relation of Man to the Globe." In 1834 he gave in Boston a series of biographical lectures on Michael Angelo, Milton, Luther, George Fox, and Edmund Burke; the first two of which were published in the "North American Review." Since that time he has given many courses of lectures in Boston, and has been one of the best-known lecturers throughout the United States. Perhaps no other man has rendered such continued service in this field. It is said that he lectured for forty successive seasons before the Salem (Mass.) Lyceum. He has also made repeated lecturing tours in the Western States, and has even lectured in California and in England.

In 1835, Mr. Emerson took up his residence in Concord, Mass., and published in the following year a thin volume called "Nature." It marked a new era in American thought—was received with sharp criticism from many quarters, and with corresponding enthusiasm by a small circle of admirers. It took twelve years to sell five hundred copies. This was followed by several orations before literary societies on such themes as "The Method of Nature," "Man Thinking," and "Literary Ethics." More important even than these was his remarkable "Address before the Senior Class at Divinity College, Cambridge," delivered July 15, 1838. From these various addresses and publications may be dated the intellectual movement then vaguely stigmatized as "Transcendentalism." This was a reaction against formalism and tradition, and brought together a variety of minds, some profoundly mystical, others full of projects for action. It led to some excesses and affectations, but was on the whole a valuable impulse towards many good things. The four volumes of "The Dial" contain a lasting memorial of that important seed-time of thought.

Mr. Emerson's two volumes of "Essays" were collected and published in 1841 and 1844, and his "Poems" in 1846. His miscellaneous addresses remained uncollected till 1849, in America, though they had been reprinted collectively in England in 1844. Visiting the mother-country in 1847, Mr. Emerson found awaiting him a large circle of admirers, whose allegiance he has always retained. In 1850 he published "Representative Men," given previously as a course of lectures in Boston. In 1852 he took part in preparing the memoirs of Margaret Fuller Ossoli. His "English Traits" appeared in 1856, "The Conduct of Life" in 1860, and "May-Day and other Poems" and "Society and Solitude" in 1869.

Though Mr. Emerson is often assigned to the class of metaphysicians or "philosophers," yet the actual traits of his intellect clearly rank him rather among poets or literary men. All his methods are literary rather than scientific, although he has won some of his warmest admirers among scientific men, as in the case of Professor Tyndall. His statements are sometimes subtle, sometimes profound, sometimes noble and heroic, but scarcely ever systematic. He rests in his intuitions, rarely attempts even the rudiments of method, but constantly recognizes, in his own words, "the opposite negations between which, as with cords, our being is swung." But it is claimed by his admirers that (quoting his words again) "We are too young by some ages yet to form a creed," and that, while not aiming at the kind of work done by Herbert Spencer, for instance, Emerson often gives in some single phrase an illumination that seems to extinguish Herbert Spencer's lights, as a sunbeam makes gas-lamps superfluous.

In viewing Mr. Emerson simply as a literary artist, the reader must still complain of this tantalizing fragmentariness, this disregard of all the unities, this structural defect. Even in his poems his genius is like an æolian harp, that now gives, now wilfully withholds, its music; while some of his essays seem merely accidental collections of loose leaves from a note-book. Yet as one makes this criticism, one is shamed into silence by remembering many a passage of

prose and verse so majestic in thought and rhythm, of quality so rare and utterance so delicious, as to form a permanent addition to the highest literature of the human race.

Mr. Emerson wrote in 1844 that all our books were European, that we were "sent to a feudal school to learn democracy;" and demanded that Americans should "advance out of all hearing of others' censures, out of all regrets of their own, into a new and more excellent social state." More than any previous literary man among us, he set the example of ignoring European traditions, methods, and literary properties wherever these could be better superseded by our own. He drew his habitual illustrations from American society and manners, and was more ready to write of the pine woods and the humble-bee than of the nightingale and asphodel. It seems hardly credible that this should have been ridiculed by the critics as "a foolish affectation of the familiar;" but the fact of the ridicule shows the need of the innovation. If that state of things has now passed by, and if our literature is no longer provincial, it is to Mr. Emerson that we are most indebted.

It is well known that his position on religious questions has been that of a philosophical radical, and that he has been quite detached from the church organizations of the time. He took this position, once for all, in a sentence which attracted much attention in his "Divinity Hall Address:" "The assumption that the age of inspiration is past, that the Bible is closed, the fear of degrading the character of Jesus by representing him as a man, indicate with sufficient clearness the falsehood of our theology." His precise attitude as to the conception of a Deity and the belief in personal immortality might be harder to define. He declares eloquently, however, in one of his orations, that "there is a sublime and friendly Destiny by which the human race is guided—the race never dying, the individual never spared—to results affecting masses and ages."

Though Mr. Emerson was, like Goethe, a prophet of Self-Culture, he never held himself aloof, like Goethe, from the immediate public agitations of his time, but has always practically recognized the truth of his own formula, "To-day is a king in disguise." He has always lent his voice in behalf of any momentous public interest. He was always frankly identified with the anti-slavery movement, and, though averse to extemporaneous speech, and ill at ease in that form of service, he often took part in the meetings of the abolitionists. In 1844 he gave an elaborate and remarkable address on the anniversary of emancipation in the British West Indies. He signed, with his wife, the call for the first "National Woman's Rights Convention" in 1850. He was a vice-president of the Free Religious Association, and several times addressed its conventions. He was also an overseer of Harvard University, and received from that institution the degree of doctor of laws in 1866. He was a member of the American Academy of Arts and Sciences, of the American Philosophical Society, and of the Massachusetts Historical Society.

Mr. Emerson was twice married—once, in 1830, to Ellen Louisa Tucker of Boston, who died the following year; and again, in 1835, to Lidian Jackson of Plymouth. He had three children, two daughters and one son. The son, Edward Waldo, graduated at Harvard College in 1866, and afterward pursued the study of medicine. Of the daughters, the elder, Ellen, is unmarried; the younger, Edith, is the wife of William H. Forbes, Esq., of Milton, Mass., and has several children. Mr. Emerson returned with his elder daughter from a trip to Europe, reaching home May 27, 1873. On his arrival at the Concord station he found all the children of the public schools drawn up to receive him, accompanied by many citizens and by a band of music. They all escorted him in a procession to his house, which had been destroyed by fire just before his departure from home, and was rebuilt in his absence. A triumphal arch, decorated with flowers and bearing the word "Welcome," was before it. Beneath this, and between two lines of children, Mr. Emerson and his daughter entered their home. It was a spontaneous tribute to this eminent author, won in his own village by his gracious manners and his simple and noble life. D. Apr. 27, 1882. (See his "Life" by O. W. HOLMES, 1885.) T. W. HIGGINSON.

**Emerson** (REV. WILLIAM), the father of Ralph Waldo Emerson, was born at Concord, Mass., May 6, 1769. His grandfather, Rev. Joseph Emerson, was minister of Malden, and his father, Rev. William Emerson, died a chaplain in the Revolutionary army in 1776. The younger William Emerson graduated at Harvard College in 1789. He was the first minister of Harvard, Mass., and afterwards (1799-1811) pastor of the First church (Unitarian) of Boston, Mass. He published a "Selection of Psalms and Hymns" (1808), and wrote "History of the First Church of Boston," published 1812. He was a fine writer, and one of the best orators of his day. Died May 12, 1811.

**Emerton** (E. and J. H.). See APPENDIX.

**Emery**, one of the hardest minerals known, ranking next to the diamond in its power of cutting or abrading hard substances. It is a variety of the species corundum or sapphire, of a dark reddish-brown, black, or gray color, and consists of nearly pure alumina and oxide of iron. It is found in large masses, and much resembles fine-grained iron ore, for which it has often been mistaken. It is obtained chiefly from Asia Minor and the island of Naxos in the Grecian Archipelago. At Naxos 60,000 quintals are sold annually at from twelve to fourteen drachmæ (about thirteen francs) the quintal. Nearly half of the quantity is exported to England, generally as ballast in homeward-bound vessels, where it is used chiefly in grinding glass. It has also been found at Chester, Mass., in a vein with magnetic iron, from which considerable quantities have been extracted. It was discovered at Chester by Dr. Charles T. Jackson of Boston, and in Asia Minor, near Ephesus, by Dr. J. Lawrence Smith, an American mineralogist in the service of the Turkish government. Both discoveries are good examples of the value of accurate mineralogical knowledge.

Emery is scarcely inferior to the sapphire or ruby in hardness, and it will not only cut the hardest steel or chilled castings, but will wear away quartz, agate, topaz, and other gems, being for the last-named purpose the chief reliance of the lapidary. It was used by the ancients for cutting gems. Dioscorides mentions it under the name of *smiris* as the stone with which engraved gems are polished; and there is even a rabbinical tradition which indicates that the "smiris" was used for gem-engraving in the time of Moses. How far it was known and used in pre-historic times must be left to conjecture, but the many neatly cut and polished stone implements and ornaments indicate the use of a material not less hard than emery. Theophrastus mentions whetstones made of the mineral used to engrave gems, and cites Armenia as furnishing the best kind. Naxian whetstones are also mentioned by ancient authors, and Pliny speaks of polishing marble statues and *filing down* gems. The backs of antique intagli have deep furrows upon them, indicating that they were *filed* into shape by rubbing with an emery-stone. It is thus probable that the massive emery was extensively used as a tool, and that it was employed for the sculpture of hard rocks, not only by the Romans, but by the ancient Egyptians.

It is now used in the arts in a pulverized form, being obtained in grains or in powders of various degrees of fineness by crushing and sifting or by elutriation. The lumps, as they come from the mine, are broken in a breaker or under stamps, and the fragments are sifted through sieves or wire-cloth having from sixty to ninety wires to the inch, by which the grades of the emery are determined. Thus, a sieve of sixty wires to the inch gives a No. 60 grade. The numbers range as high as 120, or "flour emery." These higher numbers are obtained by washing, or by collecting the fine dust which floats in the air of the crushing-rooms and settles on the beams and shelves.

There is considerable difference in the effective abrasive power of commercial emery from different localities. It varies according to the composition, the state of aggregation, and the purity. The better qualities of crystalline corundum are believed to be superior to emery in abrasive powers, and powdered sapphire to be superior to corundum. But the experiments which are cited in support of this are by no means as complete and conclusive as they should be. The following shows the relative abrasive powers, as usually stated, of the sapphire, of corundum, and of emery from some of the principal localities: sapphire from India, 100; ruby, India, 90; corundum, Asia Minor, 77; emery, Kulali, 40 to 57; of Samos, 56; of Nicæria, 50; of Gümüş, 42 to 47; of Naxos, 46; of Chester, Mass., 43 to 45.

Sapphire contains 97½ per cent. of alumina, and corundum about 92 per cent. The percentage in emery ranges from 60 to 78, with 25 to 35 per cent. of oxide of iron, a few per cent. of silica and of water.

The methods of application are various. Lapidaries sprinkle it with water or oil on their lead-wheels. Mixed with glue or other adhesive substances, it is spread in a thin layer upon wood, leather, paper, or cloth, or it is moulded into solid blocks or wheels. It is in the latter form, known as "solid emery-wheels," that the mineral has the widest application and its greatest utility.

**Emery-wheels.**—Solid wheels, consisting of a mixture of powdered emery with shellac, fused and rolled upon a stick, appear to have originated with the lapidaries of India. Small wheels of a few inches only in diameter have been in common use for many years, especially by dentists for shaping hard porcelain teeth, but they are now made by improved methods from one to thirty-six inches in diameter, and from one quarter of an inch to four inches in thickness. When carefully mounted upon a mandril and run at a high speed, the abrading power of such wheels is

wonderful. They will instantly take the teeth off the hardest file and reduce it to a plane, smooth surface, or will cut away parts of chilled castings that a file will not touch. Such wheels are shaping-tools of the first order, as far exceeding files in efficacy as the emery exceeds steel in hardness, and as the velocity of a wheel exceeds the velocity of a file upon the work. A file in the hands of an expert workman moves, say, 60 feet in a minute, but the proper velocity of an emery-wheel at its cutting surface is 5500 feet in a minute. It is evident that such wheels are destined to replace files wherever they can be brought to bear upon the work. The grains of emery are the cutting points or teeth, and do not grow dull although brought into contact with metal hard enough to turn the teeth of a file at one stroke.

The rapidity of abrasion depends not only on the velocity of movement, but upon the size of the grains of emery. For very heavy work, such as taking the rough edges off castings, very coarse emery is used, while the finer sorts are made into wheels for fine grinding and surface-work on brass or steel. The following table shows approximately the cuts of emery as compared with files. The numbers represent the standard grades of emery:

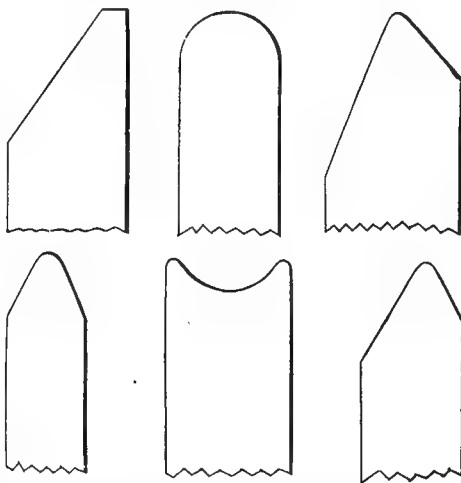
Nos. of Emery.			
8-10	represents the cut of a	wood rasp.	
16-20	"	"	rough file.
24-30	"	"	middle-cut file.
36-40	"	"	bastard file.
46-60	"	"	second-cut file.
70-80	"	"	smooth file.
90-100	"	"	superfine file.
120-flour emery	"	"	dead-smooth file.

The Tanite Company make five general classes of wheels: Class No. 1, coarse-hard; Class No. 2, medium-hard; Class No. 3, medium-soft; Class No. 4, fine-hard; Class No. 5, fine-soft.

In using emery-wheels care must be taken to maintain the proper speed, and not to press the work too strongly against the surface. If too much pressure is used, the wheels will not cut so fast, and are liable to wear away unequally and to get out of true. A rest should always be used to support the work and prevent it from vibrating upon the wheel. The bearings should be kept in good order and well lubricated.

Much attention is now given to the manufacture of machines for mounting emery-wheels. The mandrils are made of steel very carefully turned and fitted to the boxes, and frequently two or more wheels are mounted on the same mandril. The edges of the wheels are variously shaped to suit the work for which they are designed. Manufacturers now use them not only for trimming and shaping castings, but for shaping and sharpening hardened steel tools, such as the knives of planes and of wood-moulding machines, and for gumming saws. For the latter purpose they are particularly well adapted, and save time, labor, and files.

The following are outlines of some of the forms of the faces of emery-wheels:



Good emery-wheels are uniform in texture. The material with which the emery is combined must have great cohesive strength to resist the tendency of the wheels to fly asunder when revolving at high speed, and to retain the grains of emery firmly, and yet wear away evenly, leaving the cutting angles exposed, and not glaze or "gum up." It must not soften or melt under the heat generated

by the friction in cutting the work, and must be free from noxious qualities. As such wheels are run at high velocities, they require to be very carefully and exactly hung, and to be kept perfectly true, so as to prevent vibrations. They should not "wedge" upon the mandril, or even fit it closely, for expansion by heat might burst the wheel, and the flanges at the side should not be too strongly screwed up. A wheel thirty-six inches in diameter may have 611 revolutions per minute, and one of twelve inches, 1800 revolutions. Although the emery is so extremely hard, diamonds will cut the wheels, and this gem in its crude or rough form is used as a tool to turn them true or to cut their faces into any desired form. W. P. BLAKE.

**Emetic** [Gr. *ἐμετικός*, from *ἐμέω*, to "vomit"], a medicine capable of causing the stomach to contract and discharge its contents through the oesophagus. Emetics are of two classes: (1) those which appear to stimulate the action of the muscular coat of the stomach directly by their presence, such as alum, cupric sulphate (blue vitriol), and zinc sulphate (white vitriol): they act promptly, and are hence very useful in some cases of poisoning; (2) those which enter the circulation, and cause emetic action by their operation upon the nervous centres. To this class belong ipecacuanha, tartar emetic, lobelia, bloodroot, and many others. They are in general arterial sedatives, and may cause profound and even dangerous disturbances if unskillfully used.

**Emeu.** See **EMU**.

**Emigration** [Lat. *emigratio*, a "removal" or "departure" of one or more individuals], the transference of permanent abode from one country to another. Removal into a country is specifically designated as *immigration*; it of course presupposes emigration. (See **CRUSADES**, **EXILE**, **EXODUS**, **TRANSPORTATION**, **SLAVERY**.)

Whatever view we take of the origin of mankind, it is evident that the earth must have been almost wholly peopled by numerous emigrations. The story of the wanderings of tribes and races constitutes the chief part of the traditions of the nations of antiquity. A complete record of emigration would amount to a synopsis of the early history of almost every considerable nation of ancient and modern times. The movements of the Aryan and Semitic races took place on a large scale, leaving everywhere their traces in languages, customs, and religions. Among the first of recorded emigrations, though of doubtful date, was that led by the Hyksos or Shepherd Kings, proceeding from Arabia or Phoenicia, and gradually overrunning Egypt, then a seat of civilization. In the Exodus we have an account of the emigration of the children of Israel, given with great fulness of detail. One of the earliest of the long series of incursions of the uncivilized tribes of Asia was the great invasion of Cimmerians and Scythians (650 B. C.), which even threatened Egypt, but was turned back by Cyaxares, the founder of the kingdom of the Medes. (See **MAN** AND HIS MIGRATIONS.)

The Greeks, boasting their own origin from the sacred soil of Hellas, were pre-eminent among the ancients for encouraging systematic emigration. They planted their colonies far and wide along the Central Sea, and founded great cities not only throughout the Grecian Archipelago, but in Sicily, Italy, and Asia Minor, and even on Gallic shores, on the Iberian peninsula, and on the African coast. The Romans, accepting mythical traditions as eagerly as the Greeks, found their own origin in an emigration from ruined Troy. But the policy of Rome, unlike that of Greece, fostered no rival colonies, and the emigrations which marked the rise of her power were principally the flight or transportation into slavery of the inhabitants of cities and provinces that yielded to her sway. The forced emigration of the slaves and captives of conquest reaches vast proportions in ancient annals. It was, however, after the empire of Rome had reached its culmination that the great movement of barbarian nations began, which is without parallel in the history of emigrations. A brief sketch of this movement, which continued through several centuries, can merely give prominent dates and names. The multitudes of those barbarian hosts cannot be estimated; they have furnished the poet with his most appropriate comparison for the countless legions which issued from the nether abyss at Satan's command.

The southward emigration of the Goths from Gothland, or Northern Sweden, began A. D. 200; their first pressure in the empire was felt on the N. of the Euxine, and they soon crossed the Danube. By the middle of the century they had overwhelmed Greece. Meanwhile, the Franks and Alemanni moved down in vast hordes from Western Europe, the former crossing the Rhine and the latter pouring through the Rhetian Alps. These incursions were checked by the victories of Claudian, Aurelian, and Probus (270-282), but the Goths established themselves during the

following century on the borders of the Euxine, and spread through Thrace toward Italy. Between 376 and 410 was the climax of the movement of Northern races. The Huns, a nation of Tartar origin, coming down from the Ural Mountains and the table-lands of Siberia under Balamir, established an empire at the expense of the Goths, whom they drove out of the countries N. of the Danube; the latter, soon afterwards marshalled under Alaric, after ravaging Greece, descended upon Rome, effecting its capture A. D. 410. During the same period the Vandals from between the Elbe and the Vistula, with the Sueves and Burgundians of kindred origin, and the Alans from the Caucasus, swept through Italy, and, thence withdrawing, through Southern France into Spain; the Burgundians alone stopping in the valleys of the Vosges, the rest, pressed by the Goths who followed them, finally reaching Andalusia. In 429, Moorish tribes from the base of Mount Atlas were ravaging Northern Africa; in 439 the Vandals and Alans from Spain, under Genserik, following in the path of the Moors, extended the kingdom of the Vandals over the southern shore of the Mediterranean, and then crossing into Italy, captured and sacked Rome in 455. During the rise of the Vandal kingdom the Huns under Attila (435-450) swept down on the western provinces, and made an irruption into Gaul, but being defeated at Châlons in 451, they afterward withdrew to the E. of the Carpathian range. After Attila's death (453) the bulk of the remaining Huns retired to the shores of the Volga. During the same period the Saxons from between the Baltic and the Elbe, with the Angles to the N. of them, and the Jutes of Jutland, became dissatisfied with their homes, and in 449 descended on the coasts of Great Britain, establishing themselves on the island.

Before the year 470 the Slavi had overrun what are now Prussia, Poland, and Russia; about the middle of the sixth century this Slavic territory—and in fact the whole region from Franconia to the Caucasus, from Moscow to the Danube—was taken possession of by the Avars, a Tartar tribe. They unsuccessfully besieged Constantinople. Thenceforward, and indeed until the thirteenth century, the Byzantine empire was a bulwark against the Asiatic races, and prevented their penetrating Europe except by paths N. of the Euxine or S. of the Mediterranean. Starting from Arabian deserts in 632, the tide of Saracenic invasion rolled over the Levant and Northern Africa, entering Spain in 711, and was checked on the Loire by Charles Martel in 732. The Saracens spread from the Indus to the Atlantic, from the Pyrenees to the African desert, from the Caspian to the Red Sea. They invaded Sicily in 826, and held that island 265 years. The date of their conquest of India is 1004. Within the century when Europe was saved from the sword of the Saracen by the valor of Charles Martel, the victories of Charlemagne and Pepin (791-796) dislodged the Avars, and they withdrew to the eastward. The Bulgarians, partly of Tartar extraction, entered on a portion of the deserted territory. The Magyars, a Finnish tribe from the Ural, about the year 855 united with the vanquished Avars, and spread in camps of 1,000,000 men over the Dacian plain. A century later, Otto defeated their descendants, and they afterward settled on the Danube.

The Danish vikings in 852 effected a permanent settlement in Russia, but not till 980 did they become affiliated with the native Russ and Sarmatians. The incursions of the Danes on the British coasts began before 890; in 1016 Canute's kingdom included Denmark, Norway, and England. The Danish and Norwegian vikings that were afterward called Normans ravaged the French coasts during this period, and settled in great numbers in Normandy in 912; they effected the conquest of England in 1066, and by 1072 had overrun all the Italian provinces of the Greek empire.

From the ninth to the eleventh century the Tartars ravaged China. In 1050 the Uzi and Cumani, of Tartar extraction, overran all Southern Russia; they kept possession for 170 years. From 1216 to 1250 the Mongols under Genghis Khan, starting from the frontiers of China, created an empire, at a cost of 14,000,000 men slain by the sword, that extended from the Pacific to the Adriatic and the Baltic, overrunning all Southern Asia and Eastern Europe. The Mongols were probably allied to the Huns. After their victory on the Kalka in 1224, they held Russia subject for two and a half centuries. In the latter half of the thirteenth century, after the withdrawal of the Mongols from Hungary, its king invited immigration, and obtained many Italian, Flemish, and Saxon settlers. The empire of Tamerlane (1363-1405) again spread the Mongolian power over all Southern Asia; the conquest of Hindostan was effected in 1399, and Delhi afterward became the capital of the Great Mogul. From 1616 to 1647 the Mantchou Tartars overran and subjected China; expelled thence, they extended westward, and settled on the banks of the Volga in 1672, but withdrew in 1771.



The Crusades (1095, 1147, 1189, 1202, 1217, 1227, 1248, 1270), though involving great emigrations, created no permanent states.

The Ottomans had partially established themselves in Europe in 1356; by 1460 they had overrun Turkey. In 1550 the Turkish power was at its zenith, reaching from the Tigris to the Carpathian chain, from the snows of the Caucasus to the deserts of Abyssinia. The expulsion of the Mohammedans from Western Europe was an affair of centuries. They were driven out of Sicily in 1091; Valencia, 1238; Portugal, 1252; Granada, 1492.

From 1552 to 1577 the Russians pushed their conquests over the Mongolian races through two continents, and, crossing the Pacific to a third, effected settlements in North America, which in 1794 were estimated as containing 50,000 souls. The measures which culminated in the Revocation of the Edict of Nantes (1685) caused the Huguenot emigration from France, which numbered from 250,000 to 300,000 souls; Sismondi assigns even a higher figure. In 1739, India was subjected to a terrible invasion by the Persians; in 1765 the British conquest followed, and after it came a steady flow of Englishmen. The French emigration consequent on the Revolution of 1790 consisted of noble families, and was exceptional in this characteristic. The czars, beginning with Peter the Great, have made notable and successful efforts in inducing foreigners to form colonies within their domain; and the last important movement of emigration within Europe was after Napoleon's wars, when Russia, by liberal offers, obtained 250,000 settlers, principally from her Western neighbors. In the recent war between France and Germany (1870) 102,000 Germans were expelled from France, and after the war there was a large movement of the French population from Alsace and Lorraine, and subsequently an emigration thither from Germany.

There are evidences of extensive movements among the native populations of America before the advent of Columbus. The Esquimaux—or, as they call themselves, the Inuit—inhabiting the northern and north-western coasts of America, are of a race found at the N. in the eastern hemisphere. The North American tribes of the interior were nomadic, but have left few definite records of their wanderings; the Mound-Builders spread all over the Valley of the Mississippi and its tributaries, but did not reach the Atlantic coast, and the dates of their progress and extinction are alike unknown. The Shawanese within historic times moved down from the northern Alleghanies along their western slope, and penetrated nearly to the Gulf of Mexico. There are records of many of the great movements of the races in the southern portion of North America. Torquemada, among earlier, and Clavigero, among later historians, have shown that the Toltecs, who during 104 years were advancing into Mexico from a region to the N. W. of it, founded the kingdom of Toltecan in the latter part of the sixth century. A famine nearly destroyed this nation in 1052; it was replaced in the next century by the less-civilized Chichimecas, and in the century following by other races from the N. and N. W., including the Aztecs or Mexicans from California. During the supremacy of the Toltecs in Mexico, their fifth king invaded Guatemala, and there established a dynasty of Toltec sovereigns, of whom the eighteenth was reigning when the Spaniards arrived. In South America the Toupis emigrated from the northern borders of the Amazon, spread to the Caribbean Sea and most of its islands, and advanced southerly along the Atlantic coast to S. lat. 32°, penetrating inland to the headwaters of the Rio de la Plata; through all this vast region one native language was spoken. A darkness which even the genius of Prescott has failed to pierce hangs over the entry into Peru of the race that built the monuments around Lake Titicaca.

Ever since its discovery America has been the chief land of promise to the voluntary emigrant; it has also been the principal destination of the enslaved African. The early statistics of emigration to this continent, though fully equal in interest to those so abundantly compiled in respect to the U. S. in later years, are, unfortunately, few and fragmentary. The colonies of emigrants that were most successful were under the direction of English companies, formed to carry on the business as a commercial speculation. There was a sharp rivalry between the North American colonies in offering to remit taxes, to give land, implements, and in some cases money. As early as 1606 two companies were formed in England "to found establishments in Virginia;" they sent out 3570 persons in 1619–21. Up to 1624 the Virginia company had spent £100,000 and sent out 7000 persons, of whom only 2000 then survived the sickness and dangers of the new country. The colony in 1648 numbered 15,000 whites, 300 blacks; in 1660, total, 30,000. The neighboring colony of the Carolinas was insignificant at the time of a charter in 1662; it benefited by

an act of Parliament in 1670, which sent to America thieves convicted of stealing cotton goods spread to bleach. By 1700 the whites of this colony numbered 5500; in 1724, about 14,000. Easy privileges for obtaining land attracted to South Carolina in 1745 many emigrants from Germany and Holland; in 1746 the Scotch prisoners taken at Culloden were sent thither. The population had risen to 64,000 in 1750; in 1765, to 40,000 white, and at least twice as many colored. The New England company, chartered in 1620, had territory from lat. 40° to 48°, and by 1640, 21,200 persons had emigrated thither in 298 ships, at an expense to the company of £192,000; and at that date the natural increase of the colony had given it an additional 20,000, but the passage of the Toleration laws in England at this time induced fully that number to return to the mother-country. In 1722 the colony of Massachusetts contained more than 94,000 persons; most of the other colonies were much smaller. The Dutch settlements on the Hudson had less than 10,000 souls when surrendered to the English in 1664, but the Pennsylvania colony, of which a large proportion was from Germany, was of rapid growth, the immigration in a single year (1729) being 6200.

The number of emigrants to this country during the provincial period, after colonial settlement and before the war of independence, cannot be closely approximated. The U. S. Bureau of Statistics has gathered more accurate figures for recent years, but the estimates prior to 1820 remain uncertain. Dr. Seybert's "Annals" give 120,000 for the period between 1790 and 1810. Prof. Tucker estimates 1810 to 1820 at 114,000. It is, however, safe to reckon for the two periods together, 250,000. From 1820 to 1830 the numbers were 151,824; 1831–40, 599,125; 1841–50, 1,713,251; 1851–60, 2,598,214; 1861–70, 2,466,752; 1871–80, 2,944,695. Total in 91 years, 10,723,861. Of these immigrants, about two-fifths were females; 4,841,000 came from the British Islands, 3,218,000 from Germany, Austria, and Hungary; 319,000 from France; 438,000 from Scandinavian countries; 356,000 from all the rest of Europe; 732,000 from British America; 100,000 from the rest of America, principally Mexico and the West Indies; 232,000 from China; 488,000 from all other sources. In 1880 a total of 593,703 immigrants arrived in the U. S.; in 1881, 720,045; in 1882, 730,949; these numbers far exceed those of any preceding year. An act of Congress approved May 6, 1882, prohibits the immigration of Chinese laborers.

Most of the states of continental Europe claim some control over the emigrant after his departure, unless he formally disavows his allegiance. In general, these claims have not been regarded with favor by the U. S. government, which throws every facility in the way of the immigrant for becoming a citizen of the republic. The Homestead laws of the U. S., giving 160 acres to the actual settler on unclaimed public lands, the laws for the protection of emigrants during their passage, and organized State systems to provide for their subsequent welfare, have done much to ameliorate the hardships incident to an ocean-voyage and settlement in a strange land. The use of steam has greatly shortened the time of transit.

The emigration from the British Islands has long exceeded that of any other country; its climax has probably been reached, but is not indicated in its somewhat irregular increase from 2081 in 1815 to 310,612 in 1873; the total number in the interval, including both years, being 7,887,992. Dividing this interval into three periods of nearly 20 years each, we find the emigration in the first of these periods about a tenth, in the last of them about one-half, of the total. Nearly five-eighths of this emigration went to the U. S.; a fifth to Canada; a seventh to Australia and New Zealand. Between 1793 and 1838 there were 74,000 convicts transported to Van Diemen's Land. In 1837, 2664 emigrants selected Australia as their home; its attractions reached their height during the years of gold-discovery, the number of emigrants to that country and New Zealand amounting in 1852 to 87,881; 1853, 61,401; 1854, 83,237; total 1849–59, 550,000. The Irish famine in 1846 increased emigration from the British Islands during several following years: in 1847 it reached 109,680 to British America; to the U. S., 142,154; 128,838 arriving that year in the U. S.

Germany ranks next to the United Kingdom as a source of emigration, the two countries together contributing four-fifths of the numbers that reach the U. S.; the yearly arrivals from Germany surpassing those from Ireland in 1854 and ever since. The German emigration to South America during the present century has been very considerable, especially to Brazil.

France has supplied a goodly share of the settlers of America. The French emigration to Canada reached a maximum about 1670: after 1713 a census gave a population of 25,000; it was 60,000 in 1761, the date of the English conquest. The French colonies in other parts of America have not been very considerable in point of numbers, though

some of them have proved permanent; among these in the present century are a few in South America.

The emigration from the Spanish Peninsula to America cannot be accurately stated; in lieu thereof the following estimates of population during early years of settlement will be found of service. California (including "Old California") and New Spain contained under the Spaniards, according to Humboldt, 70,000 Europeans, 1,025,000 Creoles, 7000 negroes. From figures furnished by Humboldt and Navarro, the white population in Mexico in 1803 may be estimated at 1,000,000; in 1823 at 1,230,000, and the mixed and colored races at 1,370,000. A very doubtful estimate gives 100,000 whites in Guatemala and all Central America in 1778. According to Restrepo (secretary of state), after the loss of 400,000 lives in the war of independence (1825), there were about 600,000 whites in Colombia. The white population of Peru 1795-1803 was 142,000; negro, etc., 328,000. According to Don Cosmo Bueno, the total population of Chili in 1764 was 240,000; in the census of 1813 about one-fifth were white. Nieuhoff in 1647 records the employment of 40,000 slaves in Brazil; it was estimated that in 1776 there were 1,500,000 Christians in that country, which was certainly a mistake, the census of 1818 giving only 843,000 whites. At the latter date there were 2,089,000 blacks, principally slaves. In later years Brazil has greatly encouraged immigration. Paraguay in 1809 had only 5133 Europeans, according to Azara, in a population of 97,500; Buenos Ayres had perhaps twice that number. The provinces of the Rio de la Plata may be estimated, from the figures of Nuñez in 1825, as having of white, mixed, and black 400,000. The Argentine Republic has secured a large emigration within the third quarter of the present century, exceeding 40,000 in a year, of which Italians, Spanish, and French form the greater proportion. The Guianas were principally populated by slaves; Dutch Guiana for two centuries has had about 3000 whites; all the Guianas in 1825 had only 10,000 whites to 206,000 negroes.

Great variations have taken place in the populations of the West India Islands. Thus, in Cuba there were 18,400 Spaniards in 1517; 40,000 in 1656; only 26,000 in 1700; 96,440 in 1774; in 1827, 311,051 whites and 393,436 blacks. In Puerto Rico there were in 1802, 78,281 whites and 84,911 blacks; the number of both was nearly doubled by 1834. In Barbadoes there were 21,000 whites in 1656; in 1670, 50,000 whites and 100,000 blacks; these numbers had fallen in 1712 to 12,523 and 41,970, and the whites increased but little for a century. Jamaica when captured by the English in 1655 had 40,000 slaves; in 1659, 4500 whites; 1698, 2300; 1755, 12,000; 1805, 28,000; up to 1823, 890,000 slaves had been brought into the island.

Bandinel estimates the total number of slaves that reached America from 1517 to 1807 at 5,000,000 to 6,000,000. The coolie trade from British India has transported, principally to the islands and coasts of America, a number of substitutes for slaves, recently averaging 25,000 a year; they are nominally apprentices, and emigrate with the hope of returning to their native land. WILLIAM C. WYCKOFF.

**Emil'ia** [Lat. *Emilia*, called after the celebrated Via Emilia of the Romans, a continuation of the Via Flaminia and forming the great highway through Northern Italy], the ancient name of that part of Northern Italy which contains the former duchies of Parma and Modena and the papal delegations of the Romagna, or the present Italian provinces of Parma, Piacenza, Modena, Reggio, Bologna, Ferrara, Forlì, Ravenna, and Massa-Carrara. The name was revived in 1859, and applied to a territory of about 8004 sq. m., with a population of nearly three millions.

**Eminence**, on R. R., Henry co., Ky. (see map of Kentucky, ref. 2-G, for location of county), 26 miles W. of Frankfort. It has a woollen and a flouring mill, and two colleges open to both sexes. The principal business is farming and stock-raising. The location is healthy, surrounded by a beautiful blue-grass region. There is a valuable mineral spring in the vicinity. Pop. in 1880, 1043.

**Eminence**, capital of Shannon co., Mo. (see map of Missouri, ref. 7-H, for location of county), on Current River, about 120 miles S. W. of St. Louis. Pop. in 1880, 91.

**Em'inent Domain'**. Domain is the territory under the jurisdiction of a sovereign, and *eminent domain* the inherent sovereign power which the people or government retain over the estates or private property of individuals to resume or appropriate the same for public uses, and for public uses only. The difference between the power of taxation and the right of eminent domain should be carefully noted. Taxation proceeds upon the notion of contribution; it falls upon a class of persons, and is apportioned among them by rule. In the exercise of the right of eminent domain the state takes from an individual his property without reference to a burden imposed upon any other person. The right can be exercised in this country either by a State

or by the United States. The power to decide whether the property should be taken for any public use rests with the legislature, and its discretion is not reviewable by the courts, though it is conceived that the judicial power has the right to determine whether the use itself is public rather than private. Were this not so, the legislature might, under the pretence of taking property for public uses, transfer one man's property to another.

It is not necessary, however, that the exercise of the power should benefit the entire public. It is enough if it promotes the industrial capacity or resources of a considerable number of inhabitants, or in any manner indirectly contributes to the general welfare. It is not necessary that the State should act directly. The power may be delegated to a municipal body or to a private corporation. A State may delegate it to the United States. The mode of exercising it is regulated by constitutional provisions and by statutes. In some cases only an easement in land is acquired; at other times the entire fee is appropriated. The constitutional prohibition (U. S. Constitution, Amendments, Art. V.) against taking private property for public use without just compensation is a limitation on the power of the Federal government, and not on that of the States. There are similar provisions in the State constitutions binding the State legislatures. The compensation includes not only the property actually taken, but consequential damages to adjoining property. This has recently been carried so far in England by the House of Lords as to hold that a riparian owner on the banks of a navigable stream (the Thames) is entitled to compensation for the act of cutting off his approach to the river, on the ground that the right of access to a tide-water stream is a legal right, which would justify an action by the owner against one who interfered with it, unless Parliament had sanctioned the interference. (*Case of the Duke of Buccleuch, Law Reports, 5, House of Lords' Cases, 478, A. D. 1872.*) Still, if no property is taken, a claim cannot be made for consequential damages. The same right to compensation as is secured in this country by constitutional provisions is recognized generally among civilized nations, and may be considered as a general rule in jurisprudence. T. W. DWIGHT.

**Em'ir, or Emeer'** (written also **Amir and Ameer**), an Arabic word signifying "chief" or "ruler." The caliphs took the title of emir-al-Mumenin, "chief or commander of the faithful." The title is now given by prescriptive usage to those who are the real or reputed descendants of Mohammed through his daughter Fatima. Many independent chiefs of Northern Africa assume the title of emir. The word emir, joined to another word, occurs in several official titles, as emir-al-Omrah, formerly the title of the first minister of the caliphs and moguls, and at present sometimes the title of the pashas of large Turkish provinces.

**Em'lenton**, R. R. junction, Venango co., Pa. (see map of Pennsylvania, ref. 3-B, for location of county). Pop. in 1870, 438; in 1880, 1140.

**Emly**, a small town of Ireland, in the county of Tipperary, was formerly a bishop's see, till 1568.

**Emman'uel** [Port. *Manoel*], surnamed the GREAT, king of Portugal, was born in May, 1469. He succeeded John II. May 3, 1495, and married Isabella, a daughter of Ferdinand and Isabella of Castile. He promoted education, maritime enterprise, and commerce. During his prosperous reign the power and glory of Portugal were increased by the discoveries and victories of Vasco da Gama, Albuquerque, and Almeida in India and Brazil. Portugal was probably the greatest naval power of the world in his reign, which constitutes the golden age of Portuguese history. His power and renown were greater than any Portuguese monarch ever possessed, either before or since his time; but he greatly injured his country by the banishment of all Jews and the enforced conversion of their young children. His third wife was Eleonore, a sister of the emperor Charles V., whom he married in 1519. He died Dec. 13, 1521, and was succeeded by his son, John III.

**Em'maus** [Heb. *Hammath*, "hot spring"], a village in Palestine, 60 stadia, or about  $7\frac{1}{2}$  miles, from Jerusalem, associated with one of the appearances of Christ on the day of his resurrection (Luke xiv. 13). The following identifications have been proposed: (1) Etam (*Urtas*), about a mile S. of Bethlehem; (2) Khāmāsa, about 2 miles S. W. of Jerusalem; (3) Amwās (*Nicopolis*), about 20 miles from Jerusalem, on the Ramleh road; (4) Kuriet el' Enab (*Kir-jath-jearim*), about 8 miles from Jerusalem, on the Ramleh road; (5) Kulonieh, 4 miles from Jerusalem, on the Ramleh road; (6) Kubeibeh, about 7 miles from Jerusalem, on a more northern road. The question is still an open one.

R. D. HIRCHCOCK.

**Em'men**, a town of Holland, in the province of Drenthe, 31 miles S. E. of Groningen. Pop. 5437.

**Emmerich**, ém'mer-rik', a walled town of Prussia, is on the right bank of the Rhine, about 50 miles N. N. W. of Düsseldorf and 20 miles S. E. of Arnheim, with both of which it is connected by a railway. It has a custom-house, gymnasium, and several churches; also manufactures of woollen cloth, linens, hosiery, etc., and an active trade in wine. Pop. in 1871, 7817; in 1881, 8700.

**Em'met** (ROBERT), an Irish patriot and orator, born in Cork in 1780. He was devoted to the independence of Ireland, and was a leader of the United Irishmen, who desired to liberate their country from British domination. Having secretly collected arms and powder in Dublin and formed a conspiracy, he and his friends revolted in July, 1803. The insurgents killed the chief-justice, Lord Kilwarden, but were soon dispersed by a party of soldiers. Emmet was arrested and tried for treason. He pleaded his own cause in a long and very eloquent speech, which has been preserved, but he was convicted and executed Sept. 20, 1803. His fate and his affection for Miss Curran are the subjects of two of Moore's "Irish Melodies."

**Emmet** (THOMAS ADDIS), LL.D., an Irish lawyer, a brother of the preceding, was born in Cork in 1764. He was a leader of the United Irishmen, and as such was arrested in 1798, and confined in prison for nearly three years. His sentence was commuted into exile, and he emigrated in 1804 to New York City, where he practised law with distinction. He was elected attorney-general of the State of New York in 1812. He was an eloquent advocate, and had great qualities as an orator. Died in New York Nov. 14, 1827.

**Emmettsburg**, R. R. junction, capital of Palo Alto co., Ia. (see map of Iowa, ref. 2-E, for location of county), on the Des Moines River, 55 miles N. N. W. of Fort Dodge and 25 miles W. of Algona. It has a saw-mill and a flouring-mill, etc. Pop. in 1880, 879; in 1885, 1264.

**Emmitsburg**, on R. R., Frederick co., Md. (see map of Maryland, ref. 2-D, for location of county), 8 miles N. of Mechanicstown, one mile from Mason and Dixon's Line, and 10 miles from Gettysburg, Pa. It was laid out by William Emmitt, its founder, about the year 1773. The original population were Scotch and Irish. Mount St. Mary's College was established near it in 1809 by Rev. John DuBois, late bishop of New York; it is a Roman Catholic institution, one of the largest in the U. S. St. Joseph's Academy, about half a mile from town, was established in 1810, by Mrs. Eliza Ann Seton of New York. It is the mother-house of the Sisters of Charity in the U. S., numbers 2000 members, and has the largest educational building in Maryland, perhaps in the U. S. Pop. in 1870, 706; in 1880, 847.

**Emmuis** (UBBO), a Dutch historian, born at Greith, in the province of Ost-Friesland, Dec. 5, 1547, died at Grœningen Dec. 9, 1626. He studied at Emden, Bremen, Norden, and Rostock, but returned to his native town in 1570. In 1574 he set out on a new trip through the Rhine countries down to Geneva, where he was converted by Beza to Protestantism. Having returned through France, he was in 1579 made rector of the school of Norden, but refused in 1587 to subscribe the Confession of Augsburg, and was consequently expelled by the Lutherans. In 1594 he was made director of the college of Liers, and in a few years he made it one of the most celebrated educational institutions in Holland. Among his works are "Opus Chronologicum novum" (Grœningen, 1619), an attempt at a chronological arrangement of history from creation; "Vetus Grœcia illustrata" (Leyden, 1626), several times reprinted; "De origine et antiquitate Frisiorum" (Grœningen, 1603); "Rerum Frisicarum Historia" (Franeker, 1596), a work which encountered considerable opposition on account of its invectives against the Roman Catholic Church.

**Em'mons** (EBENEZER), M. D., an American geologist, born at Middlefield, Mass., May 16, 1799. He became in 1833 professor of natural history in Williams College. He was one of the geologists selected by the governor of New York in 1836 to make a geological survey of that State. In 1838 he became professor of chemistry in the Albany Medical College. In 1856 he became State geologist for North Carolina, where he remained until his death. He wrote several reports, which were published in the "Natural History of New York;" also a report of the quadrupeds of Massachusetts, three reports of the geology of North Carolina, and several text-books on mineralogy and geology. Died Oct. 1, 1863.

**Emmons** (GEORGE F.), U. S. N., born Aug. 23, 1811, at Clarendon, Rutland co., Vt., entered the navy as a midshipman April 1, 1828, became a passed midshipman in 1834, a lieutenant in 1841, a commander in 1856, a captain in 1863, a commodore in 1868, and a rear-admiral in 1872. He served in the South Sea exploring expedition from 1838

to 1842, and on the west coast of Mexico during the war with that country. In the early part of our civil war he was in command of various vessels of the Gulf blockading squadron and Admiral Dahlgren's fleet, and was captain for some months in 1863 during the operations against Fort Sumter. From 1864 to close of the war he commanded a division of blockading fleet in Gulf of Mexico. Retired Aug. 23, 1873. D. July 23, 1884. FOXHALL A. PARKER.

**Emmons** (NATHANAEL), D. D., one of the most eminent of American theologians, was born April 20 (O. S.), 1745, at East Haddam, Conn., and graduated with honor at Yale in 1767. He was ordained pastor of the Congregational church in Franklin, Mass., in 1773, and was its pastor until his death, and its sole pastor for fifty-four years. In addition to his pastoral labors he trained nearly one hundred young men for the ministry, many of them afterward eminent. His house was a kind of theological seminary. Among his pupils, nine became presidents or professors of colleges or theological seminaries, fourteen took an important part in the establishment of literary or charitable institutions, and forty-six are noticed in the biographical dictionaries of eminent men. He was also a prominent advocate of foreign missions and of the anti-slavery cause. His theological views were nearly those of his friend Dr. Samuel Hopkins. The distinctive tenets of his system are: "Holiness and sin consist in free, voluntary exercises. Men act freely under the divine agency. The least transgression of the divine law deserves eternal punishment. Right and wrong are founded in the nature of things. God exercises mere grace in pardoning or justifying penitent believers through the atonement of Christ, and mere goodness in rewarding them for their good works. Notwithstanding the total depravity of sinners, God has a right to require them to turn from sin to holiness." These propositions he believed could be evolved from the system of Dr. Hopkins. His sermons, distinguished by logical thought and by dignity and power of style, were in many instances characterized by ingenious efforts at solving the problems suggested by the doctrines of the divine government and the freedom of the human will. Died Sept. 23, 1840. His works (sermons, essays, etc.), published at different times during his life, were after his death published (1842) in seven and afterward (1861) in six volumes octavo, with memoirs of his life, in the first edition by J. Ide, D. D., and in the second by Prof. E. A. Park.

**Emory**, on R. R., capital of Rains co., Tex. (see map of Texas, ref. 2-J, for location of county). Pop. not in census of 1880.

**Emory**, on R. R., Washington co., Va. (see map of Virginia, ref. 1-B, for location of county), situated 10 miles E. of Abingdon. It is the seat of Emory and Henry College, which is sustained by the Methodist Episcopal Church South. Pop. not in census of 1880.

**Emory** (JOHN), D. D., an eminent writer and bishop of the Methodist Episcopal Church, born in Queen Anne co., Md., April 11, 1789, was educated a lawyer, became a Methodist preacher in 1810, preached extensively for many years through the Middle States, and was sent as delegate of his denomination, in 1820, to the British Wesleyan conference. He was appointed in 1824 book agent at New York, and elected bishop in 1832. Died Dec. 16, 1835. In 1817 he had a pamphlet controversy with Bishop White of Philadelphia. He was author of "The Divinity of Christ Vindicated," "Defence of Our Fathers," and other publications, which show much logical ability and a pure and vigorous style.

**Emory** (ROBERT), D. D., son of the preceding, an eminent divine and educator of the Methodist Episcopal Church, born in Philadelphia July 29, 1814, was president of Dickinson College, Carlisle, Pa., and author of the "Life of Bishop Emory" and "History of the Discipline of the Methodist Episcopal Church." Died May 18, 1848.

**Emory** (WILLIAM H.), an American officer, born in 1811 in Queen Anne's co., Md., graduated at West Point in 1831, colonel Fifth Cavalry Oct. 27, 1863, and Sept. 25, 1865, major-general U. S. Volunteers. He served as lieutenant of artillery and of mounted rangers till he resigned, Sept. 30, 1836; chiefly at sea-board posts, 1831-36; in Charleston harbor, 1832-33, during the threatened nullification of South Carolina; and in the Creek nation, 1836-38. He was appointed first-lieutenant topographical engineers, July 7, 1838, and major of cavalry Mar. 13, 1865, serving on Delaware river improvements and in topographical bureau, 1839-44; on north-east boundary survey, 1844-46; in the war with Mexico, 1846-48, on the staff of Brigadier-General Kearny; engaged in the actions on his march to California (captain and brevet major); as lieutenant-colonel Maryland and District of Columbia Volunteers; as astronomer of boundary between California and Mexico, 1848-53, and commissioner and astronomer, 1854-57 (brevet lieu-

tenant-colonel); in suppressing Kansas disturbances and on Utah expedition, 1858, and on frontier, board, and inspection duties, 1858-61. He resigned May 9, 1861, and was reappointed May 14, 1861. He was lieutenant-colonel of Sixth Cavalry, serving in Virginia peninsula, 1862; engaged at Yorktown, Williamsburg, and Hanover Courthouse (brevet colonel); in department of the Gulf, 1862-63, engaged at Port Hudson, Camp Bisland, Lafourche Crossing, and Donaldsonville; in Red River campaign, 1863-64; engaged at Sabine Cross-roads, Pleasant Hill, and Cane River; in command of Nineteenth Corps, 1864-66; engaged at Marksville, defence of Washington, D. C., Opequan, Fisher's Hill (brevet brigadier-general), Cedar Creek (brevet major-general); in command of department of West Virginia 1865-66, of department of Washington 1869-71, and of department of the Gulf 1871-75; retired with rank of brigadier-general 1876.

GEORGE W. CULLUM.

**Emory College** is located in Oxford, Ga., 41 miles E. of Atlanta and 1 mile from the Atlanta and Augusta R. R. The college was chartered in 1837, and was opened in 1838 under the presidency of the Rev. Ignatius A. Few, D. D., LL.D. The college curriculum is full in all the departments taught in first-class institutions in this country. There are 14 members in the faculty, and the enrollment for 1882-83 numbered 311 students. The college is well supplied with buildings for recitation and other uses. It has an endowment of \$100,000, most of it being the gift of Mr. George I. Seney, president of the Metropolitan Bank, New York. In all, Mr. Seney has given the college \$125,000. Atticus G. Haygood, D. D., has been president since Jan. 1, 1876. The institution is under the patronage of the M. E. Church South, but it is liberal and broad enough to have gathered students from all Protestant denominations.

ATTICUS G. HAYGOOD.

**Emotion** [from the Lat. *e*, "out," and *moveo*, *motum*, to "move," hence to "feel"] is a psychological term which may be most easily explained by its relation to that of *sensation*. A *sensation* is simply the consciousness of a peculiar state of the body, pleasurable or painful; which consciousness reacts on the body purposing to continue or discontinue its present state. When no such reaction takes place, but the consciousness of a certain state of the body flows over into the imagination, the *sensation* becomes an *emotion*; when it passes into the intellect, it becomes a *cognition*.

**Emott** (JAMES and JAMES, JR.). See APPENDIX.

**Empannel**, or **Impannel**, to enrol a list of jurors; to write a list of the names of men who shall serve as jurors in any trial. The sheriff summons a number of persons, and prepares lists called the panels of the jury.

**Empedocles** [Gr. Ἐμπεδοκλῆς], a celebrated Greek philosopher, born at Agrigentum in Sicily, lived about 450 B. C. He acquired great fame and influence by his talents and varied attainments in science. It is said that his fellow-citizens offered him the crown, but he declined it, and used his influence to found a republic in his native state. He was regarded as a public benefactor, a great poet, and a predictor of futurity. He maintained the theory that the world is developed or compounded from four primary elements, fire, air, earth, and water. He wrote, besides other works, a poem on "Nature," of which fragments are extant. It appears that he accepted the doctrine that the souls of some men, at least, are destined to migrate through animal or vegetable bodies in order to purify them. The tradition that he threw himself into the crater of Mt. Etna to immortalize his name is not generally credited. He was admired by Aristotle and Lucretius, the latter of whom eulogizes him in his poem "De Rerum Natura." The fragments of Empedocles have been edited by Stein (1852) and others. (See RITTER, "History of Philosophy;" GLADSTONE, "Empedocles and die Aegypter," 1858.)

**Em'peror** [Lat. *impera'tor*, from *im'pero*, to "command;" Fr. *empereur*; Ger. *Kai'ser*], the sovereign who rules over an empire. The title *imperator* was conferred by the ancient Romans on their consuls in their military capacity, after this authority had been confirmed to them by the *comitia curiata*. The signification of *imperator* depended on that of *imperium*, which was the name given to the supreme power of the senate and people of Rome over the city and subject provinces. An officer clothed with authority by law exercised this *imperium* within the limits and time of his command. After any great victory the soldiers were accustomed to salute their commander as *imperator* as a compliment, though, as exercising the *imperium* attached to his command, he was already such in fact. He might be a consul or a proconsul, and the *imperium* was as necessary for a governor of a province as for a general who merely commanded an army. Under the republic there might be many *imperatores* at one time. On the subversion of the republic the title was conferred on Augustus for life. The authority of the Roman emperors was acquired by the

combination of the chief offices of the former republic in a single person; besides which, some extraordinary powers were granted or usurped. Thus, Octavius held the title of *imperator* and the office of consul by successive elections. He was made tribune, which gave inviolability to his person, and *pontifex maximus* and censor, which gave him control of religion and morals. He was also invested with perpetual proconsular authority, which gave him supreme control in all the provinces, and declared chief (*princeps*) of the senate, and Augustus, which last designation was assumed by his successors. The title *imperator* was assumed by the emperors on the occasion of victories of themselves or their armies. Aurelius is represented on a coin as *imperator* for the eighth time. With the early Roman emperors the term *imperator* did not denote the sovereign power. It is not easy to determine at what time the word came to be used in the modern sense of emperor as the proper name for the sovereign of the Roman state. The term *princeps* was used as a convertible term with it. The Roman emperors appointed their own successors, who received the title of *caesar* during the life of the emperor who appointed them. After the court was removed to Constantinople, the old titles and forms of the republic gradually vanished, and the emperors assumed the style of Oriental princes. The title of emperor of the Romans was conferred on Charlemagne by Pope Leo III. in 800 A. D., and was borne by his successors until the dissolution of the Holy Roman Empire in 1806.

On the 18th of Jan., 1871, King William I. of Prussia assumed the title of emperor of Germany at the request of all the German princes. Napoleon I. assumed the imperial style in 1804, and Napoleon III. in 1852. The latter was deposed after the battle of Sedan on the 4th of Sept., 1870. After the Greek empire had been divided into two parts in 1204, the rulers of both parts continued to bear the title of emperor, the Latin emperor residing at Constantinople, and the Greek emperor at Nicaea. In 1263 the two parts were reunited, and in 1328 the Greek empire was again divided into the empire of Constantinople and that of Trebizond. After the Turks had conquered these empires, the sultans assumed the title of emperor, which was recognized by the European powers in 1606. Czar Peter I. of Russia assumed the imperial title in 1721. After the dissolution of the Holy Roman empire in 1806 the rulers of Austria assumed the title of emperor of Austria. Outside of Europe there is at present only the empire of Brazil, though the British possessions in Asia constitute the "Indian empire," and the sovereign of Great Britain has the title of emperor of India. Several attempts have been made to establish other empires in America, but all have failed. In Mexico, Iturbide assumed the title of emperor in 1822, and Maximilian of Austria in 1864. In Hayti the negroes Christophe in 1811, and Souleuvre in 1849, reigned for a short time as emperors, but were soon deposed. The rulers of Morocco, China, and Japan are also sometimes called emperors. The modern idea of an empire in general seems to be a union of states, each with a local government, under the protection or political preponderance of one powerful state. The personal sovereign of such a state may by conquest or election become the emperor, sustaining a special governing relation to his own hereditary dominions, and a general control as emperor over the confederated, yet subordinate, states of the empire. But there is a tendency towards a looser use of the term as a mere title of the head of a kingdom.

**Emperor Moth** (*Saturnia pavonia minor*), the largest British lepidopterous insect, is allied to the silkworm moth, and belongs to the Bombycidae. Its wings when expanded measure three and a half inches, each wing having a large transparent spot. The peacock moth (*Saturnia pavonia major*) is five inches across the wings, being the largest species in Europe. Silk is obtained from cocoons of certain species of this genus.

**Em'phasis** [Gr. ἐμφασις, a "setting forth," from ἐμ-φαίνο, to "show;" Fr. *emphase*], in elocution, the stress laid on particular words or syllables in a sentence in order to express or enforce an idea or a meaning; sometimes a peculiar impressiveness or earnestness of expression.

**Emphyse'ma** [from the Gr. ἐν, "in," and φῦσσω, to "flow," to "puff up"], in pathology, an inflation produced by air or gas in the cellular tissue. Emphysema of the lungs is owing to dilatation of the air-vesicles.

**Emphyteu'sis** [Gr., from ἐν, "in," and φύτεω, to "plant" or "graft"] is a contract in civil law by which lands or tenements are given to be possessed for a long term or forever, and an annual rent (*canon emphyteuticus*) in money, grain, etc. reserved and made payable to the grantor, in recognition of his paramount title. The grantee acquires the *dominium utile* or usufruct, while the grantor reserves the *dominium directum*. The Scottish grant in feu-farm is

similar to the emphyteusis. The word *fief* is supposed to have been derived from emphyteusis.

**Empire.** See **EMPEROR**.

**Empire City**, capital of Coos co., Or. (see map of Oregon, ref. 7-A, for location of county), is on Coos Bay, 130 miles S. S. W. of Salem. Excellent lignitic coal is exported. Pop. of precinct in 1870, 381; in 1880, 412.

**Empir'ic** [Gr. *ἐμπειρικός*, "experienced;" Lat. *empiricus*; Fr. *empirique*], one whose knowledge or skill is founded on experience or experiment. In the time of Celsus and Galen there was a medical sect called *Empirici*, supposed to have originated with Philinus of Cos and Serapion. These empirics were opposed to the *Dogmatic* sect or school, and considered that medical science should be based on experience rather than theory. But they extended their idea of theory so far that they excluded anatomy from the medical study as a mere theoretical dream, and they narrowed their idea of experience so much that their whole art came to consist in prescribing certain remedies for certain ailments, without paying any regard to the natural requirements of the individual patient or the peculiar exigencies of the particular case. They became so notorious for ignorance that the term empiric is now generally applied to quacks and practitioners who are ignorant of medical science. In its application to philosophy empiric denotes one who depends for truth entirely upon sensual experience, independent of those limitations of the mind's constitution which condition and supplement it. Empiricism is a name applied by many of the German schools of philosophy to the system which may be called that of observation and induction, relying upon phenomena which are made evident in consciousness. They apply the term to the methods of Locke, Reid, and Stewart, without properly discriminating them from the materialists, to whom the term, in both ancient and modern times, has been legitimately applied.

**Empirical Laws** are expressions which set forth a general relationship in any class of phenomena, without attempting to explain the principle underlying that relationship. The underlying principle may, in fact, be unknown, as in the case of **BODE'S LAW** (which see). Bode's law is one of the most remarkable of all the empirical formulas known to science.

**Empiricus.** See **SEXTUS EMPIRICUS**.

**Emp'oli**, a town of Italy, in the province of Florence, is on the river Arno, 16 miles W. of Florence, with which it is connected by a railway. It is in a beautiful and fertile district, is well built, and has an interesting church, which was founded in 1093, and is adorned with paintings by Giotto. Here are manufactures of cotton fabrics, straw hats, etc. Pop. 5805.

**Empo'ria**, R. R. junction and city, capital of Lyon co., Kan. (see map of Kansas, ref. 6-I, for location of county), 61 miles S. S. W. of Topeka. It is between the Neosho and Cottonwood rivers, 6 miles above their junction, in a fine agricultural and stock-raising region. It has a large trade, and is one of the best-built towns in the State. It is the seat of the State normal school, with a fine large building, and has a court-house, flouring-mill, furniture, soap, and carriage factories. Pop. in 1870, 2168; in 1880, 4631; in 1885, 7759.

**Emporium**, R. R. junction, capital of Cameron co., Pa. (see map of Pennsylvania, ref. 3-D, for location of county), 99 miles W. N. W. of Williamsport. It has an important lumber-trade. Valuable salt-wells abound in the vicinity. Pop. in 1870, 898; in 1880, 1156.

**Empyreu'ma** [Gr. *ἐμπύρευμα*, from *εμπύρεω*, to "kindle"], the odor emitted by animal and vegetable substances when they are burned or decomposed by a strong heat. The oils obtained by the destructive distillation of organic substances at high temperatures are called *empyreumatic oils*.

**Ems** (anc. *Ami'sia* or *Ami'sius*), a river of Germany, rises in Prussian Westphalia, near Paderborn. Its general direction is northward. After a course of about 200 miles it enters the Dollart, an inlet of the North Sea, near the town of Emden. It is connected by a canal with the Lippe.

**Ems, or Bad-Ems** (i. e. "bath of Ems"), a celebrated watering-place of Germany, in the Prussian province of Hesse Nassau, on the river Lahn, about 7 miles S. E. of Coblenz. It is surrounded by picturesque scenery, and is situated in a beautiful valley among wooded hills. Here are warm mineral saline springs, the temperature of which varies from 93° to 135° Fahrenheit. It has good hotels, and is frequented by many visitors, including English and other foreigners. Pop. in 1881, 6943. In 1785 the archbishops of Treves, Mayence, Cologne, and Salzburg formed an agreement here, called the "Punctuation of Ems," in which they demanded in twenty-three articles the change

of several papal privileges in favor of the German archbishops. The real object, however, was the establishment of a national German Church. But in consequence of the opposition of their own bishops and the firmness of the pope, they were compelled to submit to the authority of the pope within a year. On July 13, 1870, the French ambassador, Count Benedetti, had at Ems the famous interview with King William of Prussia which precipitated the outbreak of the great war between France and Germany.

**Em'ser** (**HIERONYMUS**), a German Catholic theologian and adversary of Luther, born at Ulm Mar. 26, 1477, died at Dresden Nov. 8, 1527. He studied at Tubingen and Basel, and accompanied Cardinal Raymond of Petrandi on his tour of visitation through Germany, lectured afterward in the true humanist manner at Erfurt, where he had Luther among his hearers, and finally became private secretary to Duke Georg of Saxony and the incumbent of several rich benefices. His first literary efforts were some essays on the propriety of toasting each other when drinking, on the improvement of wine, beer, and vinegar, etc. Then followed a sort of apotheosis of Bishop Benno, which is found in the "Acta Sanctorum." His principal work, however, is his notes on Luther's translation of the Bible, to which Luther yielded in many cases. His own translation is worthless.

**E'mu, or E'meu** (*Dromaius Novæ Hollandiæ*), a large



Emu.

Australian bird, belonging to the Casuariidæ and allied to the ostrich and cassowary. It differs from the cassowary in being taller, having the bill horizontally depressed, and in being destitute of the bony crest and pendent wattles. When full-grown it is of a brown color, mottled with gray. It has only rudimentary wings, but is exceedingly fleet in running. The eggs are dark green, and about seven in number.

Both the eggs and flesh are esteemed excellent for the table. Its plumage is long and almost hair-like. The plumes are readily dyed of various colors, and appear to some extent in commerce as a substitute for ostrich feathers. It has become rare in the more settled parts of Australia, having been hunted for the sake of its oil, which the skin contains in large quantities. It feeds mostly on fruit, herbage, etc., and is easily domesticated.

**Emu Wren** (*Stipiturus malachyru*), a passerine bird of Australia, nearly allied to the wrens of Europe and Amer-



Emu Wren.



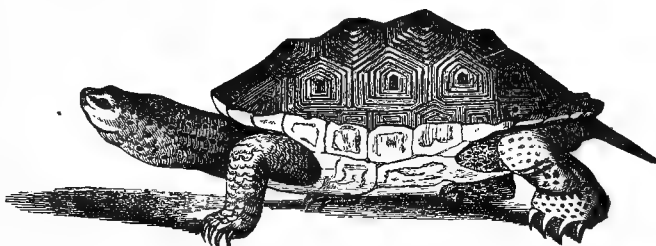
ica. The genus includes about a dozen Australian species. This bird haunts marshy districts, never alighting on high trees, and seldom taking to flight, but running rapidly about the grass with its long tail-feathers erect. It takes its name from these feathers, which are six in number, and have a real or fancied resemblance to the feathers of the emeu.

**Emul'sin** (*Synaptase*), an albuminous substance found in almonds, which acts as a ferment upon the glucoside amygdalin of bitter almonds, transforming it into bitter almond oil (hydride of benzoyl), hydrocyanic (prussic) acid, and glucose (grape sugar).

**Emul'sion** [from the Lat. *emul'geo*, to "milk"], the name of a liquid preparation resembling milk in color and consistence, and obtained by mixing oil and water by means of some other substance, mucilaginous or saccharine. Emulsions are useful in pharmacy.

**E'mys** [Gr.], a genus of chelonians or fresh-water tortoises. They differ from land-tortoises in having the feet more webbed and expanded, and the shell of the back more flattened. The painted tortoise (*Emys picta*) and alligator tortoise (*Emysaura serpentina*) are abundant in North America. Several species are natives of Southern Europe. DeKay makes the genus to include nearly all the fresh-water spe-

with reddish marks, and is red beneath. Its flesh is very good.



Salt-water Terrapin (*Emys palustris*), salt marshes of Eastern U. S.

The little spotted tortoise (*Emys guttata*), from five to nine inches long, is found throughout a great part of the U. S., is black, with roundish speckles or spots above, and is black and yellow beneath. It is sometimes caught on the land.

The salt-water terrapin (*Emys palustris*) is from five to seven inches long, being found in brackish tidal waters and salt marshes of our Atlantic coast, especially northward. It is one of the most highly prized of the terrapins. It is dug out of the mud in winter, when it is very fat, and marketed in considerable numbers for table use. Many other terrapins are known in the U. S., especially southward and westward.

**Enaliosau'rians** [from the Gr. *ἐνάλιος*, "marine" (*én*, "in," and *άλς*, the "sea"), and *σαῦρος*, a "lizard"], a group of extinct saurians having paddles for swimming instead of true feet, and having crocodilian teeth and biconcave vertebræ like those of fishes. Their remains first appear in the carboniferous rocks, and disappear in the cretaceous, being most numerous in the Jurassic strata. They appear to have been mostly or all marine. *Ichthyosaurus* is one of the most important of the genera.

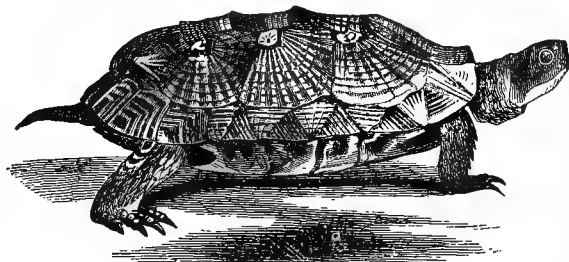
**Enam'el** [Fr. *émail*, from the Late Lat. *emal'tum*, "smalt," the blue color of enamel], a name given to various opaque or semi-opaque glasses used in glazing or finishing the surface of pottery, iron, and jewelry. Common glass fused with oxide of antimony or tin becomes a white enamel; oxide of cobalt produces a deep blue; manganese, an amethyst; cuprous oxide, a ruby-red; cupric oxide, green, etc. The hard external layer of the teeth is called "the enamel;" it contains a large percentage of phosphate of lime.

**Enamelled Leather**, leather the surface of which is rendered glossy by successive coats of linseed oil, and finally of a varnish of copal and asphaltum. (See LEATHER.)

**Enamel Painting**, the art of applying artistic painting to glass, pottery, or the metals, most glass-staining at present being simply enamel painting. The various colors (chiefly oxides of lead, platinum, gold, titanium, uranium, chromium, etc.) are mixed with some glass or "flux," ground, made into a paint with oil of spike or some other volatile oil, and then applied with a soft brush, the outline being usually first applied, and then burnt in at a great heat in a glowing muffle. Afterwards the outlines are filled up by repeated paintings and burnings, different colors requiring different treatment. Some faint idea of the needed skill may be formed from the fact that the painter has to work not with actual colors, but with substances which he knows will produce these colors after firing. Nevertheless, delicate shades and shadows can be thus produced, and there have been many famous and accurate enamellers of portraits. This art was well known in ancient Egypt and Etruria, and in mediæval times its use, derived from Byzantine and Moorish workmen, became common in France and Italy.

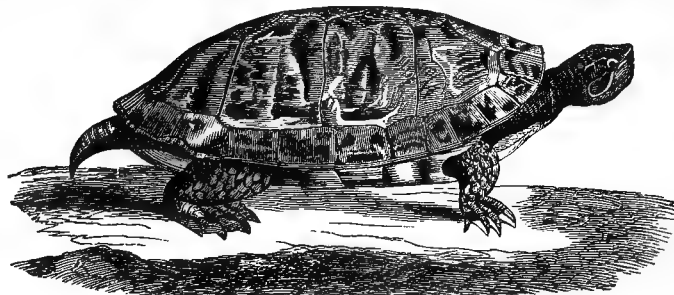
**Enara**, or **Enare**, a large lake of Russia, in Lapland, about lat. 69° N. and lon. 28° E. Area, 1050 square miles.

**Enarea**, a country of Africa, in Abyssinia, lies S. W. of Shoa. Its limits have not been accurately ascertained. It is between lat. 7° and 9° N., and is inhabited by Gougas. The chief exports are ivory, slaves, and



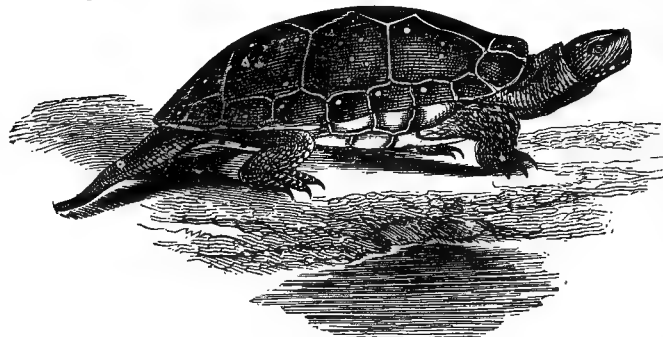
Wood Terrapin (*Emys insculpta*), U. S. and Canada.

cies in America, including fifteen or twenty in the U. S. They are generally known as terrapins, and many of them are prized for the table. Fossil remains of the genus are found in the eocene.



Red-bellied Terrapin (*Emys rubriventris*), found about New York.

The wood terrapin (*Emys insculpta*), found in the U. S. and Canada, is eleven inches long, of a reddish-brown color, with radiating lines of yellow. It is found in fresh waters, but perhaps oftener in fields and woods.



Spotted Tortoise (*Emys guttata*), U. S.

The red-bellied terrapin, common in the New York markets, is from ten to seventeen inches long, dusky in color,

coffee, the last of which is cultivated extensively. Capital, Sakka.

**Enarthro'sis**, the name given in anatomy to that kind of articulation which permits the widest range of motion. It is known as the ball-and-socket joint, and is formed by inserting the round end of one bone in the cavity of another, as in the hip and shoulder.

**Encampment** [Fr. *campement*], the position occupied by an army or body of troops, having pitched tents or erected huts for temporary lodgings; sometimes the act of pitching tents or encamping. Also a name used for the divisions of certain secret societies, as the so-called "Knights Templar."

**Encaustic** [Gr. *ἐγκαυστική*, from *καῖσις*, a "burning"], a durable species or method of painting which was practised by the ancient Greeks, and was so called from the process of burning the picture when completed. It was not developed until the later or more perfect period of Greek art. The pictures were executed with wax colors (*cereæ*), and finished by the application of a hot iron. The effect of an encaustic picture was probably similar to that of an ordinary *tempera* or water-color painting. Both *tempera* and water-color pictures were polished with a wax or encaustic varnish. Encaustic painting has not been practised with much success or to much extent by the moderns.

**Encaustic Tiles**, a variety of tiles used for the flooring of halls, churches, and public and private buildings. They were extensively made in the Middle Ages, and were then frequently employed for the ornamentation of walls. At present figured tiles are also extensively used in making flower-boxes for window culture. Encaustic tiles are plain or ornamented. Plain tiles are white or colored, and are sometimes glazed. They are made by pressing dry clay into a mould by powerful hydraulic presses, and afterward burning them. Figured tiles are moulded from moist clay, and the figures are added to the surface before burning. These tiles constitute an excellent though expensive material for floors. Fine examples of figured tile floors are to be seen in the Capitol at Washington. Holland and Belgium had anciently famous manufactures of tiles, but at present they are chiefly made in England.

**Enceinte** [Fr., from *enceindre*, to "gird about," to "enclose"], in fortification, signifies the main enclosure or the (generally) continuous enclosing line of wall and parapet of a fort or fortress. It is the inner boundary of the main ditch, and, according to its "trace" or "system," upon which its contour is broken, it distinguishes the character of the work as "bastioned," "polygonal," "tenaillé," etc. (See **FORTIFICATION**, by CAPT. O. H. ERNST, U. S. Army.)

**Enchasing, or Chasing**, is the art by which figures or ornamental patterns, raised or indented, are produced on metallic surfaces by means of steel tools or punches. It is extensively used by gold- and silver-smiths for the ornamentation of their work, being very well suited for the production of bold flutes, bosses, etc.

**Enchirid'ion** [Gr. *ἐγχειρίδιον*, from *ἐν*, "in," and *χείρ*, the "hand"], in literature, a brief and useful compilation; a manual. An ethical treatise of Epictetus is termed his "Enchiridion."

**Encho'rial** [Gr. *ἐγχώριος*, from *ἐν*, "in," and *χώρα*, "country"; that is, belonging to the country, not foreign], or **Demotic Writing**, a cursive or short-hand alphabet used in ancient Egypt. It was an abbreviation of the hieratic writing, which was itself an abridged form of the true hieroglyphics. Its remains are difficult to decipher. It began to come into use about the origin of the twenty-sixth dynasty (672-525 B. C.), and was still used in 200 A. D. It contained forty-two letters and forty-eight syllabic characters. It appears on the Rosetta Stone, and was extensively employed even in public documents. Remnants of this alphabet appear in the Coptic.

**Encina**. See **ENZINA**, DE LA (JUAN).

**Enck'e** (JOHANN FRANZ), a German astronomer, born at Hamburg Sept. 23, 1791. He received a prize for his determination of the orbit of the comet of 1680 (called Halley's comet), and published a work entitled "The Distance of the Sun" (2 vols., 1822-24). In 1825 he was appointed director of the Royal Observatory at Berlin and secretary of the Academy of Sciences. He investigated the orbit and movements of the comet which Pons discovered in 1818, and which is now designated Encke's comet. In 1830 he began to edit the "Astronomische Jahrbücher." Died Aug. 26, 1865.

**Enck'e's Com'et** was observed by Pons Nov. 26, 1818. In 1819, Encke first demonstrated that the same comet had been seen as early as 1786, and several times subsequently. He also found that its period was about 1200 days (3.303 years), its successive returns being accelerated and its

period shortened by a minute interval of time. It has the shortest period and the least aphelion distance of all the known comets.

**Enclaves** [from the Lat. *clavis*, a "key"] are small parts of one country which are entirely surrounded by another country.

**En'cratites** [Gr. *Ἐνκρατίταις*, the "self-controlling"], a name applied originally to the followers of Tatian the Syrian, who died about 172 A. D. They were also called Aquarians. They inculcated and practised total abstinence from flesh, wine, and marriage. Subsequently the name was applied to the ascetic Gnostics generally.

R. D. HITCHCOCK.

**En'crinal Limestone**, a name given by geologists to any limestone which is largely composed of the remains of crinoids, but more specifically applied to certain beds in the Helderberg and Hamilton groups in New York.

**En'crinites** ("stone lilies"), the popular name for crinoids, radiated animals which form an order in the class Echinodermata. The encrinites form many genera and species, nearly all of which are fossil. They abound in the palæozoic rocks, and are quite numerous in the mesozoic formations. In the present seas they are exceedingly rare, until recently only one species (*Pentacrinus capit Medusæ* of the West Indian seas) being known. The late deep-sea dredging expeditions have brought to light two or three more. *Comatula* in its early stage of existence so much resembles the encrinites that it was described as a crinoid (*Pentacrinus Europæus*), but in *Comatula* the stem is temporary, in the crinoids permanent. The stem consists of disks like button-moulds in form, set in a pile together, and in the living animal has some flexibility. It is mostly round or pentagonal, and is often finely sculptured on the articulating surfaces. Each joint of the arms is furnished with two cirri or appendages, which the animal uses in capturing its prey. The number of joints in the *Pentacrinus Briareus* is, according to Buckland, about 150,000. Immense numbers of these animals lived in the seas of the palæozoic ages. "We may judge," says Dr. Buckland, "of the degree to which the individual crinoids multiplied among the first inhabitants of the sea from the countless myriads of their petrified remains which fill so many limestone beds of the older formations."

**Encum'brance**. See **INCUMBRANCE**.

**Encyclopæ'dia, or Cyclopædia** [Gr. *ἐγκύκλιος* and *παιδεία* (i. e. a circular or general course of education)], a compilation usually, but not always, in alphabetic arrangement, which professes to impart information, more or less complete, upon the whole circle or range of human knowledge. The most noted of the earlier cyclopædic works were—the work of Speusippus (the nephew of Plato, died B. C. 339), not now extant; the great collections of Varro, of the Elder Pliny, of Stobæus, Suidas, Isidorus, and Capella, crude summaries of the then known arts and sciences; the "Speculum Majus," in 4 parts, of Vincent de Beauvais (1264), in 3 vols.; and other similar compilations. We should note also the work of Alfarabi of Bagdad (died A. D. 950). The earliest of modern encyclopædias was that of J. H. Alsted (1630, 35 books). L. Moréri's "Grand Dictionnaire" appeared in 1673; Hofmann's "Lexicon Universale," 1677, 2 vols.; T. Corneille's "Dictionnaire des Arts," 1694, 2 vols.; and P. Bayle's "Dictionnaire Historique et Critique," 4 vols., Rotterdam, 1697. In the eighteenth century the principal works were—J. Harris's "Lexicon Technicum," 2 vols. folio, London, 1710; Ephraim Chambers's "Cyclopædia," 2 vols. folio, 1728; Zedler's "Universal-Lexikon," 64 vols., Leipzig, 1732-50; the French "Encyclopédie" of the "Encyclopédists" Diderot, D'Alembert, Voltaire, Rousseau, Grimm, and Helvétius, 28 vols., 1751-72; 7 vols., 1776-80; the "Encyclopædia Britannica," 3 vols., 1771; 2d ed. in 10 vols., 1776-83; a 3d ed. in 18 vols., 1797; the "Deutsche Encyclopædie" of Köster and Roos, 1778-1804; and the "Encyclopédie Méthodique par Ordre des Matières," 1781-1832, 201 vols. In the nineteenth century the first European work was Dr. A. Rees's "Cyclopædia," 1802-19, in 45 vols. A work called the "British Encyclopædia," edited by Thomas Dobson, was published in Philadelphia 1798-1804; Dr. Brewster's "Edinburgh Encyclopædia," 18 vols., 1810-30, followed. The "Conversations-Lexikon" of F. Brockhaus, Leipzig, 1812, and of which 13 eds. have appeared, was the basis of many other cyclopædias. The "Encyclopædia Metropolitana," 1818-45, 30 vols. 4to, was a series of scientific treatises, as was also "Lardner's Cyclopædia." The "Encyclopædia Americana," 1829-33, 13 vols., and supp. vol., 1848, edited by Prof. Lieber, was based on the "Conversations-Lexikon." The "Penny Cyclopædia," 28 vols., 1833-43, subsequently rearranged in 4 divisions and 27 vols. as the "English Cyclopædia," 8 new eds. of the "Encyclopædia Britannica," the 9th now

publishing; the "London Encyclopædia," 22 vols., 1829; and Messrs. W. & R. Chambers's "Encyclopædia," 10 vols., 1859-68, are the principal British cyclopædias of this century. In German the "Allgemeine Encyclopædie" of Ersch and Gruber, 1818 *seq.*, 160 vols. issued; Meyer's "Grosse Conversations-Lexikon," 52 vols., 1840-55; Pierer's "Universal-Lexikon," 1840-46, 34 vols.; 5th ed. 1867-71, 19 vols.—are the best cyclopædias. The French have "Encyclopédie des Gens du Monde," 1833-44, 22 vols. 8vo; "Encyclopédie Moderne," 36 vols. 8vo, 1848-57; "Encyclopédie Catholique," 18 vols. and sup.; "Dictionnaire de la Conversation," 68 vols., 1839-51; a later edition not yet complete. The later American cyclopædias have been—"The New American Cyclopædia," 16 vols., 1857-63, revised as "The American Cyclopædia," 16 vols., 1873-76; Zell's "Encyclopædia," 2 vols. large 4to, 1869-72; an abridgment, in 1 vol. 4to, 1872; "The National Encyclopædia," 8vo, 1872 *seq.*; an edition of Chambers's "Encyclopædia," printed from imported plates, 10 vols. 8vo; Schen's "German-American Encyclopædia," 1869, 8 vols. (unfinished); "Johnson's New Universal Cyclopædia," 4 imp. 8vo vols., 1874-77; "People's Cyclopædia of Universal Knowledge," 1879; "Johnson's Universal Cyclopædia (Revised)," 1885, 8 imp. 8vo vols.; "Johnson's New General Cyclopædia and Copper-Plate Hand-Atlas of the World," 2 vols. 8vo, 1885. Works treating of only a single department of science, literature, or art have been called improperly *encyclopædias*. They are really dictionaries. (See also **DICTIONARY** and **LEXICON**.) L. P. BROCKETT.

**Endem'ic** [from the Gr. *ἐν*, "in" or "within," also "among," and *ἄνθρωπος*, a "people"]. A disease is called endemic when it is either peculiar to some locality, or, much more frequently, when it often occurs in a particular region. "Epidemics" visit a community for a time, and then disappear.

Endemic influences are receiving profound study from students of medicine and social science. The investigations deal with climate, topography, geology, water supply, personal habits and character, moral, religious, and political conditions, and (since the origin of the germ-theory of disease) with the study of minute animal and vegetable organisms. The study of endemic influences has given rise to the new science of medical geography. (See MURRY, "Noso-Geographie," 2 vols.; BOUDIN, "Traité de Géographie et de Statistique Médicales, et de Maladies Endémiques," 2 vols., 1857; SIR RANALD MARTIN, "On the Influence of Tropical Climate;" the "British Army Medical Reports," annual since 1859.)

**Ender'mic** [from the Gr. *ἐν*, "in," and *δέρμα*, the "skin"] **Meth'od**, a manner of administering medicines formerly sometimes employed, by which the skin was made to absorb the remedy used. In some instances a blister was raised, and the medicine—for example, sulphate of morphia—was applied to the blistered surface. This plan, though often surprisingly effective, has been superseded by the hypodermic method, in which the medicine is introduced under the skin by a small needle-pointed syringe.

**En'dicott** (JOHN), colonial governor of Massachusetts, was born at Dorchester, England, in 1589. He came to America in 1628, was acting governor of Massachusetts Colony in 1629-30, and was elected to that office in 1644, again in 1649, and re-elected to it every year from 1650 to 1665, except in 1654. He was a bold and energetic man, a zealous Puritan, and intolerant of whatever he considered wrong. Under his administration, from 1659 to 1661, four Quakers who refused to obey the laws, which banished them from the colony, under pain of death if they returned, were executed in Boston. He died Mar. 15, 1665.

**Endicott** (W. C.). See **APPENDIX**.

**En'dive** [Lat. *intubum* or *intybum*], (*Cicho'rium En'div'in*), a biennial herbaceous plant of the order *Compositæ*, cultivated in the gardens of Europe and naturalized in the East. Its blanched radical leaves are used as a salad. It is a native of Eastern Asia.

**End'less Screw**, a piece of mechanism formed by combining the screw with a cog-wheel, or by making a screw act on the threads of a female screw sunk in the edge of a wheel. The axis of the screw may be either in the plane of the wheel or at right angles to it; in the latter case it is called the American endless screw. In its mechanical principle the endless screw is a combination of the inclined plane and the lever.

**End'licher** (STEPHEN LADISLAUS), an eminent botanist and linguist, born at Presburg, in Hungary, June 24, 1804. He studied several Oriental languages and the natural sciences. In 1828 he became director of the Imperial Library of Vienna. He obtained in 1840 the chair of botany in the university of that city. He published several works on botany, which were splendidly illustrated. Among his

numerous works are "Genera of Plants, arranged according to the Natural Order" (in Latin, 1836-40), "Iconographia Generum Plantarum" (1838), and "Rudiments of Chinese Grammar" (1845). He favored the popular cause in the revolutionary movement of 1848. Died Mar. 28, 1849.

**Endocardit'is** [from *endocardium* and the termination *-itis*, denoting "inflammation"], an inflammation of the endocardium. It is generally of rheumatic character, and, though not often immediately fatal, it is a frequent cause of organic disease and deformity of the heart and its valves. It is frequently associated with pericarditis, and its occurrence is one of the results always to be feared in rheumatic fever. It is usually attended by pain or discomfort about the heart, and is detected by auscultation. It produces peculiar murmurs in the heart, the significance of which can only be appreciated by the trained physician. The disease is very intractable. Sedatives, such as hydrocyanic acid, belladonna, aconite, and digitalis, may be useful in acute stages. The alkaline treatment for rheumatism is often advantageous. Patients sometimes, though not very frequently, entirely recover.

**Endocar'dium** [from the Gr. *ἐνδον*, "within," and *καρδία*, the "heart"], a name applied to the serous membrane lining the chambers and valves of the heart.

**En'docarp** [from the Gr. *ἐνδον*, "within," and *καρπός*, "fruit"], a botanical term applied to the inner coat or layer of a fruit, as the stone of the cherry and peach.

**En'dochrome** [from the Gr. *ἐνδον*, "within," and *χρῶμα*, "color"], the coloring-matter of plants, especially of the lower classes of plants. In the higher classes of plants it is called chlorophyll when green, and various modifications of it are believed to produce the colors of flowers, of autumn leaves, etc. Several theories have been proposed to account for these various colors, but none are quite satisfactory. The endochrome of the lowest plants has been pronounced by some chemists to be identical with chlorophyll, except when stained by the presence of iron, etc., as in diatoms.

**En'dogens**, or **Endog'enous Plants** [from the Gr. *ἐνδον*, "within," and *γενέω*, to "be born," to "grow"], one of the primary classes of plants, are sometimes called **Monocotyledonous**. All flowering or phænogamous plants are divided into two classes, the endogens and the exogens. The former are so called because their stems grow by additions to the inside, so that the outer part is the oldest and hardest. The stems present no manifest distinction into bark, wood, and pith, but the woody fibre and vessels are in bundles which are irregularly imbedded in the cellular tissue. They have no true medullary rays, nor proper bark, nor concentric annual rings. The leaves are mostly parallel-veined, and sheathing at the base. The stems of most endogens produce terminal buds, but no lateral buds, and therefore are unbranched. The stem generally ceases to increase in thickness at an early stage of its growth, long before it attains its full height. In many of the grasses the stem is hollow or fistular. The endogens of temperate and cold climates are mostly small herbaceous plants, as grasses, lilies, and rushes; but in warm climates occur numerous endogenous trees, as the palm and pandanus or screw-pine. The embryo of all endogens has a single cotyledon, and the plumule has alternate leaves. Most endogens have the parts of the flower in threes, and the leaves in the vast majority are parallel-veined.

**En'dor**, an ancient village of Palestine, on the northern declivity of Little Mount Hermon, 18 miles S. E. of Acre.

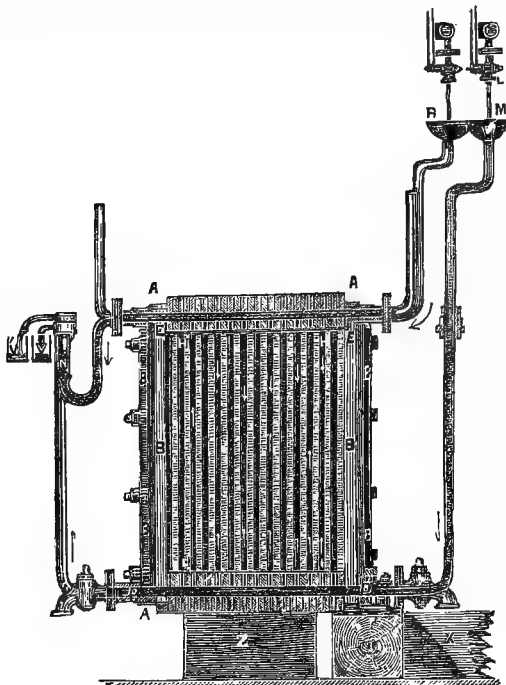
**Endorse** [from the Lat. *in*, "on," and *dorsum*, "the back"], in heraldry, the smallest diminutive of the pale; an ordinary containing the fourth part of a pale.

**Endorse**, or **Indorse**, to write on the back of a promissory note or other written instrument; to sanction; to become responsible for (a bill or note). The party who endorses is called the *endorser*. Each endorser is liable for the payment of a bill or note in case the drawee or acceptor fails to pay, as the case may be, provided that protest is legally made in time.

**En'dosmose**, or **Endosmo'sis** [from the Gr. *ἐνδον*, "within," and *ὄσσω*, to "impel"], and **Exosmose**, together called **Liquid Diffusion**, **Osmose** or **Osmotic Action**, are properties of animal and vegetable membranes first observed by Dutrochet (*Ann. Chim. Phys.*, xxxvii. 191), and subsequently investigated very fully by Graham. If two different liquids or gases which are capable of mixing with each other, as water and alcohol, are separated from each other by such a membrane as paper, caoutchouc, or a bladder, the one liquid being suspended in a bladder in the other, the liquid in the bladder will pass through the bladder into the other (exosmose), or the liquid without will pass into the bladder (endosmose), or both endosmose and exosmose will take place at the same time; and in this case the

current continues until there is an equal proportion of both liquids on either side of the bladder. These phenomena are due to the attraction which the two liquids have for each other and for the diaphragm separating them. These phenomena are essential to organic life, and perform important parts in many physiological acts. Advantage is taken of them in dialysis and many other operations of the chemist.

Diffusion is applied in France and Germany to the extraction of the saccharine juice from beets and to the separation of alkaline salts from beet molasses. For the latter purpose the "osmogene" was devised by Dubrunfaut. (*Comptes Rendus*, lxxv. 692. See also WALKHOFF's "Rüben-



Dubrunfaut's Osmogene.

zucker-fabrikant.") The osmogene consists of a box (B B) containing sheets of parchment paper (H H) held in a vertical position by wooden frames with rubber padding (A A). A stream of water (M V) flows through the box, filling half the spaces between the diaphragms. At the same time a stream of molasses (R V) flows through, filling the alternate spaces. The alkaline salts diffuse through the parchment, purifying the molasses to such an extent that the process is a profitable one for the manufacturer.

**Endow'ment**, the act of appropriating a fund for the support of a charitable institution, a professorship, or a college; also the fund or revenue devoted to such a purpose or permanently appropriated to any object; sometimes a gift of nature, an innate faculty or quality.

**Endröd**, a village of Hungary, in the county of Békés-Csanád, on the river Körös, 90 miles E. S. E. of Pesth. Pop. 8714.

**Endym'ion** [Gr. Ἐνδυμίων], in the Greek mythology, a beautiful youth beloved by Diana (Selene), who cast him into an everlasting sleep. One tradition represents him as a son of Zeus (Jupiter), who gave him immortality and perpetual sleep. Some persons suppose that Endymion is a personification of the sun or of the plunge of the setting sun into the sea.

**En'ema** [from the Gr. ἐνίμι, to "send in"], a liquid substance thrown into the rectum by injection, either as medicine or nourishment.

**En'emy** [from the Lat. *in*, negative, and *ami'cus*, a "friend;" Fr. *ennemi*; Ger. *Feind*], one hostile to another; a foe, an adversary, an antagonist; applicable to an individual or a nation. Also one who dislikes any individual or cause; a hostile army or force. In international law, the enemy is one who has publicly declared war against us, or against whom we have made such a declaration. This declaration must be made by a duly organized state or kingdom, for such a declaration by any turbulent body of men is not sufficient. Hostilities having been formally declared, every subject or citizen of the hostile nations becomes an enemy of the opposing state, and all intercourse or communication

between the citizens of one hostile state and those of the other is unlawful. An enemy cannot, as a general rule, enter into any contract which can be enforced in the courts of law; except, for example, when a state permits expressly its own citizens to trade with the enemy; and perhaps a contract for necessities or for money to enable the individual to get home might be enforced. An alien enemy cannot, in general, sue during the war a citizen of the U. S., either in the courts of the U. S. or those of the several States. The word *enemy*, in a still more extended sense, includes any of the subjects or citizens of a state in amity with the U. S. who have commenced, or who have made preparations for commencing, hostilities against the U. S.; and also the citizens or subjects of a state in amity with the U. S. who are in the service of a state at war with them. The Latins had a particular term (*hostis*) to denote a public enemy, and distinguished from him a private enemy by the term *inimicus*. In our language we have but one word for these two classes of persons. (See CONTRABAND, EMBARGO, PIRACY, and WAR.)

**En'ergy** [Gr. ἐνέργεια, from ἐν, "within," and ἐργον, "work"], in physics, the capability of effecting physical changes; that is, of doing work or overcoming resistances. It is called *actual energy* in reference to the work it is doing, and *potential energy* in reference to that which it is capable of doing, but has not yet done. A bent spring possesses *potential energy*; the same spring set free exerts *actual energy*. Energy is called *visible* when motion is directly perceptible in the moving body; it is called *molecular energy* when the motion occurs among the particles of a substance, and is not directly perceptible. Visible energy is called *kinetic* when it is due to visible motion; the kinetic energy of a moving body is equal to the weight in pounds multiplied by the square of the velocity, and divided by twice the acceleration due to gravity. When a body moves to the highest point in its course, its kinetic energy is exhausted, or rather converted into *potential energy*, which is due entirely to advantage of position. As kinetic energy decreases, potential energy increases, and the sum of the two in any moving body is always the same. Molecular energy is due to heat, actinism, chemism, electricity, etc. Various machines, such as the steam-engine, the telegraph apparatus, etc., depend for their action upon the conversion of molecular into kinetic energy. (See CORRELATION OF FORCES.)

**Enfantin** (BARTHÉLEMI PROSPER), a French socialist and leader of the Saint-Simonians, born in Paris Feb. 8, 1796, died there Sept. 1, 1864. He was destined for the army, and educated in the École Polytechnique; but when Louis XVIII. closed the school, in 1815, he sought employment in mercantile business. After travelling for several years in Russia, Germany, and the Netherlands as agent for a French winehouse, he entered a French banking-house in St. Petersburg in 1821, and became in 1823 cashier in the Caisse Hypothécaire in Paris. In 1825 he made the acquaintance of Saint-Simon, and was completely captivated by his ideas. Shortly after the death of the master he founded, together with a brother-pupil, Olinde Rodriguez, a communistic paper, "Le Producteur." Though the paper was stopped very soon, the sect continued spreading; and after the revolution of 1830 it organized itself, under the lead of Enfantin and Rodriguez. Enfantin's declaration against marriage and in favor of free love caused a split in the organization, and his imprisonment in 1832 for offences against public morality finally led to its dissolution. He afterward spent some years in Egypt, was appointed postmaster of Lyons in 1841 and director of the Paris-Lyons railway in 1845, and founded the paper "Le Crédit" in 1850; but he continued true to the last to his ideas. Among his writings are "Doctrines de Saint-Simon" (1830), "Economie politique et Politique" (1831), "La vie éternelle" (1861), and a great number of articles in the papers.

**En'field**, a town of England, in Middlesex, on the London and Cambridge Railway, 10 miles N. of London. Here is a large manufactory of small-arms belonging to the government. Pop. 16,053.

**Enfield**, on R. R., Grafton co., N. H. (see map of New Hampshire, ref. 6-E, for location of county), 42 miles N. W. of Concord. The United Society of Shakers occupy a portion of the town; they manufacture brooms, tubs, and pails, and raise garden-seeds. The three lakes in the town and the beautiful scenery around them make this one of the most delightful summer resorts in New Hampshire. There are two woollen-mills, and manufactures of furniture, flannels, leather, lumber, knit goods, carriages, etc. Pop. of township in 1870, 1662; in 1880, 1680.

**Enfield**, on R. R., Halifax co., N. C. (see map of North Carolina, ref. 2-I, for location of county), 18 miles from Weldon and 144 from Wilmington. It contains several

steam saw-mills and one steam grist-mill. There is a large wine-manufactory in the vicinity. The principal export is cotton, of which annually 5000 bales are shipped to the North. There are also exported per annum about 15,000,000 feet of lumber, 500,000 staves, 3000 bushels of early peaches, besides shingles, wine, and brick. A gold-mine is worked in the neighborhood. Pop. in 1880, 504.

**Enfield (WILLIAM), LL.D.**, an English dissenter and writer, born at Sudbury in 1741. He preached in the Unitarian churches of Liverpool, Warrington, and Norwich, and published several volumes of sermons and a "Preacher's Directory" which is highly commended. Amongst his other works is a "History of Philosophy" (1791), abridged from Brucker's history. Died Nov. 3, 1797.

**Enfield Rifle-Musket**, a variety of small-arms manufactured at Enfield, England, at the royal small-arms factories. During the late civil war the U. S. government and the Confederates each purchased large quantities of these and other European arms, on account of the difficulty of supplying the large numbers of troops with the necessary weapons. The Enfield rifle, though a very serviceable weapon, much better than the Belgian and Austrian arms then imported, was in almost every respect inferior to the old Springfield (U. S.) rifle-musket, which it much resembles. All these weapons have now given place to various breech-loading arms.

**Enfilade** [Fr.], a discharge of musketry or artillery made in a direction parallel to the length of a line of troops or of a line of rampart, so that the shot rakes the whole line. A trench or parapet is said to be *enfiladed* when guns are so placed that the shot can be fired into it in a direction coincident with its length.

**Engadine, or Engadin**, an extensive valley in Switzerland, canton of Grisons, is about 45 miles long, and has an average width of 1½ miles. The noble Bernina Mountains separate this valley from the Valtelline. It is the upper part of the valley of the river Inn, which runs along it in a north-east direction between two chains of the Alps. The highest part of the valley is 5900 feet above the level of the sea. The climate is very cold, and snow and frost occur even in July. The valley is divided into the Upper and Lower Engadine. There are several glaciers and a number of valuable mineral springs. The inhabitants number about 12,000, and speak a peculiar Romanic dialect, called Ladin. The people are mostly Protestants. The valley is very beautiful, and affords much timber and pasturage. The Lower Engadine is well cultivated, but less beautiful than the upper valley. The people are a pious, simple class of peasantry. The young men are known throughout Europe as good confectioners and coffee-house keepers. They usually amass a competence, and return to enjoy their small fortunes in their native valley. The government is a pure democracy. The noble Cembra pines which adorn this valley are of great value.

**Eng** ("right") and **Chang** ("left"), the Siamese Twins. They were born at Bangesau, Siam, April 15, 1811, of a Chinese father and a Chino-Siamese mother, and brought to the U. S. in 1829. Since that time the twins were on exhibition in America and Europe a number of times, and died, after having lived, as Eng and Chang Bunker, about twenty years in the neighborhood of Mount Airy, N. C., in Jan., 1874, the death of Chang preceding that of Eng a few hours. They differed in appearance, character, and strength more than average twins, performed their physical functions separately, and were addicted to different habits, Chang being intemperate and irritable, Eng sober and patient. Both were married and had large families of children, a number of whom died young, but none exhibited any malformation. Chang received a paralytic stroke in Aug., 1870. He died unexpectedly while his brother was asleep, after having been affected with an inflammatory disease of the respiratory organs. Eng died a few hours afterwards, probably chiefly from the influence of the nervous shock on learning the sudden death of his brother. They are the best known of the "double monsters" on record, none others of whom ever lived to the advanced age of sixty-three. The "Hungarian Sisters," Judith and Helena, who were born in 1701, and connected at their sacral regions, lived up to twenty-one years of age, and also the "Two-headed Nightingale," two mulatto girls of North Carolina, born in 1851.

The connection of the Siamese Twins took place in their epigastric regions, between the navel, which was common to both, and the ensiform processes, which were bent out in a forward direction and met very closely, held together by a ligamentous apparatus. The connecting band was a few inches long, after having elongated a little during the long life of the twins, and eight inches in circumference (two and a half in diameter). It was covered with skin, which in the median line had a narrow zone with common

sensitiveness. Inside the skin there was normal subcutaneous and muscular tissue, portions of the muscles of one crossing those of the other. The interior was occupied by the prolongation of the peritoneum in such a manner that at the post-mortem examination a hand introduced into the abdomen of Chang entered two pouches reach-



Eng and Chang (the Siamese Twins).

ing into Eng, and a hand introduced into the abdominal cavity of Eng entered one pouch (lying between the two of Chang's) which was long enough to be extended into the abdomen of Chang. The livers of the twins were located in close proximity to the connecting band, and connected with each other by small blood-vessels, which were lined with a thin layer of genuine liver tissue. Thus, the question whether a separation of the twins by surgical means would have been possible, must be answered negatively. The severing knife would have injured the peritoneum of both brothers, and resulted in a very dangerous (although perhaps not necessarily fatal) inflammation. The greatest danger would have resulted, however, from the lesion of the short connecting blood-vessels, particularly the vein, and the accompanying liver tissue. Two separations, by surgical interference, of "double monsters" are on record: one is reported by König in 1689, one by Boehm in 1866. (*Virchow's Archiv.*) The latter operated on his own twin daughters in 1861; one died after three days, the other was alive in 1866, at the age of five years. In both cases the connection of the twins took place in the exact place where the Siamese Twins were attached to each other, but the connection was confined to the skin and subcutaneous tissue only.

A. JACOBI.

**Engano**, an island of the Malay Archipelago, is near the S. W. coast of Sumatra. It is over 30 miles in circuit, and is rather high and well wooded. Area, 400 square miles. The people are of Malay race, and are independent. The island has a good harbor, but is mostly surrounded by coral-reefs. Lat. 5° 21' S., lon. 102° 20' E.

**En-gedi** [Heb. *Eyn Gedi*, the "kid's fountain;" the modern *Ain Fidy* of the Arabs], a town several times mentioned in the Bible, and also called *Hazezon-tamar*, alluding to its palm trees, which have now disappeared. It stood on the W. side of the Dead Sea, at a point about equally distant from its N. and S. extremities. Here are found some ruins of the old town, which stood in a very fertile spot near the fine fountain which gave it a name. There are numerous caves in the vicinity. These served as hiding-places for King David and his followers in the days of their outlawry during the reign of Saul.

**Eng'el (ERNST)**, a very prominent German statistician, born in 1821, became in 1860 director of the statistical bureau in Berlin, and presided in 1863 in the International Statistical Congress in Berlin. He published the "Zeitschrift des statistischen Bureau" (since 1860), the "Jahrbuch für die amtliche Statistik des Preussischen Staates" (since 1863), and "Preussische Statistik" (since 1866).

**Engel (JOHANN JAKOB)**, a German author of much merit, was born at Parchim Sept. 11, 1741. He became professor of belles lettres in Berlin in 1776. Among his works are "Ideen zu einer Mimik" (2 vols., 1785), and "Lorenz Stark" (1795), a romance which was very popular. His



works are characterized by a refined taste and great elegance of diction. Died June 28, 1802.

**Engel** (JOSEPH), a German anatomist, born in 1816, became professor of descriptive anatomy at the University of Zurich in 1844, professor of pathological anatomy in Prague in 1849, and of descriptive anatomy at the Joseph Academy in Vienna in 1854. He published, among other works, "Specielle pathologische Anatomie" (1856), "Das Knochengestüst des Menschlichen Antlitzes" (1850), and "Compendium der topographischen Anatomie" (1859).

**Engelberg**, a village in a valley of the same name, in the canton of Unterwalden, Switzerland, at the foot of Mount Titlis. It is famous for its school, which is connected with a stately Benedictine abbey, *Mons Angelorum*, founded by Pope Calixtus II. in 1120, and rebuilt in 1729. It has a good old library and some valuable paintings. Here is also a famous cheese-cellar of great extent.

**Engelbert**, a voluminous old Benedictine author, was abbot of Admont in Styria, and died in 1331. He was of noble birth. Of his numerous works the most important was a Roman history, "De ortu, progressu et fine imperii Romani," published in 1553 and 1803. Several theological tracts of his production have been published by Pez, with a biography and a full list of his works.

**Engelbert**, SAINT, a son of Engelbert, count of Berg-Geldern, was born in 1185. He became in 1215 elector of the empire and archbishop of Cologne, having when twenty-two years old declined the bishopric of Münster. He paid off the debt of the electorate, enlarged its territories, and reformed its administration. When the emperor Frederick II. went to Italy, Engelbert was the principal regent in Germany. He reformed the corrupt clergy, checked the power of the nobles, and zealously advanced that of the Church. His energy and rigor made many enemies, and he was murdered by his own nephew Nov. 7, 1225. The murderer, Count von Isenburg, was broken on the wheel, and his accomplices, the bishops of Osnabrück and Münster received excommunication. Saint Engelbert is one of the characteristic figures of German mediæval history, recalling Saints Dunstan and Thomas à Becket, but he seems to have possessed more zeal for the purity of the Church than they showed, and an energy equal to theirs in extending its power. His life was written by Cæsar of Heisterbach, and in recent times by Ficker.

**Engelbrecht** (JOHANN), a German enthusiast, born at Brunswick in 1599. He was a tailor's son, and worked at his father's trade until his health failed. He was liable to cataleptic attacks, during which he went for many days without food or drink. In 1622 he set himself up for a prophet, in all sincerity regarding himself as a divinely-inspired teacher. His writings have been in part translated into English. Though he was quite unlettered, some of Engelbrecht's books, like his addresses, display considerable power and an insight into spiritual things. After suffering imprisonment and enduring much obloquy, he retired from public life and died in 1642.

**Eng'elmann** (GEORGE), M. D., a German botanist and physician, born at Frankfort-on-the-Main Feb. 2, 1809, was educated at Frankfort, Berlin, and Heidelberg, removed to the U. S. in 1832, and settled at St. Louis in 1835. He founded there a journal called "Das Westland." He is especially eminent for his researches in the Cactaceæ, the dodders, the euphorbias, junco, conifers, and other difficult departments of botany. He has published various monographs on botany and meteorology.

**Eng'elstoft** (CHRISTIAN THORNING), a Danish theologian, born in 1805, became in 1845 professor of theology at the University of Copenhagen, and in 1851 bishop of Fühnen. He wrote, among other works, a "Manual of Church History" (1845).

**Enghien**, a town of Belgium, province of Hainaut, about 20 miles S. W. of Brussels, with which it is connected by railway. It has a superb château of the Aremberg family, and manufactures of cotton and linen fabrics. The family of Bourbon-Condé derived from it the title of duke. Pop. 3852. The great Condé was styled in his youth Duc d'Enghien.

**Enghien, d'** (LOUIS ANTOINE HENRI DE BOURBON), DUC, a French prince, born at Chantilly Aug. 2, 1772, was the eldest son of the duke of Bourbon. He became an *émigré* in 1789, and joined in 1792 the army of the prince of Condé, who was his grandfather. He fought against the French republic until 1799. In 1804 he married the princess Charlotte of Rohan-Rochefort, and became a resident of Ettenheim in Baden. Here he was seized by the order of Bonaparte, carried to Vincennes, tried by a military court, and shot Mar. 21, 1804, on the pretext that he was an accomplice of Cadoudal in a conspiracy against Bonaparte. This

act excited great indignation, as it is generally believed that D'Enghien was not guilty.

**En'gine** [probably from the Latin *ingenium*, "natural capacity," "invention"], a name given to a variety of mechanical contrivances designed to apply the forces of nature in performing useful work. In a general sense, the word is often applied to any powerful machine, but its use in industry is restricted to prime movers. Here also a distinction is to be observed. Prime movers of great simplicity, like windmills and water-wheels, are not called engines. Something implying the exercise of ingenuity (*ingenium*) in the combination of parts and the adaptation of means to ends is necessary to entitle a machine to be ranked in this class.

The forces which engines are employed to apply and utilize are principally heat, gravity, and electricity. Those in which the efficient force is heat, called in general thermodynamic engines, occupy the first rank as it respects their industrial value; and among these the class of engines in which steam is the vehicle employed to utilize the heat are the most important of all. The varieties of steam-engines are almost as numerous as the uses to which they are applied; but in most the elastic force of the steam is employed to impart, by direct pressure, a reciprocating rectilinear motion to a piston within a cylinder, this motion being usually converted into a rotary motion by means of a crank. Such is the principle of all the large stationary engines used to drive the machinery of factories, foundries, etc., and generally of those employed to propel vessels on inland waters or on the ocean, or to drag trains upon railways. Such also is the principle of most of the steam-engines used in the minor industries, and of the portable engines (called by the French *locomobiles*) employed in agriculture and for miscellaneous purposes.

The real or supposed disadvantages attendant on the use of crank motion have led many inventors to seek a form of construction for the engine in which rotary motion should be produced by the direct action of steam. Hence there has sprung up a very numerous tribe of "rotary engines;" none of which, however, have secured a very general acceptance. (See ROTARY STEAM-ENGINE.) A plan of marine engine has also been proposed, and perhaps constructed, in which the rotary and reciprocating motions are in a certain sense combined, the piston being a plane passing through the axis of the cylinder, around which (axis) it vibrates through a considerable arc. The object in this case is to economize space, and to keep the heavy parts of the engine as low down in the ship as possible. Finally, Bishop's disk engine, another marine engine intended for driving propeller screws, employs as a piston a disk, which, moving in what may be called an equatorial spherical sector upon a ball-and-socket joint at the centre of the sphere, gives to the polar axis a motion of nutation by which the crank is driven. This construction is said to have been very successful.

The first application of steam to produce a useful effect was made by Captain Thomas Savery, a British engineer, in a contrivance for the drainage of mines or the elevation of water generally, of which he exhibited a model in 1669 to the Royal Society of London—a contrivance usually but improperly called Savery's engine. This consisted of a vessel, or pair of vessels, of metal, ellipsoidal in form, called receivers, connected at the bottom by a tube having a valve opening upward with the water to be raised, and having a pipe descending to the bottom of the receiver within, but furnished with a stop-cock at top, which communicates upward with the level at which the discharge is to take place. In this apparatus, the cock being open, the air is first expelled by steam introduced from a boiler; the cock being then closed, the steam is condensed by means of cold water applied to the surface of the receiver; into the vacuum formed by this condensation the water then enters by force of atmospheric pressure, lifting the valve; the receiver being full, the cock is once more opened, the valve closing spontaneously, and steam is introduced at the highest point of the vessel, pressing on the surface of the water, and driving it upward through the discharge-pipe. Owing to the small conducting power of fluids for heat downward, the temperature of the water is very little raised during this operation, and that only near the surface. This contrivance, though very wasteful of heat, came into quite general use in England. One of the first uses to which the inventor himself applied it was for the raising of water to be used by its fall to turn a mill-wheel; and it is said (*Encycl. Brit.*, art. "Steam-Engine") that several engines of this kind were erected at Manchester to impel the machinery of some of the earliest cotton-mills and manufactories of that district. It should be here observed that the marquis of Worcester, in his "Century of Inventions," published in 1663, described a machine identical in principle with that of Savery, which he asserts

that he actually constructed and operated successfully; but as no evidence of this remains but his own record, the statement is to be received with some hesitation.

In 1690, Denis Papin, a French physicist (at that time, however, curator of the Royal Society of London), devised a project—or rather, it may be said, suggested the possibility—of an engine in which the efficient power should be the pressure of the atmosphere; this to be brought into play by creating a vacuum beneath a piston in a cylinder by the explosion of gunpowder or by the condensation of steam. Dr. Papin, however, did not follow out his idea. It was taken up by two common mechanics, Newcomen and Cawley of Dartford, who some years later (the precise date of the invention is not preserved) produced a machine having a real industrial value, which, under the name of Newcomen's engine, continued to be used, chiefly in the drainage of mines, for nearly a century. In this engine a vacuum was produced beneath a piston in an upright open cylinder by first filling the cylinder with steam, and then condensing the steam by the application of cold water to the exterior. The downward pressure of the atmosphere—about fifteen pounds to the square inch, or a ton to the square foot—then caused the piston to descend, dragging after it the working-beam of the engine or (in raising water) the handle of the pump. Two important improvements were made soon after the introduction of this engine. The first was the condensation of the steam by means of a jet of cold water thrown into the interior of the cylinder, instead of applying water to the surface. The discovery of the superior efficacy of this method was the result of an accidental leakage, through the piston, of the cold water always kept on top to prevent the entrance of air, in consequence of the imperfect fitting of the piston to the cylinder. The sudden descent of the piston on the occurrence of a free influx of water thus occasioned suggested an arrangement for the purposed introduction of the jet at the proper instant, whereby the movements of the engine were greatly accelerated. The second improvement consisted in attaching rods to the working-beam, so connected with the cocks by which the steam and condensation water were alternately admitted to the cylinder as to cause those cocks to be opened and closed at the proper moments by the action of the machine itself. The engine thus became automatic; and this most valuable addition to its capabilities of usefulness is said to have been made by a boy named Humphrey Potter, employed to tend the engine, and charged with the monotonous duty of opening and closing these cocks by hand. Observing that the opening of one of the cocks was necessary at the beginning of the stroke, and that of the other at the end, also that when one was opened the other must be closed, he attached strings to the handles of the cocks, and so connected them with the beam as to produce the desired effects in their proper order. In planning and successfully executing this contrivance the youthful inventor had not particularly in view the benefit to the world it was capable of yielding, but only his own personal relief from an irksome task. He designed, therefore, to keep it a secret, in order that he might enjoy the liberty it secured him. But the very excellence of his invention betrayed him. The engine provided with his attachments immediately began to work with a uniformity and regularity unknown before, exciting the curiosity of the attendants to discover the cause; so that the secret was brought to light. The name given to Newcomen's engine was not "the steam-engine," but "the atmospheric fire-engine."

In 1725 appears to have been produced the first engine (for the machine of Savery was not properly an engine) in which the direct pressure of steam was employed as a motive-power. This was invented by one Jacob Leupold, whose contrivance embraced a piston in an open cylinder, like Newcomen's, but employed high-pressure steam, not only to balance the pressure of the atmosphere, but to drive at the same time the piston of a force-pump elevating a column of water.

This was the state of things in regard to thermo-dynamic engines when in 1765 the attention of James Watt, a mathematical instrument maker of Glasgow, was called to the subject, in consequence of his having been called upon to make some repairs upon a model Newcomen engine used to illustrate the physical lectures of the university of that city. In the hands of Watt this contrivance completely changed its character, and became, in the proper sense of the word, a steam-engine. (For the further history of this most important of the mechanical aids to the industrial progress of the world, for a description of the variety of forms which have been given to it, and of the accessory apparatus by which its efficiency has been improved, and for an account of the physical and mathematical theories of its action, we must refer the reader to the proper heads, STEAM-ENGINE and HEAT.)

Thermo-dynamic engines have been proposed, in which

ammoniacal gas or the vapor of ether or that of some other volatile liquid should be made the vehicle of the thermal force. These have been in some instances actually tested, but they have never gained a general acceptance. The argument urged in their favor has been of course economy, but the basis of this economical argument has been greatly narrowed by the recognition of the doctrine of the conservation of force as one of the fundamental truths of physical science. There remain, nevertheless, certain questions relative to this point still open, which will be found briefly discussed in the article HEAT. Other forms of thermo-dynamic engines, which have secured to themselves a place among the aids to industry, are those which employ as a direct or indirect source of motive-power the explosive force of combustible gases when inflamed in mixture with atmospheric air, and those in which the elastic force of heated air itself is used to drive a piston. (For descriptions and theories of these, see HEAT, HOT-AIR ENGINE, and INFLAMMABLE-GAS ENGINE.)

The attempt to make electricity subservient as a motive-power to the uses of the arts has been many times made, but never with a high degree of success. There is no difficulty whatever about the undertaking, considering it merely as a mechanical problem. From the point of view of economy, however, such attempts will always be failures, unless there should be discovered some source of electro-motive force less expensive than any now known. (For information on this subject, see ELECTRO-DYNAMIC ENGINES.)

Hydro-dynamic engines are those in which water is employed not simply to produce motion by its own gravity, as in falling upon an overshot or breast wheel, or by its momentum, as in driving an undershot or flutter wheel, but by the hydrostatic pressure of a natural head, or of what may be called an artificial head, produced by confining a large volume of water in a strong cylinder, and compressing it by means of a heavily loaded piston in the cylinder. Such engines are usually of small dimensions, but work under a very high pressure—a pressure sometimes of three or four hundred atmospheres. They were originally introduced by Sir William Armstrong to control the heavy cranes and other lifting machinery used in foundries, and were first publicly exhibited by him in the great International Exposition of 1851, held in London. In the management of the ponderous "converters" used in Bessemer steel-works they may be said to be indispensable. (See on this subject the article HYDRO-DYNAMIC ENGINES.)

F. A. P. BARNARD.

**Engineering.** "The engineer is he who, by art and science, makes the mechanical properties of matter serve the ends of man. In the widest sense, almost every man is more or less an engineer. The first man who bridged a torrent with a fallen tree had in him something of the engineer; the first man who dug a new channel for a brook, the first man who cleared a pathway in the forest, had in him something of the engineer; but the title of engineer is more properly restricted to those who make the useful application of mechanical science their peculiar study and profession."\*

Hence, engineering is the art and science by which "the mechanical properties of matter are made to serve the ends of man," or, as otherwise defined, it is "the useful application of mechanical science" to those ends.

The branches of science which are applicable to the engineer, says the same eminent authority, "fall under the general head of *mechanics*; but they are distinct in method and application (though not in principle) from astronomical mechanics, which treats of the motion of the stars, and from those parts of physical mechanics which relate to such subjects as the transmission of sound and light. They are also so far to be kept distinct from *pure* or *abstract* mechanics that, in treating specially of mechanics as applied to engineering, certain fundamental principles are to be taken for granted, the demonstration of which forms part of the course of natural philosophy. To that course also must be left all mechanical problems which are interesting in a scientific point of view only, and not practically useful.

"The objects to which the science of the engineer relates are divided under two heads—viz., *Structures* and *Machines*.

"Strictly speaking, all machines are structures, though all structures are not machines; but it is convenient to limit the term *structures* to those combinations of solid materials whose parts are not intended to have relative motion, and which are thus to be distinguished from *machines*, whose parts are intended to have relative motion and to perform work.

"The theory of structures is founded on the principle of statics, or the science of equilibrium. It is divided into two parts, relating respectively to the two requisites of a struc-

\* The late W. J. Macquorn Rankine on "The Science of the Engineer."

ture, stability and strength—stability being the power of resisting forces tending to overthrow the structure, or to derange the parts of which it is made from their proper relative positions; and strength, the power of resisting forces tending to alter the figures of those parts or to break them in pieces.

"For example, in a bridge, stability requires certain relations to exist between the distribution of the load, the figure of the arch, and the dimensions of the abutments, in order to prevent the dislocation of the arch-stones or the overthrow of the abutments; and strength requires the arch to be of a thickness sufficient to resist the tendency to crush it.

"In applying the principles of stability and strength to structures, regard must be had to the special properties of the materials employed, whether earth, stone, bricks, cement, timber, iron or other metals, as well as to the kind of workmanship to which each material is subjected, and the forms in which it is used.

"The end to be aimed at in every scientifically designed structure is to adjust exactly the position, form, and size of the whole, and of each part, to the forces which it has to sustain. The more nearly this end is attained, the better will the structure be, not only in efficiency, durability, and economy, but also in beauty. This, independently of ornament, is the fundamental principle of beauty in architecture as well as in engineering.

"The theory of machines is founded on the principles of cinematics, or the science of motion considered in itself, and on those of dynamics, or the science of the relations between motion and force.

"Pure mechanism is the name which has been given to the cinematical part of the theory of machines, or that which takes into consideration their action in transmitting and modifying motion only, without regard to the force which is at the same time transmitted. As examples of its application may be cited parallel motion, the arrangement and proportioning of wheels, and the correct shaping of their teeth. The science of pure mechanism has of late been brought to a very complete state, and reduced entirely to the consequences of one general principle.

"The dynamical part of the theory of machines considers them as transmitting at once both motion and force, or performing work. It treats of the resistances, whether from solids or fluids, which impede the action of machines, the means of regulating that action, and the nature of the sources of motive-power, whether animal strength, the gravitation of water, the currents of the air, or the mechanical action of heat. The entire theory of the work of machines is founded on one principle, that of the conservation of energy.

"Machines have further to be considered with-reference to their strength, or capacity for sustaining without injury the forces which they transmit.

"The term *civil engineering* is applied to a wide and somewhat indefinite range of subjects, but it may be defined as embracing those applications of mechanics, and of the arts of construction generally, which belong to lines of transport for goods and passengers, whether roads, railways, canals, or navigable rivers; to works for the conveyance of water, whether for drainage or water-supply; to harbors and works for the protection of the coast. All these kinds of works are combinations of structures and machines; they comprise *structures*—in earthwork, as cuttings, embankments, and reservoirs; in masonry, timber, and iron, as bridges, viaducts, aqueducts, locks, basins, piers, and breakwaters; they comprise *machines*—such as carriages and locomotive engines, lock-gates, sluices, and valves, pumping steam-engines, and dredging-machines. Their principles, therefore, consist to a great extent of the general principles of construction and machinery, combined and adapted to suit the circumstances of each kind of work.

"But civil engineering has besides some principles peculiar to itself. It involves the art of laying out lines of transport and selecting the sites for works in the best manner possible with reference to the features of the country, so as to secure economy in execution and working. Hydraulic engineering involves the laws of rainfall and of the supply and the flow of streams; and the engineering of coast-works requires a knowledge of the action of the waves and tides."

In addition to the above, geology and mineralogy, chemistry in so far as it relates to the treatment of metals and of building materials, botany and vegetable physiology with special reference to timber trees, are indicated as departments of science which every engineer would do well to study.

An art or science which makes the mechanical properties of matter serve the ends of man embraces also military engineering, of which the object is the application of these properties to the operations of war. In a technical sense,

military engineering is more restricted, and embraces fortification, whether permanent or temporary, and its auxiliaries, such as floating obstructions and torpedoes for harbor defence; the works of attack or defence of fortresses, or, in other words, sieges, both active and passive; the construction and the laying of military bridges; reconnaissances and surveys for military purposes, including the operations of armies in the field; the works of field fortification, whether lines for the holding of extensive areas of the theatre of war, or those transient works (*fortifications improvisées*) by which troops are protected in line of battle; and in general, if we make the distinction which has already been made in another place, it embraces the constructions for military purposes as distinguished from warlike machines, though perhaps the line is not so sharply drawn as in civil engineering. Military engineering, among all the great military powers of the world at the present day, is made the special subject of study, as distinct from other branches of the art of war; but the exercise of its functions is committed to special military organizations called "corps of engineers," or its equivalent. (For more particular information on this subject consult "The Royal Engineer," by SIR FRANCIS B. HEAD; HEYDT, "Recherches sur l'organisation du Corps du Génie en Europe;" and ALLENT, "Histoire du Corps du Génie.")

In a more general sense, military engineering embraces also artillery, gunnery, military pyrotechny, transportation, including vehicles, railways (especially their repair and preservation, and the renewal of destroyed bridges in war), and in general all those branches of civil engineering which are involved in the foregoing.

Another great department of engineering science is that which relates to the extraction of metallic ores, coal, and other valuable minerals from the earth. Its general principles are those of civil engineering, but the circumstances under which they are applied impose the necessity of materially modifying the methods. Mining engineering may be said, then, to embrace the methods of underground surveys, which in many respects differ from those on the surface; the proper modes of reconnoitering, reaching, and attacking mineral deposits; drifting galleries, sinking shafts, and timbering and walling the same; the ways and means of interior transportation; methods of hoisting in shafts or slopes; the construction of engines for lifting minerals or miners, and of pumps for the extraction of mine water; and, finally, the proper ventilation of underground works. It describes the miner's methods of attack in detail, the dangers which he has to encounter, and his means of precaution and defence; and further treats of the mechanical preparation or milling of ores, and of those constructions in the open air which are part of the plant of a mine, but which are operations referable to civil engineering and building.

(For more particular information in regard to special branches of engineering science, see AQUEDUCT, ARTILLERY, BREAKWATER, BRIDGE, DOCK, DYNAMICS, FORTIFICATION, GUNNERY, HARBOR, HYDRO-DYNAMICS, JETTIES, LIGHTHOUSE, MACHINERY, MENSURATION, MINING, NAVAL ARCHITECTURE, NAVIGATION (INLAND), RAILROADS, ROAD, SHIP, RAILWAY, SHIPS OF WAR, THERMO-DYNAMICS, TUNNEL.)

J. G. BARNARD.

**Engineers, Corps of.** Among all modern nations assuming to be military powers, the engineering service is organized into separate corps (see ENGINEERING), and for the training of *élèves* for service in them, special military schools are generally provided. (For information as to the organization of these corps see HEYDT, "Recherches sur l'organisation du Corps du Génie en Europe.") In the U. S. the existing Corps of Engineers owes its origin to the act of Congress of Mar. 16, 1802, by which the President was authorized to organize and establish a Corps of Engineers, which was (ultimately) to consist of 1 colonel, 1 lieutenant-colonel, 2 majors, 4 captains, 4 first lieutenants, 4 second lieutenants, and a limited number of cadets (*i. e.* the total number not to exceed 20); and it was further provided, that the said corps, when so organized, shall be stationed at West Point in the State of New York, and shall constitute a Military Academy; and the engineers, assistant engineers, and the cadets of the said corps shall be subject at all times to do duty in such places and on such service as the President of the U. S. shall direct. Thus, by their common organic law the Corps of Engineers and the Military Academy were *identical*. The 63d Article of War (April 10, 1806) says: "The functions of the engineers being generally confined to the most elevated branch of military science, they are not to assume, nor are they subject to be ordered on, any duty beyond the line of their immediate profession, except by the special order of the President of the U. S.," etc.

Most of the officers of the newly-created Corps were soon called to duties along the seaboard in constructing our for-

tifications, while, as the wants of the service and of the Academy have become more clearly recognized, the number of cadets has been increased, to supply not only the Engineers and Artillery, but officers of all arms of the service; and the various professorships and departments of instruction now existing have been established at the Academy.

In 1838 (July 5) the Corps was increased to number forty-seven officers, and at the same time a corps of Topographical Engineers of about the same number (engineers under the designation having been before authorized) was organized. In 1846 (May 15) a company of "sappers, miners, and pontoneers" was authorized to be "attached to and compose a part of the Corps of Engineers, and be officered by officers of that corps, as at present organized; they shall be instructed in and perform all the duties of sappers, miners, and pontoneers, and shall aid in giving practical instructions in these branches at the Military Academy," etc. With some slight changes these corps were thus constituted at the commencement of the civil war. In 1861 three additional companies of engineer soldiers were authorized by Congress, which, with that already existing, were styled the "battalion of engineers;" and a company was also organized for the Corps of Topographical Engineers. In 1863 the latter corps was abolished, and its officers merged with the Corps of Engineers, the organization of which, as confirmed by the peace establishment of 1866, is one Chief of Engineers, with the rank, pay, and emoluments of a brigadier-general; six colonels, twelve lieutenant-colonels, twenty-four majors, thirty captains, and twenty-six first and ten second lieutenants. Under this organization the Corps of Engineers, embracing its commissioned officers and companies of sappers, miners, and pontoneers, constitutes a special arm of the service, and is charged with all duties relating to the selection, purchase, and survey of the sites, and the plan, construction, and repair of all fortifications, whether permanent or temporary, and their care when not garrisoned; with all channel and river obstructions, including torpedoes, required for coast defence; with all works for the attack and defence of places; with all fixed and movable bridges for the passage of rivers; with all lines, redoubts, intrenched camps, bridge-heads, etc. required for the movements and operations of armies in the field; and with making such reconnaissances and surveys as may be required for these objects. It is also charged with the survey, plan, and construction of harbor and river improvements; with military and geographical explorations, reconnaissances, and surveys, including the geodetic survey of the lakes; and with all engineer duties, confided to other departments than that of war, which may be specially assigned to the corps by acts of Congress or orders of the President of the United States.

By act of Congress of July 13, 1866, the Superintendency of the Military Academy, which had still been confined to the corps, was opened to all arms of the service; and at that date the intimate connection between the academy and the corps with which it was originally identified may be said to have terminated. The Corps of Engineers may truthfully be said to have made a record worthy of its title. As the Military Academy, it has been the "nursing father" of the U. S. army. Among its chiefs and superintendents we find in Williams, Swift, Armistead, Macomb, Totten, Thayer, etc. names identified with our military history, and conspicuous for their services in the field as well as in peace. During the Mexican war its officers rendered conspicuous services, recognized and mentioned by Generals Scott and Taylor, while in our civil war the names of Meade, McClellan, Halleck, McPherson (killed), Humphreys, Rosecrans, Meigs, Gillmore, Cullum, Benham, Warren, Woodbury, Tower, Wright, Newton, Alexander, Foster, Morton (killed), Franklin, W. F. Smith, Michler, Parke, Abbot, Poe, Duane, Comstock, Weitzel, Reese, Babcock, Cross (killed), O'Rourke (killed), John R. Meigs (killed), Michie, etc. stood conspicuous; and some of the ablest of the Confederate officers, Lee, Beauregard, J. E. Johnston, etc., had been officers of the corps. In its services to science it claims the Academy, the great superintendent of which, Sylvanus Thayer (recently deceased), is with justice styled the "father of the Military Academy." The names of Bache, Bailey, Davies, Bartlett, Church, Mahan, Webster, Mitchell, Norton, F. H. Smith, Ewell, etc. are evidences of its influences upon science and educational institutions. In the development of the country by works of civil engineering it has had no insignificant share, and the names of J. G. Swift, Long, McNeill, W. H. Swift, Totten, Abert, Douglass, Turnbull, etc. are among those of the fathers of American engineering. Finally, in its own peculiar sphere, the devising and constructing of our great system of sea-coast defences (of which it may be said to be the first to lay down principles, as distinct from those of the somewhat pedantic art of "fortification" of the textbooks), and in its numerous works of harbor and river im-

provement and in the Delaware Breakwater, it has erected enduring monuments of its services.

J. G. BARNARD.

**Engineers in the U. S. Navy** are non-combatant commissioned officers who have charge of the machinery of steam vessels. Engineers are not only required to be practically acquainted with the management of nautical steam-machinery, but they must be good mechanics, capable of superintending necessary repairs; and they are further required to have acquaintance with the physical properties and powers of steam, and with the collateral departments of science. There are first and second assistant engineers, who are also commissioned officers.

**England** [Lat. *Anglia*; Fr. *Angleterre*; Ger. *England*], the southern and larger division of the island of Great Britain, and the principal member of the United Kingdom of Great Britain and Ireland. All that belongs to the United Kingdom at large, its geography and statistics, as well as its history from the time when the permanent union of Scotland with England and Ireland united the three countries into one empire, will be treated of under the head of GREAT BRITAIN, while in this article we shall confine ourselves to what is peculiar to England and to its history up to the time of the union.

England is bounded on the N. by Scotland, E. by the German Ocean, S. by the Straits of Dover and the English Channel, S. W. by the Atlantic, and W. by St. George's Channel and the Irish Sea. It is situated between lat. 49° 57' 30" and 55° 47' N., and lon. 1° 46' E. and 5° 41' W., the greatest length N. and S. being 400 miles, and the greatest breadth 280 miles. In shape it resembles a triangle, of which Berwick may be considered the apex, and a line from the Land's End to the North Foreland the base. The sea-coast, if measured from one headland to another, is about 1200 miles; if the principal indentations are followed, about 2000 miles. The area amounts to 58,320 square miles, of which 7397.6 belong to Wales and 50,922.4 to England proper. Taken by themselves, England and Wales are more densely populated than any other European country except Belgium, the average population of a square mile amounting to 389. Since the beginning of the present century the population has increased about 150 per cent. It amounted in 1801 to 8,892,536, in 1831 to 13,896,797, in 1871 to 22,704,103, and in 1881 to 25,974,439. Since Alfred the country has been divided into counties or shires, and these again generally into hundreds, and always into parishes. The northern counties are divided into wards, instead of hundreds; Kent and Lincoln, into lathes and sokes; and York, into ridings, each of which is regarded as a county by itself. The following table exhibits the area in statute acres (640 acres = 1 square mile) and the population of each of the fifty-two counties at the date of the census of 1881:

ENGLAND.			ENGLAND.		
Counties or Shires.	Acres.	Pop. in 1881.	Counties or Shires.	Acres.	Pop. in 1881.
Bedford .....	294,983	149,473	Suffolk .....	944,060	356,893
Berks .....	462,210	218,363	Surrey .....	485,129	1,436,899
Buck'gham .....	477,151	176,323	Sussex .....	933,269	490,505
Cambridge .....	524,935	185,594	Warwick .....	566,271	787,339
Chester .....	657,123	644,037	Westmoreland .....	500,906	64,191
Cornwall .....	863,665	330,686	Wilts .....	866,677	258,955
Cumb'land .....	970,761	250,647	Worcester .....	472,453	380,283
Derby .....	658,624	461,914	York (East Riding) .....	750,828	315,460
Devon .....	1,655,208	603,595	" (City) .....	1,979	49,530
Dorset .....	627,265	191,028	" (North Riding) .....	1,361,664	346,260
Durham .....	647,592	867,258	" (West Riding) .....	1,768,380	2,175,514
Essex .....	987,032	576,434			
Gloucester .....	783,699	572,433			
Hereford .....	532,918	121,062			
Hertford .....	405,141	203,069			
Hunt'gdon .....	229,515	59,491			
Kent .....	995,932	977,706			
Lancaster .....	1,208,154	3,454,441			
Leicester .....	511,907	321,258			
Lincoln .....	1,767,879	469,919			
Middlesex .....	181,317	2,920,485	Anglesey .....	193,511	51,416
Monmouth .....	370,350	211,267	Brecon .....	460,158	57,746
Norfolk .....	1,356,173	444,749	Cardigan .....	443,387	70,270
N'thampton .....	629,912		Carmarthen .....	594,405	124,864
Northumb'land .....	1,290,312	434,086	Carnarvon .....	369,477	119,349
Nottingham .....	527,752	391,815	Denbigh .....	425,038	111,740
Oxford .....	483,621	179,559	Flint .....	161,807	80,587
Rutland .....	94,889	21,434	Glamorgan .....	516,959	511,433
Salop .....	844,565	248,014	Merioneth .....	384,717	52,038
Somerset .....	1,049,812	469,109	M'tgomery .....	495,089	65,718
S'thampton .....	1,037,764	593,407	Pembroke .....	391,181	91,824
Stafford .....	748,433	951,018	Radnor .....	276,552	23,523
			Total Wales .....	4,712,281	1,360,513
			Total of England and Wales .....	82,289,351	25,974,439

During the last twenty years the urban districts have grown much more rapidly in population than the country districts; and while in 1861 the population of 141 districts and 57 sub-districts, which included the chief towns, was 9,155,964 to 8,771,645 of the rural districts, which contained the small towns and the rural parishes, the population of the former had in 1881 risen to 12,900,297, against only

9,803,811 of the latter. No country of Europe has so large a number of populous cities as England. London, with its 4,764,312 inhabitants, contains more than one-fourth of the entire urban population of the country, which, besides, had in 1881 eleven other towns with a population of upwards of 100,000 inhabitants—namely, Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, Newcastle-on-Tyne, Salford, Hull, and Portsmouth. The number of births in 1881 was 883,518; of deaths, 491,813; of marriages, 197,080. The proportion of male to female children born is as 104,810 to 100,000; the equilibrium between the sexes is restored about the tenth year of life, and is finally changed, by emigration, war, and perilous male occupations, to the extent that there are in all about 100,000 women to 94,900 men in England and Wales.

England and Wales have their own State Church, which is different from the State Church of Scotland, while Ireland at present has no State Church at all. The sovereign of England is by law the supreme governor of the Church of England, possessing the right to nominate or to appoint to the vacant archbishoprics and bishoprics. The Church has in England 2 archbishops, 26 bishops, and about 12,000 parishes. No information concerning the membership of the Church of England, or any other religious denomination of England, is given in the official censuses of 1861 and 1871. The estimates of the population connected with the Established Church differ from 12,700,000 (MARTIN, "Statesman's Manual" for 1873) to 17,781,000 (RAVENSTEIN, "Denominational Statistics of England and Wales," London, 1870). The number of Roman Catholics is estimated at from 2,000,000 (Martin) to 1,058,000 (Ravenstein). The entire number of sects having places registered for the performance of divine worship was, on Oct. 1, 1872, 125, and the entire number of registered places of worship, 18,996.

*History.*—England was undoubtedly known to the Phœnicians, Carthaginians, and Massilians, all of whom are supposed to have traded with it; but its real history does not begin until the establishment of the Roman rule by Cæsar in 55 B. C. The rule of the Romans, who called the present island of Great Britain *Britannia*, lasted till the beginning of the fifth century, when they withdrew. (See *BRITANNIA*.) In consequence of the inroads of the Picts and Scots from the north, and the quarrels of the British chiefs among themselves, the country appears to have soon become a prey to complete anarchy. A British prince of Kent, Vortigern (Gwrthyrn), is said to have been the first to secure the aid of two Saxon chiefs, commonly called Hengist and Horsa, in his struggles against the northern invaders. The statements as to the first appearance of the Saxons in England are conflicting and untrustworthy, and even the names of their leaders are considered by some historians as fabulous. Certain it is, that in the course of about 130 years the Saxons, Jutes, and Angles completed the conquest of the greater part of England, establishing three Saxon kingdoms (Sussex, Wessex, and Essex), one Jutish (Kent), and four Anglian (Bernicia, Deira, East Anglia, and Mercia). The British maintained for a somewhat longer period five states (Strath-Clyde, Cumbria, North and South Wales, and Cornwall). Egbert, king of Wessex, is commonly believed to have become about 830 the first king of all England. During his reign the invasions of the Danes began, who for a period of twenty-four years (1017–41) became masters of the kingdom. In 1041 the crown again devolved on an Anglo-Saxon prince, Edward the Confessor, but his authority was little more than nominal, six powerful earls, Danes and English, dividing the country between them. At his death, in 1066, Harold, earl of Wessex, seized the throne by force, but in the decisive battle of Hastings (Oct. 14, 1066) against another claimant to the throne, William, duke of Normandy, he was defeated and killed. With the reign of William, surnamed "the Conqueror," a new era of English history begins. The lands were divided into 60,000 knights' fees or estates among the followers of the Conqueror as feudal lords, and thus on the solid basis of extensive landed estates the firm foundation was laid of a powerful aristocracy, which amidst the social revolutions of centuries has more successfully defended its ascendancy than that of any other country of Europe. The population of England at this time appears to have been from 2,000,000 to 3,000,000, and about 100 boroughs were governed by municipal customs or under the protection of the kings, nobles, or prelates, from whom in after times they purchased their franchises. In the course of time the distinction between the Norman conquerors and the conquered Saxons passed away, and from their union arose the English people as it now exists. The Norman line gave to England only three kings—William I. and his two sons, William II. and Henry I. The death of the latter in 1135 was followed by a war of succession between Stephen of Blois, his nephew, and his only daughter, Matilda, who was married to Geoffrey of Anjou. In 1155 the son of

Matilda, Henry II., was generally recognized as king of England. He was the founder of the house of Plantagenet, which in direct line ruled in England until 1485. Henry possessed, besides England, the provinces of Anjou, Touraine, and Maine in France, to which he added Guienne and Poitou by marriage and Brittany by conquest. He conquered Ireland in 1171, and by the Constitutions of Clarendon in 1164 curtailed the privileges of the Church, but was forced, in consequence of the assassination of Archbishop Becket, to make his peace with the Church. He was in 1189 succeeded by his eldest son, Richard I. ("Cœur de Lion"), who distinguished himself in the Crusades, but could not prevent the nobility from increasing their power at the expense of the crown. The reign of his younger brother, John ("Lackland," 1199–1216), is one of the most inglorious in the English annals. He lost nearly all the possessions of the English sovereigns in France, and in 1213 consented to hold the English crown as a gift from Rome. His weakness, however, had some good results for the people of England. The separation of the Normans of England from those of France hastened the consolidation of the English nation; and when involved in disputes with the pope, he had to conciliate the barons, who were backed by the people, by the concession of the celebrated Great Charter (*Magna Charta*), signed at Runnymede in 1215. The charter secured to the English people, in advance of any other people of Europe, two great rights—that no man should suffer arbitrary imprisonment, and that no tax should be imposed without the consent of the council of the nation. When John showed an unwillingness to carry out some of his promises, the barons called Louis of France (son of the king, Philip Augustus) to their aid, who conquered a large portion of the country, but was compelled, soon after the death of John (Oct. 17, 1216), to make peace and renounce the project of annexing England to France. But while the national pride of the English people successfully prevented its subjection to France, anarchy rapidly increased during the reign of John's son, Henry III. (1216–72). As Henry at the death of his father was only a boy of nine years, the government was carried on first by the earl of Pembroke, and after his death by Hubert de Burgh and the bishop of Winchester, neither of whom was able to check the demands of the nobility for greater power. When Henry assumed the government himself, an open war with the barons soon broke out, who extorted from the king an enlargement of the Great Charter, and in 1264 took him and his eldest son, Edward, captives. The next year the first English Parliament was convened by the leader of the rebels, the earl of Leicester; but soon Prince Edward, who had been set free, broke the power of the barons in the battle of Evesham, in which the earl of Leicester fell, and restored the authority of the king. Henry deemed it, however, best to pursue a conciliatory policy, and in particular to confirm the Great Charter. Edward I. (1272–1307) had sufficient energy and statesmanship to put an end to the confusion into which the country in the latter years of his father's reign seemed to relapse, and considerably promoted the consolidation of the kingdom. He conquered in 1283 the last prince of Wales, and united this country, which thus far had been semi-independent, for ever with England, conferring on his eldest son the title of prince of Wales, which has ever since been borne by the eldest son of the English sovereign. He obtained a decisive victory over Scotland in the battle of Falkirk (1299), but under the leadership of Wallace, Comyn, Fraser, and Bruce the Scotch saved their independence. In a war with France the last English possession on the Continent, Guienne, was lost, but it was restored through the mediation of the pope. For the development of the English constitution his reign was of the greatest importance, as the council of the realm assumed a form resembling that of the modern Parliament by the separation of the greater barons from the tenants in chief, the latter ceasing to be summoned to Parliament, and being present only through their representatives. The first sitting of the Commons in a separate chamber took place in 1295, and in the following year the famous statute was passed that no manner of tax should be imposed without the common consent of the bishops, barons, and burgesses of the realm. Edward II. (1307–27) lost the footing which his father had gained in Scotland, and was finally dethroned by the prelates and nobles, who assumed the power of a Parliament. The reign of his son, Edward III. (1327–77), is regarded as one of the most brilliant periods of English history. His claim to the throne of France involved him in a war which, with few interruptions, lasted from 1337 to 1374, and which, notwithstanding the brilliant English victories of Cressy (1346) and Poitiers (1364), finally led to the surrender by the English king of all the English possessions in France, except Bordeaux, Bayonne, Calais, and a district of Gascony. The great expenditures required by the



war made the king dependent on his Parliament, which henceforth was directed by statute to be summoned annually. Another important result of the war was the entire fusion of the Normans and Saxons into the English nationality. The spirit of chivalry attained at the court of Edward its highest point of exaltation, but on the other hand the laboring-classes made their power felt for the first time; for as their service had become more valuable in consequence of the terrible ravages of the great pestilence in 1349, they demanded and received higher wages, and a series of despotic edicts ordering them to work at the former wages proved entirely inefficient. During the reign of Edward, Wycliffe began (about 1360) his attacks upon the abuses in the Church, and he was supported by Edward's fourth son, John of Gaunt, and by some of the principal nobility. As the king's eldest son, Edward, prince of Wales, known as the "Black Prince," died one year before his father (1376), the latter was succeeded by his grandson, Richard II. (1377-99), during whose weak reign an attempt to enforce the tyrannical labor laws brought on the famous rebellion of the peasantry under Wat Tyler, which, though suppressed with much bloodshed, relaxed the servitude of the peasantry. Richard was dethroned by his cousin Henry, duke of Lancaster, who ascended the throne as Henry IV. (1399-1413). His reign, which was greatly disturbed by rebellions and conspiracies, is remarkable for two events in the history of the English constitution—the fixing by statute of the parliamentary right of election for counties in all freeholders (afterwards restrained under Henry VI. to those who were worth forty shillings per annum), and the recognition of the two houses as bodies possessing distinct privileges, not to be interfered with by each other. The religious reformation of Wycliffe found in Henry a determined opponent, the act for the punishment of heretics under which so many atrocities were committed for nearly two hundred years being passed during his reign (1401). His son, Henry V. (1413-22), put down the religious movement of the Lollards with a strong hand, and renewed the claims of his ancestors to France. The new war between the two countries was favorable to England; Henry entered Paris, and on his death a large portion of France recognized, with England, his son, Henry VI. (1422-61), then only a boy of nine months, as king. After many campaigns the French were, however, ultimately successful, the exploits of Joan of Arc, Count Dunois, and other French leaders putting for ever an end to the English attempts to conquer France. Soon after that terrible civil war known as the war of the Red and White Roses began (see *ROSES, RED AND WHITE*), Richard, duke of York, a descendant of the duke of Clarence, third son of Edward III., claimed a title to the throne preferable to that of King Henry, on the ground that the latter was only a descendant of the fourth son of Edward III., and that the pretensions of the king's grandfather, Henry IV., to be descendant from Edward, earl of Lancaster, according to popular tradition the eldest son of Henry III., and excluded from the succession on account of deformity, were apocryphal. Richard, duke of York, fell in the battle of Wakefield, Dec. 30, 1460, leaving his claims to his eldest son, Edward, the earl of March, a youth of nineteen, who was proclaimed king as Edward IV. in 1461, and maintained himself until his death (1483), with a short interruption (1470-71), when the rebellion of the earl of Warwick, formerly the most prominent among his supporters, compelled him to flee to Holland, and restored for the time Henry VI. The son of Edward (Edward V.), a minor, was after a reign of only thirteen days dethroned by his uncle, the duke of Gloucester, placed in confinement, and soon disappeared. The usurper made himself king under the name of Richard III. (1483-85), but soon a coalition of disaffected Yorkists and of the Lancastrians was formed against him, at the head of whom was Henry Tudor, earl of Richmond, who through his mother descended from the House of Lancaster, and to satisfy the Yorkists was to marry Elizabeth, the eldest daughter of Edward IV. In the decisive battle of Bosworth Field, in 1485, Richard lost his crown and his life, and Tudor ascended the throne as Henry VII. With him a new era begins in English history. The first years of Henry (1485-1509) were greatly disturbed by pretenders to the throne, who, personating the head of the House of York, claimed to be the legitimate heirs to the crown. But the chief feature of his reign is the large increase of the royal power at the expense of the high nobility and the Parliament. Many of the principal nobles having perished in the wars of the Roses, Henry succeeded in enforcing against the barons the laws forbidding them to give badges and liveries and to employ retainers. The change thus produced in the relation of the nobility to royalty became still greater from the fact that the former began to value money-payments from their tenants and dependants higher than personal services, while the lower classes of the people began to understand that hereafter they had

to support themselves and to respect the laws, instead of looking to the nobility for support and for impunity in case they had committed lawless acts. The great event in the reign of his son, Henry VIII. (1509-47), was the separation of the Church of England from Rome. Henry was a violent opponent of Luther and the German Reformation, but when the pope refused to grant him a divorce from his wife, Catharine of Aragon, he renounced his communion with the pope and assumed the title of the Head of the Church. (See *ENGLAND, CHURCH OF*.) His only son, Edward VI. (1547-53), succeeded at the age of nine years, and the country thenceforth was governed by a council of regency favorable to the Reformation, which now advanced from questions of government to questions of doctrines. The duke of Northumberland, who had caused one of his sons to marry Lady Jane Grey, great-granddaughter of Henry VII., caused Edward to bequeath the crown to his daughter-in-law; but the reign of Lady Jane lasted only ten days, when Mary (1553-58), the daughter of Henry VIII. and his first wife, Catharine of Aragon, ascended the throne. Mary was a devout Catholic, who obtained the consent of her Parliament to repeal (1553) the legislation of Edward VI. and that (1555) of Henry VIII., thus re-establishing the papal authority. When the chiefs of the Protestant party opposed the counter-reformation more than 200 of them suffered at the stake. Her marriage with Philip II. of Spain did not, however, save to the Catholic Church its ascendancy in England, for Mary died in 1558 without issue, and on the other hand it cost England the last possession in France, Calais, which was taken by the duke of Guise. Mary was succeeded by her half-sister, Elizabeth (1558-1603), the daughter of Henry VIII. by his second wife, Anne Boleyn, who was strongly opposed to the supremacy of the pope, by whom she had been declared to be a bastard. Parliament in 1559 restored the royal supremacy of the Church, which, by the adjustment of the Prayer-Book and the Thirty-nine Articles, substantially received the form in which it still exists. The power of the Roman Catholics in England was completely broken; and when most of them embraced the cause of Mary, queen of Scotland, who, on seeking an asylum in England, had been imprisoned, Elizabeth ordered Mary to be executed. Abroad, she aided the Protestants of France and the Netherlands, and the crushing defeat of the Spaniards, whose Armada was destroyed in 1588, elevated England to a higher position among the countries of Europe than she ever had had before. Ireland was reduced to a state of entire submission, and the commerce and naval power of the country received a wonderful impulse by the establishment of commercial intercourse with India. Elizabeth was the last sovereign of the House of Tudor; she was succeeded by James VI., the son of the unfortunate Mary. Thus England, Scotland, and Ireland became united under one sovereign; and although the legislative union with Scotland was not consummated until 1707, and that of Ireland not until 1800, the three countries were, in fact, one empire.

James VI.—or, as he was called after his succession to the throne of England, James I.—was proclaimed Mar. 24, 1604, crowned July 25, assumed the title of king of "Great Britain, France, and Ireland" Oct. 24, and reigned till Mar. 27, 1625. He had received a good education, and showed great interest for science and literature, but he was pedantic and inconsistent. After the discovery of the Gunpowder Plot (Nov. 5, 1605) he banished the Jesuits and Seminary priests from England, and afterwards wrote several treatises himself in defence of pure Protestantism. But he failed to give his son-in-law, the elector palatine, from whom descends the house of Hanover, the aid he had promised him; and one of the principal reasons why he disappointed his Protestant allies in Germany was his eagerness to enter into a matrimonial alliance with Roman Catholic Spain. In his time the translation of the Bible into English and the colonization of Virginia and New England took place. Meanwhile, the political tendencies which at this time were carried out with such great success in France by Richelieu—namely, the consolidation of the royal power and the concentration of all authority in the Crown—also began to show themselves in England. During the time of James I. there was much talk about "the king by God's grace," and hardly had his son, Charles I. (1625-49), ascended the throne before the conflict actually began between the king and the Parliament. He had declared that he would not be a Venetian doge, and his two first Parliaments he dissolved. But the third, which sat in 1628, passed the so-called Petition of Right, in which the constitutional rights of an Englishman are clearly defined, and the king was compelled to give his consent to the Petition. After this event, however, he convoked no Parliament for eleven years, but ruled as arbitrarily as if there had never been a Parliament or a constitution. Justice was administered by Star Chambers, money was levied

by proclamations, and the Puritans and other non-conformists were cruelly persecuted. Charles wished to introduce the liturgy in Scotland, but the Scottish people rose in arms, subscribed the National Covenant, invaded England, and defeated the royal troops at Newburn-on-Tyne. In Nov., 1640, the Long Parliament assembled, and it began business by impeaching Strafford and Laud. The Star Chambers were broken up, the proclamations abolished; but when the Parliament went further and demanded that the king should give up his right to dissolve Parliament, and even resign the supreme military command, open war broke out between the king and the Parliament. In the beginning the king was successful and gained several victories, but in 1644 he was defeated at Marston Moor, and in the following year he was so thoroughly beaten at Naseby that he had to flee for his life, and finally gave himself up to the Scottish army, which sold him, say some authors, to the English Parliament. A high court was then appointed, before which the king was tried. He was convicted, and beheaded Jan. 30, 1649. Oliver Cromwell, who commanded the right wing in the battle of Naseby and contributed much to the victory, controlled the army, which belonged to the party of the Independents; and after the so-called Pride's Purge, in Dec., 1648, when forty-one Presbyterian members were driven out of the Parliament, he also controlled that assembly. In 1649 he went to Ireland as lord lieutenant, and put down the royalist rebellion there with great severity. In 1650 he was appointed commander-in-chief against the Scottish rising in favor of Charles II., and subdued the rebellion after the battles of Dunbar and Worcester. He was now the most powerful man in the kingdom, and in 1653 he assumed the title of Lord Protector of the Commonwealth, and governed as a monarch till his death, Sept. 3, 1658. He was succeeded by his son, but almost immediately after his death a strong royalist reaction set in, and in 1660, Charles II. returned to England and was hailed with great enthusiasm. His reign (1660-85) was one of the most shameful periods in English history. The court was dissipated and licentious, and moral contamination spread from it into the upper layers of society. The king, who had no children by his queen, Catharine of Braganza, left twelve illegitimate children by seven different mistresses. The Parliament, very subservient at first and afterwards only feebly contending against the evil, was broken up into factions and corrupted by bribery. With respect to a foreign policy, the king and (through him) the country were nothing but vassals of Louis XIV. The two wars with Holland (1665-67 and 1672-74), which brought the English arms very little glory, were carried on in the French interest. The king in 1675 received 500,000 crowns from Louis in order to prorogue Parliament, and for several years he also received an annual pension in reward of his subserviency to the French policy. As base was his internal policy. He had given the most binding promises of amnesty and loyalty. Nevertheless, in 1682 the Presbyterian divines were ejected from their livings. This act, however, did not cause any great excitement. Had not Parliament itself voted that the bodies of Cromwell, Bradshaw, and Ireton should be disinterred and hanged upon the gibbet of Tyburn? But when in the same year he issued his declaration of indulgence to the Roman Catholics, people became suspicious; and when his brother, the duke of York, heir-apparent to the crown, openly professed the Roman Catholic faith, a bill for his exclusion from the succession was brought into Parliament and passed by the House of Commons. It was rejected, however, by the House of Lords, and on the death of Charles II., James II. succeeded (1685-88). It was evidently James's intention to overthrow the constitutional system of England and restore the Roman Catholic Church. For the accomplishment of the first purpose he meant to create a large standing army, and, in spite of the great difficulties he had to encounter on this point, he partly succeeded. For the restoration of the Roman Catholic Church he first allied himself with the Episcopalians, afterwards with the dissenters. But he was much less successful on this point, and when in 1688 he issued a declaration of indulgence to the Roman Catholics, and ordered it read in all the churches, the crisis came. The archbishop of Canterbury and six bishops petitioned the king against the order, but were sent to the Tower and tried on the charge of libel. Another event of decisive importance took place just at the same time. James II. had hitherto had no son, and it was hoped that on his death his daughter Mary, married to William of Orange, would succeed to the throne. But on June 10, 1688, Queen Mary gave birth to a son, afterwards known as the Pretender. People generally considered this child spurious, and on June 30 an invitation to invade England was signed by the earls of Shrewsbury, Devonshire, and Danby, Lord Lumley, Henry Sidney, Edward Russell, and Henry Compton, and sent to William

and Mary. They landed at Torbay (Nov. 5) with an army of 15,000 men; and as James II. saw himself deserted immediately almost by all, even by his own daughter, Anne, he fled to France. In Feb., 1689, a convention of the estates of the realm of England formally established William and Mary on the English throne, and the risings which took place in Scotland and Ireland in favor of the fugitive James II. were successfully subdued—in the former country by Sir John Dalrymple after the massacre of the MacDonalds in 1692, and in the latter by William himself in the battle of the Boyne, July 1, 1690, and by Ginkel in 1691. Mary died Dec. 28, 1694, and William now reigned alone. In his foreign policy he was so far successful that he actually checked the progress of Louis XIV., and the result of his internal government was the firm establishment of the English constitution. By an act of settlement adopted by Parliament in 1701, the house of Stuart was formally excluded from the throne of England, which, after the death of William and his sister-in-law, Anne, was settled on the house of Hanover. After the death of James II., however, his son, the Pretender, was recognized by Louis XIV. as king of England, and this, in connection with Louis's breach of a newly-concluded treaty concerning the Spanish succession, caused William to prepare for war, when he died Feb. 21, 1702. His policy, however, was continued by his successor, Anne (1702-14), and led to brilliant results. The queen herself was weak both of intellect and character, but the splendid victories of Marlborough completely annihilated the ambitious plans of Louis XIV., and the conquest of Gibraltar added to the British crown one of its proudest possessions. William had not always been successful in the field, and he proved himself greater in the council-chamber than on the battle-ground; but he knew that an army is not only a useless, but even a dangerous, instrument when not in perfect order; and the army which was placed under the command of Marlborough was probably the best organized and best disciplined body of troops then existing. The result answered his expectations. The first part of the war, from the capture of Liège (Oct. 23, 1702) to the battle of Blenheim (Aug. 13, 1704), was very brilliant; and when, in spite of an unbroken series of victories, from the battle of Triermonst (July 18, 1705) to the battle of Malplaquet (Sept. 11, 1709), the war still dragged on, this was probably due to underhand intrigues of various sorts. In literary respects the reign of Anne was also a remarkable period, and has been called, not altogether without reason, the Augustan age of English literature, Addison, Pope, Steele, and Swift forming its most conspicuous ornaments. May 1, 1707, the complete union of England and Scotland was accomplished. (For the further history of the two countries see GREAT BRITAIN.)

#### CHRONOLOGICAL TABLE OF THE SOVEREIGNS OF ENGLAND FROM THE CONQUEST TO THE HOUSE OF HANOVER.

<i>Norman Line.</i>	
William the Conqueror.....	1066-1087
William Rufus.....	1087-1100
Henry I.....	1100-1135
Stephen of Blois.....	1135-1154
<i>House of Plantagenet.</i>	
Henry II.....	1154-1189
Richard I.....	1189-1199
John.....	1199-1216
Henry III.....	1216-1272
Edward I.....	1272-1307
Edward II.....	1307-1327
Edward III.....	1327-1377
Richard II.....	1377-1399
<i>House of Lancaster.</i>	
Henry IV.....	1399-1413
Henry V.....	1413-1422
Henry VI.....	1422-1461
<i>House of York.</i>	
Edward IV.....	1461-1483
Edward V.....	1483-1483
Richard III.....	1483-1485
<i>House of Tudor.</i>	
Henry VII.....	1485-1509
Henry VIII.....	1509-1547
Edward VI.....	1547-1553
Queen Mary.....	1553-1558
Queen Elizabeth.....	1558-1603
<i>House of Stuart.</i>	
James I.....	1603-1625
Charles I.....	1625-1649
Cromwell, Oliver.....	†1658
Cromwell, Richard.....	†1660
Charles II.....	1660-1685
James II.....	1685-1688
Queen Mary.....	†1694
William of Orange, †1702.....	1688-1702
Queen Anne.....	1702-1714

REVISED BY CLEMENS PETERSEN.

**England, Church of,** that portion of the Christian Church which has existed in England since the time of Saint Augustine (A. D. 597). The title is also sometimes given to the English Church with reference only to the period since the Reformation, but with no great accuracy, since the Church of England, like the other national churches of Europe, is, both in law and fact, a continuous body. Christianity was introduced into England, if not in the days of the apostles, at least very soon after them; and it speedily made its way even beyond the limits of the Roman settlements. The abandonment of Britain by the Romans, the invasion of the Saxons, and the consequent neglect or persecution of the native Christians, gave a serious check to the progress of the infant Church, and in the sixth century its influence was limited to the northern parts of the island, whither many of the Britons had retired to escape from the invaders. The mission of Augustine, however, was strictly to the heathen Saxons. Pope Gregory the Great had contemplated undertaking this mission in person, but upon his elevation to the papal throne had been compelled to abandon his design. Augustine (or Austin), prior of St. Andrew's monastery at Rome, was selected as his substitute. After a brief delay in France, where he was consecrated bishop by Vigilius of Arles, Saint Augustine arrived in Kent in the autumn of 596. His labors were crowned with success. The conversion of the kingdom of Kent was followed by the triumph of Christianity in all the kingdoms of the Heptarchy. The influence of the Italian missionaries, however, did not extend far, if at all, beyond the limits of the kingdom of Kent. The whole northern part of England was converted by British and Irish clergy. There was also, for many years, much jealousy between the native and foreign churchmen, but in process of time the two missions melted into one church; and it has long been customary to date the historical beginning of the Church of England and the succession of its prelates from the foundation of the see of Canterbury by Saint Augustine (A. D. 597).

At that time there was but one Christian Church, and the doctrines of the Church of England were of course the common faith of Christendom. In considering, as will be done presently, the events of the sixteenth century in England, it should be borne in mind that the abuses which were then removed had no existence in the sixth. The primacy of the pope had not then developed into a supremacy, but, as appears from the letters which passed between Gregory the Great and Saint Augustine, the authority of the former was limited to giving advice and counsel. The controversies about image-worship, which gave occasion to the Councils of Nice and Frankfort, did not reach their height until the eighth century. The mediæval teachings of purgatory and pardons were not fully developed until the twelfth, and the growth of the idea of papal supremacy was necessarily kept in check by the Eastern patriarchs until the eleventh. The final impetus was given to its growth by the separation of the Eastern and Western churches, and the general acceptance in the West of the pseudo-Isidorian Decretals.

As time went on these teachings made progress in England, as they did in the rest of Western Europe. As the papal authority took the obnoxious form of claiming a right to confirm the nominations of bishops and to hear appeals, it was met with frequent and vigorous opposition—not only in England, but also in the other kingdoms of Europe. Appeals to Rome had been prohibited in England from a very early period, and a vacancy in an episcopal see was apt to lead to a protracted controversy between the pope and the reigning sovereign, neither of whom was willing to admit the pretensions of the other.

When in the reign of Henry VIII. the Church and Parliament of England resolved to put an end to appeals to Rome, and to the claims of the pontiffs to a right to confirm the nominations of bishops (which, under certain circumstances, had been stretched into a claim to nominate in the first instance), they conceived that they were merely re-asserting those ancient rights of the Church of England which, though they had been suffered to fall into disuse, had never been abandoned. This position was taken with great unanimity, and was adhered to consistently by Bishop Gardiner and the national (or, as it might now be called, the old Catholic) party in England. The king was drawn into the violent measures of the dissolution of the monasteries and the spoliation of the Church by other counsellors.

The efforts of the Church of England to regain its ancient liberties were contemporaneous with, though distinct from, the continental Reformation. That event, however, was not without its influence in England; and in the reign of Edward VI. men who sympathized with Luther or Calvin, or even with the teachings of Zuinglius, had gained control over the English Church and nation. Under their influence, indeed, England was becoming rapidly Protestantized; and, in all likelihood, had not their career been cut short by the

death of the king, the religious condition of England would have been much the same as that of Switzerland or Scotland.

The accession of Queen Mary led to a violent reaction. The Protestant school of Cranmer and Ridley was forcibly suppressed, and the national party, of which Gardiner was the leader, was compelled to change its ground. The authority of the pope was restored in more than mediæval plenitude. Attempts were made not only to revive the state of things which existed in the early part of the reign of Henry VIII., but actually to destroy the ancient liberties of the Church of England. It is a grave question among historians whether Edward or Mary, both acting doubtless from the most conscientious motives, would, had their reigns been prolonged, have done more serious injury to the Church.

Queen Elizabeth, on coming to the throne, found herself encompassed with difficulties. There were then three schools or parties in the English Church: first, that of Gardiner and his followers, which had changed its ground, and was now disposed to maintain the papal supremacy, with all that it involved; second, that of Parker, which went beyond the former national school in its desire to reform what it believed to be abuses; and third, the Protestants, many of whom had taken refuge in Switzerland during the reign of Mary, and who returned full of admiration of the form of religion which they found established there, and anxious to introduce it into England. The private opinions of the queen, if indeed she had formed any, were not distinctly known, and it was for some time doubtful to which school she would give her influence and approbation. It may seem strange to minds educated in the ideas of the present age that the religious belief of great nations should have been directed or influenced by the private opinions of their sovereigns; but in the sixteenth century, and even later, the Church formed a part of the constitution of the nations of Western Europe. There was no idea that there could be more than one religious society in a nation, and therefore no idea of toleration or religious liberty. The history of England in the sixteenth century is not different from that of other European states. If the civil authority could carry out a reformation of religion in England and Sweden, it could suppress it in France and Spain and Italy.

Thus it was the purpose of any party that might succeed in gaining the favor of the queen to become not merely dominant, but exclusive. Its peculiar views were to be forced on all men. The Protestant (or, as it was soon afterwards called, the Puritan) school speedily put itself out of the question by the fact that its teachings would have led to the destruction of the Church of England, and the establishment of a new form of religion upon the plan adopted at Geneva. Various circumstances tended to alienate the queen from the papal (or, as it began to be styled, the Roman Catholic) party. The haughty discourtesy with which Pope Paul IV. received the information of her accession, which she sent to him in the usual form; the assumption of the title of queen of England by Mary of Scotland, with the great probability that France and Spain would proceed to assert the claims of the Scottish queen by force of arms; and the persistent attitude of opposition to all reforms maintained by the Marian bishops, compelled Elizabeth to put herself in the hands of the national or reforming party, of which Matthew Parker was the acknowledged leader. Like the national party in the reign of Henry VIII., this school was prepared to remove the jurisdiction which the pope had exercised within the realm of England. Like those earlier leaders, it desired to preserve the faith and discipline of the Church unaltered, but it went beyond them in proposing to remove certain abuses of teaching and practice which it conceived had led the people into superstition. These were the use of images, the invocation of the saints, the popular idea of purgatory, and the peculiar definition of the manner of the Real Presence in the blessed sacrament which is known as transubstantiation. These were doubtless developments, but, in the view of the school of thought which became dominant in England, unlawful developments of true doctrines. The Reformers thought that they could trace the progress of variation from the simpler teachings of the earlier Church, and their purpose was to carry back the Church of England, as nearly as possible, to its primitive simplicity. Whether they succeeded or not is a question which need not be now discussed; it will be sufficient to say that they proceeded to carry out their plans with promptitude and vigor. Parker was made archbishop of Canterbury in the place of Pole, who had died almost at the same time as Queen Mary. The majority of the bishops, refusing to co-operate with him, were removed or resigned their sees, and their places were filled by men whom he could trust. Attention was at once given to the reform of the service-books of the Church. Two prayer-books, compiled partly from the old Latin Uses of the Church of

England, had been set forth in 1549 and 1552, but had been suppressed in the reign of Mary. After much deliberation, it was determined to make the second of these the basis of the Prayer-Book, which was henceforth to be in English. The reforms in doctrine to which allusion has been made were indeed carried out, but care was taken to avoid touching any part of the common faith of Christendom. The famous principle of Vincent of Lerins, of universal acceptance as the test of Christian truth, was affirmed, and the authority of general councils was acknowledged. These arrangements received the approbation of Convocation and Parliament. Concessions had been made to both the extreme parties—to the Puritans, in adopting the second instead of the first prayer-book of Edward VI.; to the Roman Catholics, in leaving out certain expressions which were justly obnoxious to them—and it was thought that religious unity would thenceforward prevail in England.

This settlement, the joint work of Convocation and Parliament, was accepted by the great body of the nation; and, since all men continued to frequent the parish churches for about ten years, it was hoped that the unity of the English Church would continue unbroken. In 1570, however, after the excommunication of Queen Elizabeth by Pius V., the party afterwards called Roman Catholics, acting under the direction of the pope, separated from the Church. In those ages politics and religion were so singularly intermingled in Western Europe that any religious agitation commonly involved plots and treasons against the state, and sometimes open war. In this respect England was no better nor worse than other countries; and in this condition of affairs the true motive is to be found for the stringent laws which were enacted and put in force against "popish recusants." The penal laws, however, were the work of the State rather than of the Church; and they were intended not as a measure of unnecessary persecution, but as a precaution against the plots for the destruction of queen and government, which followed one another in quick succession.

Some of the extreme Protestants followed the example of separation in 1580 under the leadership of Robert Brown, who, however, returned to the Church and died in its communion. They were known at first by the name of Brownists, afterwards as Independents, and finally as Congregationalists. Others remained in the Church and demanded a further reformation, which, however, has never been conceded. The Prayer-Book has indeed been twice reviewed, but the tendency on both occasions has been to bring it into nearer accordance with the first book of Edward VI., which is supposed to have contained the true sentiments of the earlier Reformers.

The remaining history of the Church of England may be passed over briefly. After its suppression during the civil war—the success of which has, by some writers, been attributed to a temporary though secret combination between the extreme sections of its enemies—it was restored in 1660, since which time no change has been made in its doctrine or discipline. The exciting scenes of the sixteenth and seventeenth centuries, the successive attempts to restore the supremacy of the pope, culminating in the ill-advised measures of James II. and the consequent irritation of the people, led, first, to a reaction, and after the revolution of 1688 to a long period of religious indifference. The latter part of the seventeenth century was an age of immorality; the earlier part of the eighteenth was a time of negligence and indifference. Since the middle or early part of the eighteenth century there have been three great religious revivals. The first was that of John and Charles Wesley, both priests of the Church of England, who set themselves to the task of developing personal holiness (the great want of an age of religious indifference and immorality) in the members of their Church. Their labors were crowned with great and immediate success; but, partly by reason of the absence of encouragement from the leaders of the Church, and partly from the impatience of some of their own followers, they failed in accomplishing their designs. The Wesleys themselves lived and died in the communion of the Church, but many of their followers withdrew from it and formed a new body of dissenters.

The second revival was that of the "Evangelicals," as they were called, about 1798, of which such men as the Rev. Charles Simeon and the late Bishop Daniel Wilson were the leaders. The guiding thought in this movement also was the development of personal holiness. The movement was well adapted to the times, and may be regarded as successful while it lasted, but it lacked the elements of permanence. Its weakness lay in neglecting definite dogma, which experience has shown to be essential to any form of religion. The work of these good men, however, is worthy of all reverence. They accomplished a great deal in their generation, and they prepared the way for the revival which is now in progress.

While the aim of the Oxford divines, as they were called, was, equally with the others, the development of personal holiness, they endeavored to avoid the tendency of the first to schism, and of the second either to neglect dogma altogether or to give undue prominence to one or two points of Christian doctrine. Hence, they naturally dwelt much upon the authority of the Church; and their object seems, in their early history (1833–63), to have been simply to teach the Church to carry out in practice the doctrine, discipline, and manner of life which are set forth in the Prayer-Book. Of late years, however, the leaders of this school have given much thought to the relations of the Church of England to the rest of Christendom, and to the question of the restoration of visible unity among Christians. These points are discussed in the "Eirenicon" of the celebrated Dr. Pusey. Hence, much attention has been given to the study of church history, and the history of the English Church may be said to have been re-written within the last forty years.

Both these schools still exist, and are commonly known as Low Church and High Church. The former claims, and no doubt justly, to be the representative of the Protestant or Puritan part of the Church in the reign of Elizabeth; the latter, of the Catholic or national school, which then gained the predominance, and, with the exception of the forty years of the evangelical revival, has always retained it. The peculiar character of the former is its claim to great liberty of private judgment; of the latter, its deference to authority. With the exception of a small party which has lately arisen, of which Dean Stanley was one of the leaders, and which is somewhat eclectic in its teachings, these two great historical schools may be regarded as comprising the whole Church of England.

The discipline of the Church of England has continued unchanged for many centuries. The bishoprics, with the addition of two or three which were created by Henry VIII., and those of Ripon, Manchester, St. Alban's, Truro, Liverpool, and Southwell, erected within the present century, still remain in their ancient seats; and the succession of the bishops, of whom lists are extant, is traced in them to the sixth or seventh century. England and Wales are divided into two provinces, under the archbishops of Canterbury and York. The former has under him twenty-three bishops, the latter eight. The episcopal incomes amount to about £156,000. The population of England and Wales is over 25,000,000; the church sittings are estimated at 6,000,000. The actual church population is about 13,000,000. The system of parishes introduced by Theodore, the seventh archbishop of Canterbury (668–693), still exists. The number of parish priests and curates is not less than 20,000. The canon law, derived from the acts of successive English councils, still forms the basis of the ecclesiastical system. The revenues of the Church have been estimated at £5,000,000.

The great achievement of the English Church during the present century has been the establishment of the colonial episcopate. This began with the sending of Bishop Heber to Calcutta in 1814; there were in 1833 seventy-two dioceses in the English colonies and in missions. There are about 3000 clergymen.

From time immemorial the archbishop of Canterbury has been held to be entitled to the dignity, though he has never borne the name, of a patriarch. That this is something more than an empty dignity would seem to be implied by the unanimity with which the late Archbishop Longley was accepted as the president of the conference or synod of bishops which sat at Lambeth in 1867, and by the general disposition to consider him as the spiritual head of the Anglican communion. This includes the Church of England (with Wales), of Ireland, the Church in the colonies, and the Episcopal churches in Scotland and in the United States of America. These churches, while they are one in doctrine, regulate their internal affairs for themselves, yet they may meet, as they have done twice, in a synod of their bishops when any question of general interest arises. The whole number of episcopal sees and jurisdictions, as at present arranged, is 195, though the actual number of bishops is a little larger. There are nearly or quite 30,000 priests and deacons.

*Literature.*—BENE, "Opera," edited by Giles (Oxford, 1843–45, 12 vols.); USSHER, "Ed. Brit. Antiquitates," edited by Elrington (Dublin, 1847–62, 16 vols.); THOMAS FULLER, "Church History of Britain" (1655; best edition by Nichols, London, 1868, 3 vols.); JEREMY COLLIER, "Ecclesiastical History of Great Britain" (1703; best edition, London, 1840, 9 vols.); CARDWELL, "Documentary Annals of the Reformed Church of England" (Oxford, 1839–42); G. G. TERRY, "History of the Church of England" (London, 1864, 3 vols.; new ed. 1881); J. STOUGHTON, "Ecclesiastical History of England" (London, 1867–78, 7 vols.); R. W. DIXON, "History of the Church of England from

the Abolition of the Roman Jurisdiction" (London, 1878); F. G. LEE, "The Church under Queen Elizabeth" (London, 1880, 2 vols.); A. H. HORE, "Eighteen Centuries of the Church of England" (Oxford, 1881). Especially on Church law, see BLUNT AND PHILLIMORE, "Law of the Church of England" (London, 2 vols.).

BEVERLEY R. BETTS.

**England** (JOHN), D. D., was born in Cork, Ireland, Sept. 23, 1786. He was educated at Carlow College, and took orders in the Roman Catholic Church in 1808. He was soon after appointed lecturer at the North Chapel and chaplain of the prisons, and in 1809 he began the publication of the "Religious Repository," a monthly. He was greatly distinguished for his zeal, his benevolence, and his bold championship of Catholic emancipation. He was also a prominent journalist, and was once fined £500 for his boldness in discussing political questions. In 1820 he became bishop of Charleston, S. C., and there founded the "Catholic Miscellany," the first journal of his Church in America. Died April 11, 1842. His works, in 5 vols. 8vo, appeared in 1849. Bishop England's heroic behavior during an epidemic of yellow fever in Charleston endeared him to all classes of citizens. He was a man of great energy, profound learning, and much zeal for his Church, but possessed kind and liberal feelings for those who had views unlike his own.

**England** (SIR RICHARD), G. C. B., a son of Lieut.-Gen. Sir Richard England, an officer of Irish origin, distinguished in the British service during our Revolutionary war. The younger Sir Richard was born at Detroit, Mich., in 1793; entered the British army at the age of sixteen, and served against Napoleon I. He subsequently gained distinction in South Africa, India, Afghanistan, and the Crimea, and was made (1863) a full general in the army. He also became a grand officer of the Legion of Honor, colonel of the Forty-first Foot, etc. D. Jan., 1883.

**Eng'le** (FREDERICK), a rear-admiral of the U. S. navy, was born in 1799 in Delaware co., Pa.; became in 1814 a midshipman, in 1825 a lieutenant, in 1841 a commander, and in the Mexican war commanded the Princeton, in which he rendered distinguished services during the blockade. In 1855 he was made a captain. During the civil war he commanded the Hartford for a time, but owing to advanced age was soon assigned to less difficult positions, and was for a time governor of the naval asylum. In 1866 he was appointed a rear-admiral and placed upon the retired list. Died at Philadelphia Feb. 12, 1868.

**Eng'les** (JOSEPH PATTERSON), D. D., a Presbyterian divine, was born at Philadelphia, Pa., Jan. 3, 1793, and graduated at the University of Pennsylvania in 1811. In 1813 he became co-master of the grammar-school of that institution, and was (1817-45) master of the Classical Institute, of which he was one of the founders. In 1845 he became publishing agent of the Presbyterian Board of Publication. He was the editor of an edition of the Greek Testament and the author of several volumes, mostly for the young. Died April 14, 1861.

**Engles** (WILLIAM MORRISON), D. D., was born in Philadelphia Oct. 12, 1797, and graduated at the University of Pennsylvania in 1815. In 1820 he became pastor of the Seventh Presbyterian church in Philadelphia, in 1834 editor of the "Presbyterian," and in 1863 president of the Presbyterian Board of Publication. Died Nov. 27, 1867. He was a man of marked ability and excellence. He published "Records of the Presbyterian Church," a "Bible Dictionary," "Book of Poetry," "Sailors' Companion," "Sick-Room Devotion," "Soldier's Pocket-Book," and other works, chiefly devotional.

**Englewood**, R. R. junction, Cook co., Ill. (see map of Illinois, ref. 2-C, for location of county), 7 miles S. of Chicago. It is the site of the county normal school, which has a fine building and is very successful. This school is designed strictly for the education of school-teachers; both sexes are admitted. The school has a normal department, a training-school, and a high-school department. The tuition is free for residents of the county. Pop. in 1880, 2350.

**Englewood**, on R. R., Bergen co., N. J. (see map of New Jersey, ref. 2-E, for location of county), 14 miles N. of New York. The village is near the Palisades of the Hudson River. The township was organized in 1871 from part of Hackensack. Pop. of township in 1880, 4076.

**English** (EARL), U. S. N., born Feb. 18, 1834, at Burlington, N. J., entered the navy as a midshipman Feb. 25, 1840, became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, a captain in 1871. He was in the engagement with the Barrier-forts at the entrance to the Canton River, China, in 1856, and during 1862 and 1863 commanded several vessels

of the Gulf blockading squadron. In 1864 and 1865 he commanded the steamer Wyalusing of the North Atlantic blockading squadron, and participated, in Oct., 1864, in the capture of Plymouth, N. C. He has since become commodore, and in 1883 was chief of the bureau of equipment and recruiting. FOXHALL A. PARKER.

**English** (GEORGE BETHUNE), an adventurer and author, was born at Cambridge, Mass., Mar. 7, 1787, and graduated at Harvard College in 1807. He studied law and was admitted to the bar, afterwards read divinity, was licensed to preach, and in 1813 published a work in favor of Judaism, which Edward Everett and others answered in 1814. He tried in vain to enter the army; became a newspaper editor, was for a time a resident of New Harmony, Robert Owen's community, and then became a lieutenant of U. S. marines. He went to Egypt, resigned his commission, became (according to some accounts) a Mohammedan, entered the Egyptian service, in which he gained distinction in 1820 in the expedition against the Mamelukes and hostile tribes of Nubia, serving as an officer of artillery. He afterwards became U. S. agent in the Levant. In 1827 he returned to the U. S., and went to Washington, D. C., where he died Sept. 20, 1828. He possessed a great readiness for the acquisition of languages, and was the author of several works, chiefly respecting religious questions, and a "Narrative of the Expedition to Dongola," etc. (1823). Mr. Everett accuses and convicts English of wholesale plagiarism, flagrant dishonesty in perverting the sense of quoted passages, and gross indelicacy and indecency of language and sentiment. As a reply to Everett's review of his "Grounds of Christianity Examined," he published "Five Smooth Stones out of the Brook," which was worse than the book itself. He was a man of remarkable talents, but of reckless and inconstant character.

**English** (JAMES E.), an American statesman, was born at New Haven, Conn., in Mar., 1812. He became a successful merchant and manufacturer, was a Democratic member of Congress (1861-65), and was elected governor of Connecticut in 1868 and 1870. He was appointed to fill a vacancy in the U. S. Senate caused by the death (Nov. 21, 1875) of O. S. Ferry, and was nominated for governor of Conn. by the Democratic convention Aug. 18, 1880.

**English** (THOMAS DUNN), M. D., an American poet and lawyer, born in Philadelphia June 29, 1819. He became in 1856 a medical practitioner near New York City. Among his works are several successful dramas, numerous novels, among them "Walter Wolfe" (1844), and a volume of poems (1855). Dr. English has won a high reputation as a humorist and critic, and has been long prominently connected with important journals.

**English** (WILLIAM H.), b. in Lexington, Ind., Aug. 27, 1822; educated at South Hanover College; practised law, and was postmaster of Lexington, Ind.; clerk of Ind. House of Representatives in 1843; was four years in U. S. Treasury department; secretary in 1850 of convention at Indianapolis to revise Constitution of Ind.; member of Ind. legislature in 1851, and of U. S. House of Representatives in 1852; was three times re-elected to the latter, retiring in 1860; was president of First National Bank of Indianapolis, and resigned that office in 1877 on account of ill-health. He was nominated for Vice-President of the U. S. by the Democratic Convention at Cincinnati, O., June 24, 1880.

**English Channel** [Fr. *La Manche*, "the sleeve"], that portion of the Atlantic which separates England from France. It extends on the English side from Dover to Land's End, and on the French from Calais to the island of Ushant. On the E. it communicates with the German Ocean by the Strait of Dover, 21 miles wide, and on the W. it opens into the Atlantic by an entrance 100 miles wide. At its greatest width it is about 150 miles. On the English side, off the coast of Hampshire, lies the beautiful Isle of Wight. Guernsey, Jersey, and the other Channel Islands are situated off the N. coast of France. The Channel has a current that sets from the westward, and it is noted for its disagreeable roughness, which causes its passage to be dreaded by tourists.

**English Harbor**, in the island of Antigua, is one of the finest ports in the West Indies, and is capable of receiving vessels of the largest class. It has a dockyard and a naval hospital, and is perfectly secure in all winds. It is on the S. side of the island, in lat. 17° 3' N., lon. 61° 45' W.

**English Harbor** (WEST), a port of entry of Fortune Bay district, Newfoundland, has extensive cod and herring fisheries. Pop. 210.—There are several fishing-towns of Newfoundland called English Harbor, one of which, a post-village of Trinity district, 7 miles by road and ferry from Trinity, has a pop. of 350.



**English Language and Literature.** The English language is the speech of the people and the descendants of the people who between A. D. 425 and 600 took possession of the greater part of the island before known as Britain. From the time of their settled possession of this country they and their language were called English, and their land was called England, at home and abroad. In later years, and for a long time, they have been called Anglo-Saxons, and their language Anglo-Saxon, but this compound name is fictitious, and was unknown to them. They were so called by historians because, according to the earliest accounts of their migration or conquest, at a time when migration meant conquest, they were chiefly composed of two tribes, the Angles and the Saxons, with whom, in smaller numbers, were another tribe called the Jutes, of whom little more is known than their name. These people came from a small tract of country about the union of the peninsula of Denmark with the mainland, which is now known as Sleswick-Holstein. They were an offshoot of that branch of the Indo-European, or Aryan, race known as the Teutonic family, which itself branched into three divisions—the Scandinavian, the Gothic, and the Teutonic proper. The Scandinavian went northward; its representatives are now the people of Norway, Sweden, Iceland, and Denmark. The Gothic branch was the southernmost. It has perished by absorption, and the only remnants of its language, which has been dead for nearly a thousand years, are a mutilated translation of the Gospels, a translation of St. Paul's Epistles, fragments of Esdras and Nehemiah, made by Bishop Ulfilas about A. D. 350, and a calendar. The main branch, the Teutonic proper, filled the country now somewhat vaguely known as Germany. The Germans, however, do not call themselves or their language German, but Deutsch, and this Deutsch people divided itself into two branches, the Hoch Deutsch, or "High German," and the Platt Deutsch, or "Low German." The people who went from what is now called Sleswick-Holstein to what, at the time of their going, was called Britain, belonged to the latter branch of the Teutonic stock. The English language is therefore, by origin and main affinity, a Platt-Deutsch tongue. Among living tongues it is nearest of kin to the Frisian, which is still spoken by a small people on the shore of the North Sea, on the borders of Holland nearest to Denmark. In the formation of the English language the kindred Norse or Scandinavian folk had a directly and an indirectly modifying influence, which shall be considered hereafter. The English, or "Anglo-Saxon," language must have been spoken in the country from which the Angles and the Saxons came, but no trace of it was left there; and chiefly because the emigration of the people to Britain was so complete that it left the country for a time bare and almost desolate. The English language, as it was taken into Britain by the men who were to supplant the Britons and to change the very name of the country, was simple and unmixed, so far as any language can be simple and unmixed; and it so remained for centuries. The Celtic dialect of the subdued Britons had no influence upon the sturdy speech of the Teutonic invaders, who ere long filled the whole island from the Grampians to the English Channel with their language as with themselves. And it should be here remarked that the language spoken from the Grampians southward was English, or "Anglo-Saxon," and that what is called Lowland Scotch owes none of its peculiarities to any Gaelic influences, but is as purely and absolutely English as the dialect spoken in any other part of the island; and, indeed, that what is sometimes called "broad Scotch" is probably more like the original speech of the Angles than that more cultivated and literary speech which has, by a certain right, arrogated to itself exclusively the name *English*.

The Early English, or "Anglo-Saxon," was a simple or homogeneous language; that is, its words were all, or as nearly as possible all, of one stock—the Platt-Deutsch branch of the Teutonic stock. It was also a synthetic or inflectional language; that is, it expressed time, condition, number, and person by changes in the forms of words, like the Latin and the Greek, and not by the use of "auxiliary" words. In this condition it remained in England for about six hundred years (A. D. 450 to 1066), changing somewhat, as all living or spoken languages change, and receiving very slight additions from the Celtic tongue of the Britons, and more considerable accessions from that of the Danes, who began their inroads about the end of the eighth century, and who at last distributed themselves over the north-eastern part of the island, and even obtained control over it, under Cnut, for about fifty years. When they were driven out as a ruling power they left behind them, of course, many descendants, and also memorials of their presence in many words which had been taken into the language, and in many names of places. The termination *by*, as in Derby, Whitby, Naseby, Holdenby, etc., marks

their presence. The terror and confusion consequent upon the ravages of the furious Danes helped to sweep away the little that there was of scholarship and literature among the English (or Anglo-Saxons); but even they were not too rude to escape the intellectual ruin which spread over Europe in the Dark Ages, and the light of their little learning was going out of its own feebleness when it was extinguished by an utterly barbarous violence.

Upon a country thus harried, distracted, and oppressed there came yet another change—that of the conquest by William of Normandy, A. D. 1066. The Normans took absolute possession of the island, over which they spread themselves, carrying with them their retainers, bringing with them their priests, and England became a Norman possession and colony; the speech of the conquerors becoming, consequently, that of the court, of courtly circles, and of all public documents and transactions. The Normans belonged to the Scandinavian branch of the Teutonic stock, which had spread northward, even to Iceland. Sailing southward, some of them had taken possession of a province of France, called from them Normandy; but these retained neither their Scandinavian tongue nor manners. They adopted those of the French whose land they had seized. Although they had been in Normandy only about two hundred years when William set out for his invasion of England, they then spoke a dialect which is known as Norman-French. For their day, they were an accomplished and an elegant people. The English (or Anglo-Saxon) tongue, being reduced to the position of a language spoken only by rude tillers of the soil and artisans at that dark period of the world's history, soon lost its distinctive forms and its nicer inflections; a process by which, although at the time deteriorating, it was prepared to become with greater ease an analytical language on its amalgamation with the Norman-French. Yet it never became in any sense French or Romanic, but remained in its essence and in its structure English.

The elements of our present composite English are therefore (1) pure English or "Anglo-Saxon," (2) British or Celtic, (3) Danish or Norse, (4) Norman-French, (5) Latin, (6) Greek, (7) words adopted from all languages, including Arabic, Hebrew, and even those of the savage aborigines of Africa and America. Words of the last class are comparatively few in number; their presence in the language does not at all affect it in its structural or historical aspect, nor do they in any way distinguish it from other Indo-European tongues.

1. Pure English, or Anglo-Saxon, which entered Britain about A. D. 450, and became the dominant tongue about A. D. 600, furnishes modern standard English with its strength, its stability, its vitality, and its real character. It is the distinctive element of our speech; and not only so, but it forms, except from a lexicographer's point of view, the bulk of the spoken language. If all other elements were taken away, the language would yet exist with its life and vigor unimpaired. We could live and love and hate and work and play and worship, and express all our wants and our feelings, tell tales and sing songs. But were this element to be removed, the language would fall to pieces in heterogeneous, disconnected, and lifeless masses. And yet in all copious dictionaries of the English language the words of other than purely English origin are quite three-fourths of the whole vocabulary. This seeming paradox is owing to the fact that all or almost all our words of commonest and most necessary use, including those particles which connect the others and modify their meaning, are pure English, while those which belong to literature, science, and art, which express abstract ideas and the subtle variations of thought, are, in the main, of foreign, and chiefly of Romanic, origin. The words which are used by all, men, women, and children, learned and unlearned, and used by all most often, belong to the former class: those which are used chiefly by the more or less learned classes, and much the greater number of them rarely even by those, belong to the latter. This is a phenomenon which appears in no other language, at least in anything like so great a degree. It makes modern English a two-sided, and, as we have words of both classes for many nearly identical thoughts and things, almost a double-faced language. The proportion of pure English used in literature is unavoidably different in the works of various writers and at various times. But although our speech has grown upon its Romanic side for centuries, and not at all of course upon its English side, on which it has rather dwindled, the proportion of the former element in use by a writer is not determined only by the period at which he lived: his taste, the character of his mind, his associations, and the nature of his subject, all influence his conscious, but generally his unconscious, choice of his medium of expression. Sir Thomas Browne and John Bunyan were contemporary, but they wrote almost in different languages; that of the

former being as nearly as possible Romanic, that of the latter as nearly as possible pure English.

The computations of Trench and of Marsh upon this subject are the most valuable and interesting that have been made. The former, supposing the English language of the present day to be divided into one hundred parts, apportioned these parts, in round numbers, thus: Saxon, 60; Latin, including that which has come through the French, 30; Greek, 5; leaving 5, which he well says is perhaps too large a residue, to be divided among all other languages from which we have adopted isolated words. This estimate is founded upon such a vocabulary as that in Webster's or in Worcester's Dictionary, in which there are thousands of words, foreign in origin, which the general reader would not meet with once in his lifetime. Mr. Marsh found that in the vocabulary of the "Ormulum" (which was written about A. D. 1225)—that is, in the total of the several words used in it—97 per cent. of the words are Anglo-Saxon; that in the vocabulary of our English Bible 60 per cent. are native; that in that of Shakespeare the proportion is about the same; while in Milton's poetical works the home-born words are less than 33 per cent. But this computation tells us nothing of the comparative frequency with which words of English and of foreign origin are used. On an examination of various works of thirty representative authors who wrote between A. D. 1300 and the present day, and of four books of the New Testament, he found that Robert of Gloucester used 96 per cent. of English words; the author of "Piers Ploughman," in four entire divisions of his work, from 84 to 94 per cent.; Chaucer, in four tales, from 88 to 93 per cent.; the New Testament, represented by thirteen chapters from "John," "Matthew," "Luke," and "Romans," gave from 90 to 96 per cent., St. Paul's proportion being the smallest, St. John's the largest. Shakespeare, estimated by one act from each of three plays, gave from 88 to 91 per cent.; Milton, on a like computation, from 80 to 90 per cent.; Addison, 82 per cent.; Johnson, in the Preface to his Dictionary, sunk to 72 per cent.; and Gibbon, in one chapter of his History, to 70 per cent. of home-born words. From this level the writers of the present day are found to have risen in their use of the Teutonic element; Bryant using from 84 to 92 per cent.; Browning, 84 per cent.; Tennyson, 87 to 89 per cent.; Longfellow, 87 per cent.; and even Ruskin, critical writer on art although he is, from 73 to 84 per cent. of true English words. These are the most characteristic writers of the thirty well chosen by Mr. Marsh for examination upon this interesting point; for it is only by the consideration of such facts as those presented above that, seeing the pages of our dictionaries, and even the columns of our newspapers, so overwhelmed with words of Latin, French, and Greek origin, the reader who has not made a special study of language can rightly estimate the greatness and the strength of the native or Anglo-Saxon element in modern English. For example, Shakespeare and Milton use many stranger words but once, and many more but twice, but the home-born words hundreds, and in case of the particles thousands, of times; and a like usage is common with the best writers of the present day; yet *similar*, *conjunction*, and *domiciliary* each count one in a dictionary, as well as *like*, *and*, and *home*. The simpler and more direct a writer is, the more purely English will his language be, unless he writes upon philosophy, natural science, art, or literature. To paraphrase a well-known passage of Shakespeare's, homely brevity is the soul of our language—foreign tediousness its limbs and outward flourishes.

Notwithstanding what has just been said, we have now to remark that in the language of English-speaking peoples to-day the purely English part is so unlike that spoken by their forefathers before the Norman Conquest, who yet called their speech English and their country England, as to be, to all intents and purposes, a different language. The English of Alfred is far more unlike that of Victoria than the Greek of Homer is unlike the dialect now spoken in the Morea; although between the former there are only one thousand years, and between the latter more than three thousand, or about two thousand five hundred if we reckon from the redaction of the Homeric poems by Pisistratus. And yet the course of the language is distinctly traceable step by step; for in its remnants and records of early literature English is richer than any other tongue known to philology, Sanscrit being left out of consideration. The question has therefore arisen, What propriety is there in any distinction between English and Anglo-Saxon, and where shall the line of demarcation be drawn? It is urged by some philologists, and with much reason, that as a man is the same individual in infancy, youth, maturity, and old age, although no recognizable likeness could be found between the old man and the infant, so English is English under all the varieties of form which it has taken. How far this is true for what may be called practical purposes

we shall now see in a brief examination of its structure in some of its earlier stages. For example:

"Dá ða hig fêrdon, ða comon sume ða wêardas on ða ceastre, and cyðdon ðæra sacerda caldrum ealle ða þing ðe ðær gewordene wæron. Dá gesamnodon ða ealdras hig and worhton gemót and sealdon ðam þegnum micel feoh, and cwædon, Secegaþ ðæt hys leorning-enihtas comon nihtes, and forstælon hyne, ða we slêpon."

That passage is not to be understood by any reader, however intelligent and well instructed, who has not made a special study of the language in which it is written, although its meaning is familiar to almost every person, literate or illiterate. Only three words, *and*, *we*, and *hys*, would seem to him at all vernacular, and yet it was the every-day English of English people who lived in England. It is the Anglo-Saxon version of verses 11, 12, and 13 of Matthew, ch. xxviii., with our present version of which it would be well to compare it:

"Now when they were going, behold, some of the watch came into the city, and shewed unto the chief priests all the things that were done. And when they were assembled with the elders, and had taken counsel, they gave large money unto the soldiers, saying, Say ye his disciples came by night and stole him away while we slept."

Strange and foreign to us as the first passage is—as foreign as French or German—a brief examination of it will make clear to any person, although entirely unacquainted with Anglo-Saxon, that it is written in a tongue with the accents of which he is not entirely unfamiliar. *Fêrdon* is fared, went; *comon*, came; *sume*, some; *wêardas*, wards, watch; *ceastre*, or *caster*, city (as in Lancaster); *cyðdon*, quoth, told; *sacerda*, priests (sacred persons); *caldrum*, elders; *ealle*, all; *wæron*, were; *worhton*, worked; *gemót*, a meeting; *sealdon*, sold, gave; *þegnum*, thanes; *micel*, mickle, much; *feoh*, fee, pay, money; *secegaþ*, say; *leorning-enihtas*, learning-knights, disciples; *nihtes*, nights; *forstælon*, stole; *hyne*, him; *slêpon*, slept. It thus appears that almost all the words in this passage are essentially English now. In the lapse of eleven hundred years they have changed somewhat in form, and somewhat, but not essentially, in meaning. It will help us to understand the nature of the change which took place in the language if we compare with the foregoing another version of the passage—Wycliffe's—which, although from the Vulgate, is sufficiently correspondent to the others for our purpose:

"The wiche when they hadden gon, loo, summe of the keperis camen into the cytee, and tolden to the princes of prestis alle thingis that weren don. And they gedrid to gidre with the elders men, a council takun, gauo to the knightis plentenus money, saying, Seie ge, for his disciplis camen by nigte and han stolen him, us slepinge."

Wycliffe or his co-workers made his translation about six hundred years after the first quoted above, and which was the first that was made into any form of English; in the making of which the Venerable Bede took part. This passage in the Wycliffe version gives us some notion of the nature and extent of the changes which had taken place during that period, for, although antiquated, it is unmistakably English—almost as easily understood by any intelligent person as if it had been written to-day, although it was written about five hundred years ago. But certain forms in it at once attract our attention. They are *hadden* (had), *camen* (came), *tolden* (told), *weren* (were), *han* (have). This ending in *en* is no rude or dialectical form of language. It will be found that the nominatives to all these verbs are plural. They are therefore plural forms of the verb which have been dropped since Wycliffe's day. They are a remnant of the elder form of the language; for, looking back to the earlier version, we find like plural terminations, but instead of *en* we find *on*—*fêrdon* (fared), *comon* (came), *wæron* (were), *worhton* (worked), etc. In the Wycliffe version we find also the plural forms *keperis*, *prestis*, *thingis*, *knightis*, which since Wycliffe's day have passed into *keepers*, *priests*, *things*, and *knights*. In the earlier version we find a like syllabic plural in *is*, but instead of *is*, as *wêardas* (wards), *ealdras* (elders), *enhtas* (knights). Besides the forms already remarked upon, we find in the earlier version *caldrum*, meaning elders, as *ealdras* does, but elders in another relation, the same which is indicated by a like termination in *þegnum*. *Secegaþ* is "say," but it is "say" imperatively. The old imperative therefore was in *th*, but this had begun to pass away five hundred years ago, for Wycliffe writes *seic* (say). Another form in the earlier version attracts our attention: *nihtes*, meaning by night, "comon nihtes;" "they came by night," as we say; but this *nihtes* is a genitive form, and means "of night;"\* but so even now—

\* The true genitive of *niht* is *nihte*, and *nihtes* has been regarded as an adverb. But it seems rather to have been conformed to *dages*. *Dages* and *nihtes* means, "of (or by) day and of (or by) night."

a-days, among some people, we hear such phrases as "He came o' nights." But the fashion of expressing this thought by a change in the word *nicht* had passed away before Wycliffe's day, for he uses a preposition and writes "by night."

By this brief comparison of these passages we have a suggestive illustration, but nothing more, of the changes which the old English language underwent in the course of years, until, about A. D. 1525, it assumed substantially the form in which we have it now. Those changes may be succinctly said to have been the gradual disappearance of the case-endings of nouns, except the possessive, which was contracted from *es* to *'s*, and the nominative plural, which was changed from *as* to *es*, and in many words to simple *e*;<sup>\*</sup> a like change, but complete in the adjective, which loses all distinction of the form and the sense of case and of number, and does not conform to or agree with its substantive; the entire disappearance of gender; the loss of the infinitive and imperative form of the verb, with the distinctions of person except in the third person singular; the only other inflectional changes remaining being those of the preterite and present or indefinite participle in the weak verbs (*love, loved, loving*), to which is added the perfect or definite participle in the strong verbs (*sing, singing, sang, sung*). The verb to be is not at variance with this assertion, its several tenses, and even persons, being taken from three distinct verbs; which appears to have been the case in the whole Indo-European family of speech, the Sanscrit included, from the earliest ages. Truly inflected case and personal endings are preserved only in the pronouns; and even there imperfectly or irregularly, for although *his* and *him* are inflectional forms of *he, me* and *mine* are not inflected forms of *I, nor us* and *ours* of *we*. Briefly, in this regard grammatical forms, with a few exceptions, disappeared, and with them the grammatical construction required or permitted by those forms.

The modern English sentence is built only upon the logical relation of thought, not upon the formal relations of words. Besides these changes there is another, that of contraction, a kind of phonetic degradation which is constantly going on more or less in all languages. Syllables are dropped or contracted, so that not only does *luflath* become *love, maken*, *make, hlaford*, *lord*, and the like, but what used to be, only two hundred and fifty years ago, *work-ed* has for a long time been spoken and is now written by some persons *workt*. Letters are also dropped which do not affect the syllabic sound of the word, as *wou'd* and *shou'd*, for *would* and *should*, in which, within the memory of living men, old people used to pronounce the *l*. Language appears to shut up on itself like a telescope.

The next change in the English language in the order of time—one which, in fact, began long before that just sketched was completed—is the introduction of the Romanic element; that is, of words which came directly or indirectly from the Latin language. These words are of three sorts: First, those which came through the Norman-French, and which are ours by inheritance from the Normans who eight hundred years ago made England their home, and who in the course of two centuries became fused with the English people; of which *castle, faith, spy, person, poor, custom, sermon, voice, place, and rage* are examples. Secondly, words of general use formed by scholars in later years directly from the Latin, or from some one of the Romanic languages, or which have been adopted without modification from those languages; examples of the first sort under this class being *index, consul, circus, opera*; of the second, *trait, chagrin, portmanteau, puisne* or *puny*. Thirdly, words common to science in all languages, which have come into simple or metaphorical use in English by reason of the diffusion of knowledge and the immediate, every-day connection of science with the affairs of common life. Examples of this class are *zenith, diameter, tangent, ellipse, fulcrum*.

The Romanic or Latin elements of the English language have been divided into Latin of the First Period—that which is a mere trace of the Roman occupation of Britain, and which appears chiefly in the compound of *castra*, "a camp," in the names of places, as Lancaster, Doncaster, etc.; Latin of the Second Period—ecclesiastical terms consequent upon the conversion of the English or Anglo-Saxons to Christianity about A. D. 600; Latin of the Third Period—that large formative element which came in through the Norman-French; and Latin of the Fourth Period—all Romance words which have been brought in since the beginning of the sixteenth century. But for an understanding of the formation and growth of the language the division first set forth seems the better, as the Latin of the

so-called first and second periods is very small in proportion, and has had a very little formative influence, while the Latin of the so-called fourth period includes the two very diverse elements (1) of Romanic words which have been really taken into the language and subjected to its formative influence; and (2) those which, originally little more than signs or technical names common to science or to the arts the world over, have been transferred into speech in a literal or a metaphorical sense. In tracing the history of our language the only Romanic element of high importance is that which is due chiefly to the presence of the Normans in England, and which became welded into English speech about A. D. 1350.

For about one hundred years after the Norman Conquest the conquerors and the conquered held themselves as much as possible aloof from each other—in scorn on the one side and sullenness on the other. And for nearly two centuries more the government of England, politically and ecclesiastically, was carried on in Latin and in Norman-French. These two languages prevailed in the court, in the universities, in Parliament, and in the courts of law; and even in the grammar-schools the boys construed their Latin into Norman-French. But as the Normans were few and politic, and the English were many and sturdy, there was unavoidably some mingling of the two languages as well as of the two peoples, and the English gradually prevailed. Political and patriotic motives, which cannot be here noticed in detail, combined with the natural influences already mentioned to turn Normans into Englishmen, both in feeling and in speech, until, about A. D. 1350, English took the place of Latin in the schools and in the courts of law, and the speech of the whole of the people of England became English. It was not, however, the English which the Norman invader heard at Hastings which obtained this compensating victory, but a speech much modified and largely mixed with strange elements. What has come down to us of that which was written in England during these three hundred years is worthless as literature. Words could hardly express its barrenness of thought and of feeling and the rudeness of its structure. But its worth in the history of the language cannot be overrated.

Before the Conquest there were two broad dialectic distinctions in English speech—the Northern and the Southern. The Northern dialect, showing the influence of the Angles and having a marked infusion of Norse, is known as the Anglian. It has left very few literary records of its existence; partly, it has been supposed, because of the destruction of the monasteries by the Danes. The Southern was more Saxonish, free from Danish mixture, a softer speech, more cultivated, and it left a literature which may almost be called copious. But the change to which living language is always subject, and which is greater and more rapid when the mass of the people can neither write nor read, and their speech is excluded from literature, from the court, and from public transactions, caused such modifications after the Conquest that in the thirteenth and fourteenth centuries three great dialects of English can be plainly distinguished—the Northern, the Midland, and the Southern. These differed from each other even more in their inflections and in their construction than in their vocabularies. It was not the Southern that prevailed and became standard English, or "the king's English," as it has been called, but the Midland, and this was modified more by influence from the North than from the South.

Of the English written between A. D. 1100 and 1350 that of hardly any two authors was alike. The language, having no recognized standard, was used by each scribe according to the mode of speech that prevailed among the people among whom he was bred and for whom he wrote. Writing was therefore as dialectal as speech, and owing to the immobility of the people and the lack of communication between them, a separation of fifty miles made a difference of dialect which is quite perceptible upon close comparison.

For the purposes of the present sketch it is unnecessary even to glance at more than the few most prominent and most significant of the English writings of this period. Layamon's "Brut" is a rhymed chronicle of the traditional history of Britain. It was a translation, with large additions, from the Anglo-Norman poet Wace's "Brut d'Angleterre," itself a translation from the Latin of Geoffrey of Monmouth, which professes, probably with truth, to be founded upon a British or so-called Welsh original.† Layamon's work was written about A. D. 1200. The dialect is the Southern, and is regarded by Sir Frederic Madden, whose authority is very high, as a fair representative of the language which prevailed among the more cultivated people

\* The earliest English or "Anglo-Saxon" had various plural and genitive forms, which, for the sake of brevity and convenience, are here passed over.

† Welsh is not a national or folk name. It means merely "foreigner." The Teutones, Teutch, or Deutch, whom we call Germans, called foreigners Welsh, as the Greeks called them Barbarians.

throughout the south and west of England. It is marked by departures from the inflectional forms of Anglo-Saxon or pure English, and by a consequent disregard of the construction founded upon them, which shows that the original English was already broken down even in the South, where it held its own longest, and was far advanced in the transition to Modern English. Gender has almost disappeared; the imperative takes to before it; the government of prepositions is disregarded; strong verbs have sometimes weak preterites and participles; and *a* appears as an article. But although many Norse words are found in the "Brut," it is important to remark that the number of Norman-French words is very few indeed. Less than fifty are found in the whole poem (if so it must be called) of 32,250 lines. Considering that Layamon's work is a translation by a priest from a poem in the Norman-French, then spoken by the rulers of England, which was itself translated from the Latin, this is a very significant fact. It shows that the English, although it had broken up as to its forms, had yet kept itself almost entirely free from Romanic intermixture during one hundred and fifty years. The same interesting fact is established by a very important work, a metrical paraphrase of the Gospels, written about the same time by a monk named Orm or Ormin, and which was called by its author, from his own name, the "Ormulum." This specimen of Early English versification has a peculiar value in the history of the language, from the fact that the writer undertook to express the exact pronunciation of words by a system of spelling peculiar to himself. This was the indication of the short sound of a vowel by the doubling of the following consonant, while in the case of a long vowel the following consonant would be single, the effect being like that of the final *e* with us; as, for instance, *pin* and *pine*. Thus, Orm would write "thin" *thinn*, but "thine" *thin*, and "pan" *pann*, but "pane" *pan*, "own" *on*, but "on" *onn*. He writes for example

"Nu brotherr Walterr, brotherr min."

and

"Pe Goddspell unnderrstannenn."

Thus early was the first attempt at phonographic English spelling. The means taken was an application of a rule which has prevailed always more or less even to the present day, only that we call in the final *e* or accept its aid. For example, *pult*, *pule*, *tall*, *tale*, *mall*, *male*, *pill*, *pile*, *till*, *tile*, *tiller*, *tiling*, *fill*, *file*, *filler*, *fling*. This phonographic freak of Orm's, together with the rhythm of his verse (unfortunately, he did not use rhyme), gives a very clear notion of the pronunciation of English as he spoke it; and considering the remote period at which he lived, and the unfixed state of the language then, it is remarkable how small and few comparatively have been the changes in the sound and accent of English words. Orm's dialect is East Anglian; the infusion of Norse words in his vocabulary is very strong; and altogether his work is a characteristic representative of the Northern form of English about the beginning of the thirteenth century. Like Layamon's "Brut," it is notably free from any intermixture of Norman-French. Considering these points, it is very remarkable that the "Ormulum" is, of all important writings of its period, the most like modern English; a fact which indicates the very strong influence which the Northern dialects exerted in the formation of our standard English speech.

We have thus far had "English undefiled" under our consideration, but we have now reached a period at which a flood of French or Romanic words was turned into that "pure well." The interfusion of the languages was the consequence and the sign of an interfusion of the people. Englishmen did not become Normans—that was impossible—but the Normans became Englishmen—Englishmen of a high and haughty class, a noble order, but still Englishmen; and taking for their own use the language of the people whose country they had also taken for their own use, they brought a large and in most respects a valuable store of words from the speech of their race as their contribution to the common stock. The introduction of French words was largely due, there can be no doubt, to the influence of the priests. These men were dependent upon the Norman nobles; they were their beneficiaries, their chaplains. The higher members of the priesthood, and a very large proportion of the whole order, were of Norman race. Their professional language was Latin, of which Norman-French was a dialect. Their intercourse with women and children, and the reverence in which they were held by them, weak and plastic, but still the makers and the stuff of future Englishmen, gave them an influence upon the language of the country which can hardly be overrated. What sort of English the priests began to use about this period is shown by the "Ancren Riwle," a treatise on monastic life which was written by a priest for the guidance of three ladies about A.D. 1220. Intended

for private use, it so commended itself by its matter and style to general favor that it soon became widely diffused, and there are in existence several copies of it, no two of which, however, are exactly alike, and some of which differ greatly from the original. The difference, however, is chiefly, if not altogether, dialectical. This little work is of interest enough in both a literary and a linguistic point of view to make a brief passage worthy of our consideration. The following description of the glutton is picturesque and humorous:

"Þe guire glutin is þes feondes manciple. Uor he stikeð euer iðe celere, oðer iðe kuchene. His heorte is iðe disches; his þouht is iðs neppes; his lif iðe tunne; his soule iðe crocke. Kumeð forð biuoren his Louerde besmited and bismecoured, a disch in his one hand and a scole in his oðer; maðeled mid wordes, and wiggleð ase uordrunken mon þet haueð imunt to uallen; bohalt his greute wombe, and te uenod laugeweð þet he to bersteð;"—which being modernized is as follows:

"The greedy glutton is the fiend's manciple [purveyor]. For he sticketh either in the cellar or in the kitchen. His heart is in the dishes; his thought is on the nap [napery, table-cloth]; his life in the tun; his soul in the crock [pитеr]. He cometh forth before his Lord besmited and besmeared, a dish in his one hand and a bowl in his other. He babbleth with words, and wiggleth as a fordrunken man that hath a mind to fall, beholds his great womb, and the fiend laugheth that he to-bursteth."

The modern air of this not exceptional passage is remarkable. As far as the structure of the sentence is involved, it might almost have been written to-day. And as to the words, only a few of them have dropped out of use, and a few of them have changed a little in signification—none of them at all essentially. The same facts are not less apparent in the following passage, which is given first in the dialect of Dorsetshire, in which the "Ancren Riwle" is supposed to have been originally written; next, for the sake of a comparison of the variations, in that of Salop, to which the copyist was plainly accustomed:

"Ancre ne schal nout forwurðen scolmeistro, ne turnen  
Ancre ne schal nawt for-wurðo scolemeister, nor turnen  
*An anchoress shall not become a schoolmaster, nor turn*  
hire ancre hus to childrene scole. . . . Hwon ge  
ancrehs hus to childrene scole. . . . Hwen ge  
*her anchoress-house into a children's school. . . . When ye*  
beoð i-leten blod, ge ne schulen don no þing þeo preo  
arn i-leten blod, ge ne schulen do preo daies na þing  
*are let blood, ye shall do nothing for three*  
dawes þet on greue; auh talkeð mid ouer meiden-  
þ on groves; ah talkes to owre seruanz,  
*days that grieves [irks] you; but talk with your maids,*  
es and mid þeaufulen talen schurteð ou togederes. Ge  
wid þeaufulen tales schurtes ow togederes. Ge  
*and with moral tales pastime (?) you together. Ye*  
muwen don so ofte hwon on þuncheð heuie, oðer  
mwen swa don ofte, hwen ow þunches heuie, oðer  
*may do so often when you think [feel] heavy, or*  
beoð uor sume worldliche þinge sorie oðer seke. So  
arn for sum worldliche þing sarie oðer seke. Swa  
*are for some worldly thing sorry or sick. So*  
wisliche witeð ou in our blod-letunge; and holdeð  
wisliche wites ou in owre blod-leting, 7 haldes  
*wisely care you in your blood-letting, and hold*  
ou ine swucho reste þet ge longe þerefter muwen ine  
ow in swuch rest, þ ge longe þrafter muhen i  
*you in such rest that ye long thereafter may in*  
Godes seruise þe monluker swinken; and also hwon ge  
Godes seruise þe monluker swinken; and also hwon ge  
*God's service the bristlier work; and also when ye*  
iueleð eni seconesse; vor muchel sotschipe hit is uorto  
felen ani seconesse; muche sotschipe hit is to  
*feel any sickness; for much folly it is to*  
uorleusen, nor one deie, tene oðer twelue. Wascheð ou  
lose for an dai tene oðer twelue. Wasches ow  
*lose for one day ten or twelue. Wash you*  
hwarse habbeð neode ase ofte ase ge wulleð. Ancre  
hwer se ned is as ofte as ge wiln. Anker  
*where the need is as oft as ye will. An anchoress*  
þet naueð nout neih hond hire uode, beoð bisie  
þ naves nawt neh hond hire fode, beos bisi  
*that hath not nigh at hand her food, let there be busy*  
two wummen; one þet bileaue euer at hom, on oðer þet  
twa wimmen; an þ leave eaver at home, an oðer þ  
*two women; one that stays ever at home, another that*  
wende ut hwon hit is need; and þeo beo ful unorne,  
wende ut hwen ned drives; and lat beo ful unorne  
*goes out when there is need; and be she very coarse*

oðer of feir elde; and bi þe weie ase heo geð  
 oðer feir ealde; By þe wei as ho gas,  
 or of well-stricken age; and by the way as she goeth  
 go singinde hire beoden; ne ne holde heo nout non tale  
 ga seiende hire beodes; ni ne halde na tale  
 go she singing her prayers; nor hold she not non talk  
 mid mon ni mid wummon; ne ne sitte ne ne stonde,  
 wid mon ne wid wummon; ni sitte ne stonde  
 with man nor with woman; nor sit she not nor stand  
 bute þet leste þet heo mei, er þen heo kume hom.  
 bute þ leaste þ ho mei, ear þen ho han cume.  
 but the least that she may before that she come home."

But perhaps the most important fact in regard to the "Ancren Riwe," a fact very important when considered with the other facts of the modern structure of its sentences, and its having been originally written in English (for most of the writings of this period are translations from the Norman-French), is that the number of words of the latter origin in it is three times as great, for instance, as that in Layamon's "Brut," the date of which is at most only about twenty years earlier. Its editor suggested that as it was written by a churchman for the guidance of ladies of the higher classes in conventual life, the number of Romanic words in it might be due to its ecclesiastical character. This, however, I find not to be the case. The number of such words in the whole work is 496, and a division of them into classes gives only 75 as of ecclesiastical origin or meaning, and 421 of such as may be regarded as referring to the affairs of common life. The proportion is therefore more than six and one half of the latter to one of the former.

The "Ancren Riwe" merits the exceptional consideration which it has received at our hands, because of its being an original English composition—a very rare thing at this period of our literature—and because it is in prose, to which poetry is in almost every way inferior in the study of language; poets, whether mere dull rhyming chroniclers or men gifted with the "faculty divine," being ever ready to use old words or new, and to take any liberty with form, sense, or construction, for the sake of rhythm, rhyme, picturesqueness, or impressiveness, in any way they may be understood.

But although the "Romance of Kyng Alisaunder" and Robert of Gloucester's "Chronicle" are in verse, and translations, the first from the Norman-French, and the second from the Latin, these may be taken with some allowance as fairly indicative of the state of the language among the more cultivated speakers at the time of their production, which was about A. D. 1300. They both show that toward the end of this century Norman-French was shooting its bright glancing threads across the sturdy warp of English speech so freely as to change manifestly its tone and texture. The number of Norman-French words used in "Kyng Alisaunder" is 1140, that in Robert of Gloucester 853; and in both works these Romanic words are of all sorts and of all shades of meaning. And now we find an increase of the words compounded from the two languages, showing that the two-blooded English people were now welding them together, and that they were exercising upon each other a reciprocal if not a mutual influence.

Our attention has thus far been chiefly given to writings of southern English origin. But as we near the birth-time of modern English we are brought to face the fact that our language, as it has been written and spoken for five hundred years by standard authors and in the most cultivated society, is not a representative of the Southern dialect, although that dialect was spoken in London and in the counties south of the Thames and somewhat north of it. It was not at the king of England's court that the king's English had its origin. The earliest representative of English essentially modern in substance, form, and structure is found in the "Handlyng Synne," written by Robert Manning of Brunne or Bourne, in Lincolnshire, about A. D. 1305, it having been begun in 1303. The "Handlyng Synne" is a translation in rhyming verse of a Norman-French poem written about thirty years before. But it is not to the influence of its original that we owe the flood of Romanic words which pours through it, and in which respect it surpasses all previous known English writings, even "Kyng Alisaunder" and the "Ancren Riwe." There are not many lines, comparatively speaking, that do not contain a Romanic word; and as many contain two or even three, it may be said to have one at least for every line. About one-third of the writer's nouns, adjectives, and adverbs are Norman-French or of Latin derivation, which is, roughly speaking, about the proportion in good English of the present day. But not only have we to remark Robert Manning's use in the "Handlyng Synne" of this large proportion of French words, but that, of the consequently smaller proportion of Teu-

tonic words used by him, a very considerable proportion were soon to pass out of sight and hearing. Another work of Manning's, a translation of Peter de Langtoft's rhyming chronicle of England, is also marked with these traits of language, but the infusion of Norman-French is not quite so great. He tells us in that work that he undertook it, and also we may be sure the "Handlyng Synne," for the good of what might be called "the average Englishman" of his day, and thus gives us reason to believe that it represents, nearly at least, that day's average English. He asks his hearers or readers to listen to

"All þe story of Inglande,  
 Als Robert Mannyng wryten it fand,  
 & on Inglysch has it schewed,  
 Not for the leirid bot for þe lewed,  
 For tho that in this land wonn,  
 þat þe Latyn no Frankys conn."

The "lewd" were the ignorant, the un-"leirid," the commonalty. Let us, then, examine a passage written by an author who addressed himself in the first quarter of the fourteenth century to the generality of his countrymen, and to those who were ignorant of both French and Latin. The following lines are Manning's version, in the "Handlyng Synne," of St. Paul's description of charity—a description, like his definition of faith, never surpassed or to be surpassed:

"þoghe y speke as weyl wyþ tung  
 As any man or angel haþ song,  
 And y lyve nat wyþ charyte  
 No þyng awayleþ hyt to me.  
 For y do þan ryght as þe bras  
 And as þe tympan þat bete was;  
 Þe bras to oþer gyveþ grete sown,  
 And bet hym self up and down.  
 And þoghe y speke al yn preþecye  
 And have þe kunnyng of every maystrye,  
 And wyþ gode beleve myghte seye  
 Þe hylles to turne yn to þe valeye,  
 Gyf hyt ne be wyþ charyte wroghte  
 Elles he seyþ þat y am noghte.  
 Þogh y gyve alle my worldes gode  
 Unto pore mennys fode,  
 And gyve my body for to brenne  
 Opunly oþer men to kenne,  
 But gyf thar be charyte wyþ alle  
 My mede þarfore shal be ful smalle."

This passage no modern reader, who will attend to the sound rather than to the spelling of the words, and who will remember that þ expresses exactly what we express imperfectly by *th*, and that *g* is the sign of a guttural sound between those of *g* and *y*, can have the slightest difficulty in understanding. He will rather be struck by its conformity to the established version—a conformity the more remarkable because even Wycliffe's translation had not yet been made. Manning's language, indeed, is, to all intents and purposes, modern English, spelling being an altogether unessential part of speech, and what is called the orthography of our day being in great part a conventional use of letters imposed upon us by pedants and printers. In Robert of Brunne we find the verb-phrase established which gave us, for example, "he loves" for "he loveth;" and he brings down the Northern *secho* (she) in place of *hi*, and uses *þey* (they) and *þer* (their) instead of *hi* or *hei* and *hire* or *heore*. He gives us the present or indefinite participle both in the Southern *ing*-form and in the East Midland *and* (*synging*, *syngand*). For *loren*, the old past participle of *leosan* (to lose), and which we still preserve in composition, *forloren*, he uses *lost*; and (still more strange to English of the day then but little past) for *thu luse*, the second person singular of the preterite, he has "þou lostest." Even now we preserve the old gerundial infinitive and say "you are to blame" and "this house to let;" but Manning, as if anticipating the squeamishness of people who generally can neither speak nor understand idiomatic English, wrote "þey beþ (are) to be blamed." We find in his "Handlyng Synne" very early, if not the earliest, examples of these phrases: *somebody*, *some one*, *one of these days*, *oftentime*, *herebefore*, *inasmuch*, *as well as*, *once forever*, *to and fro*, *thereunto*, *would God that!* *side by side*, *body and bone*, *all to pieces*, *do to death*. He uses a participle, and a French participle at that, for an English preposition, "passing all things" for "before all things." And whereas earlier writers had given foreign words English endings, as he did in writing *felmylyche* (felon-like), he gave an English word a foreign ending, translating the French *viteynage* by adding the Romanic *age* to the English *bond*, thus giving us *bondage*, and setting an example of composition which since his time has been continuously followed.

The man who wrote this English was born a few miles



from the extreme southern angle of Lincolnshire (the most northern of the midland counties), just where it borders upon the shires of Rutland, Northampton, and Cambridge. Manning was born and bred and lived all his life in Lincolnshire, and we may be therefore sure that we have in his writing the common speech of that county, and particularly that of its southern part. And there it was, one hundred miles (like five hundred now) from the king and his court; that the English of after courtly life and of literature took form. It was the speech of the rural Midland Englishmen, strongly influenced by the Anglian speech of the North, and much by the Norse invaders, tempered by the softer dialect of the South, that gave us the language which from the time of Chaucer to the present day has been the vehicle of a literature without an equal except that of the tongue of Homer and of Plato. The evidence of this philological deduction remains also in the speech of the peasantry of the country thereabout. The learned Latham has remarked: "The particular district where the difference between the language of the educated portion of the community and the masses is at its minimum, I believe to be the parts between St. Neots in Huntingdonshire and Stamford on the borders of Lincoln, Rutland, and Northamptonshire." And it must be always remembered that, using again his words, "it is the literature that resembles the dialects, rather than the dialects that emulate the literature."

The new English language was now fully formed. The changes which it afterward underwent did not appreciably affect its structure; and as to its substance, that was changed only by such loss and gain as in some degree must be wrought in all living speech. The language was in its structure and in all its vital substance Teutonic; it was English or "Anglo-Saxon." But amalgamated with it by centuries of contact and of friction was a mass of Norman-French or Romanic words, which, except from the narrowest and most bigoted Anglo-Saxon point of view, must be regarded as a part of the native English language. For the words were not adopted from another language, but two peoples having mingled their blood, they mingled their speech also; they who furnished the fewer numbers furnishing only a like proportion to the language. All Romanic words which are found in English writings (not Norman-French written in England) before A.D. 1350 seem to have justly a birthright in our modern English uninflected speech.

Although the English language was formed, there was yet no English literature worthy of the name, no writing which deserves to be read for its intrinsic merits. One author soon appeared who is worthy of notice because of the wide circulation of his book, which was due on the one hand to its subject, and on the other, we may be sure, to the fact that its style made it easily understood by all the people of England who were educated and intelligent enough to take an interest in any book. This book was Sir John Mandeville's "Travels," written first in Latin, then by the author in French, and last in English. It has no national character whatever, nor indeed any individual character derived from the mental traits or temperament of its author. Its interest to his contemporaries consisted only in its marvellous relations: to posterity its value is purely philological, and chiefly in its evidence of the copious admixture of Romance words which at the time when it was produced, soon after 1350, prevailed in the speech of English people. The story of this prose-writer, telling bare facts in bald language, contains a larger proportion of Romanic words than is found in the works of any poet of his century. Marsh supposes, with reason, that Mandeville used about fourteen hundred Romanic words not known in the previous century, and that between A.D. 1300 and 1350 as many Latin and French words were introduced into the English language as there were in the whole period of nearly two centuries and a half between A.D. 1066 and 1300.

Standing between the old English and the new, uniting the form of the one to the spirit of the other, is the author of "Visio Willelmi de Petro le Plowman," usually called "Piers Ploughman," an anonymous work of which there is reason to believe that the author was William Langland, Longland, or Langley, a clerk or churchman of some grade, who was born at Cherbury Mortimer in Shropshire. "The Vision of Piers Ploughman," to which the author or some other writer thoroughly imbued with his spirit afterwards added "The Creed," is a satirical poem written in the alliterative verse which was common to the Anglo-Saxon and Danish bards. This alliterative verse is without rhyme, and is dependent for its formal charm upon rhythm and the regular recurrence of words beginning with the same letter. The first of two verses, or the first part of a verse—that before the cesural pause—must contain two accented syllables, and the second, one, having the same initial sound.

At the time when "Piers Ploughman" was written, about A.D. 1365, this verse was quite out of fashion among courtly rhymers, but we may be sure that it was familiar in ballads and folk-songs to the common people, to whom this poem was addressed and in whose interest it was written. It is remarkable that such being the purpose of the writer, and that his success being exceptionally great, the proportion of Norman-French or Romanic words used by him was not less than that found in the works of any of his immediate predecessors—evidence unmistakable again of a thorough interfusion of the two tongues in common speech at or before the middle of the fourteenth century. The "Vision and the Creed of Piers Ploughman" together form a great national work, the first great original work in English literature. Neither the Vision nor the Creed has much coherence of plan, but the latter has more than the former. The writer was a humane satirist, and his purpose was to set forth the wrongs of his humbler countrymen suffered at the hands of nobles and priests and lawyers, but chiefly at those of the priesthood. He gave voice to the sorrow, the shame, and the subdued indignation of a deceived, oppressed, and pillaged people. The tiller of the soil from whose labors nearly all wealth springs, and who then, as often since, starved amid the food that he raised for others, found in him an advocate, and the grasping noble and the corrupt churchman a just judge and a pitiless satirist. The pathos and the humor of his work are not less remarkable than its causticity. It is in these respects, as in all others, thoroughly English in its tone and character; and as an exposition of popular feeling, and no less a picture of contemporary manners, it has not a superior in the whole range of literature. The following brief passages are characteristic of the author's style and of his subject-matter.\*

"And thanne cam Coveitise · kan I hym naght discryve,  
So hungrily and holwe · sire Hervey hym lokede.  
He was bitel-browed · and babber-lipped also,  
With two blered eighen · as a blynd hagge;  
And as a lethren purs · lollid his chekes  
Wel sidder than his chyn · thei cheveled for elde;  
And as a bondman of his bacon · his berd was bi-draveled,  
With an hood on his heed · a lousy hat above  
And in a tawny tabard · of twelve wynter age,  
Al so torn and boudy · and ful of lys crepyng  
But if that a lous couthe · han lopen the bettre,  
She sholde noght han walked on that welthe · so was it  
thred-bare." *Vision, Passus v.*

"And as I wente by the way · wepyng for sorowe  
I seigh a sely man me by · upon the plough hongon.  
His cote was of a cloute · that cary was y-called;  
His hod was ful of holes · and his heare oute  
With his knoppede shon · clouted ful thykke;  
His ton toteden out · as he the lond trede;  
His hosen over-hongen his hok-shynes · on everiche a syde  
Al beslomered in fen · as he the plow folowed.  
Tweye myteynes as meter · maad al of cloutes,  
The fyngres weren for-ward · and ful of fen honged.  
This wit waseled in the feen · almost to the ancle  
Foure sotheren hym byforne · that feble were worthi:  
Men mighte reknen ich a ryb · so senful they weren.  
His wiif walked hym with · with a long gode,  
In a cuttede cote · cutted ful heyghe,  
Wrapped in a wynewe shete · to weren her fro wederes  
Bar-fot on the bare iis · that the blod folwede.  
And at the londes ende lyth · a litle crom-bolle,  
And thereon lay a lytel chylde · lapped in cloutes  
And tweyne of tweie yeres olde · upon another syde  
And al they songen o songe · that sorwe was to heren;  
They crieden alle o cry · a kareful note  
The sely man sighed sore · and seyde, Children, both stille." *The Creed, etc.*

It is worthy of remark that the first great work in English literature was written in a language formed neither by scholars nor courtiers, but by the people at large, and that it was a protest against wrong, against fraud, against priestcraft and hypocrisy—a demand for the recognition of human rights, for personal freedom and liberty of conscience.

The "Vision," and more particularly the "Creed," of Piers Ploughman bear the stamp of a great historical period. At the time of their production John Wycliffe and his followers were disturbing the established religion of England at its very foundations, and the author or authors of "Piers Ploughman," if not openly attached to the Lollard party, must be reckoned as of it. As regards the "Creed," this fact was recognized in the most emphatic

\* As these passages are quoted for their matter, and not for their language, I have chosen the text edited by Wright, and with him have modernized the þ and the ȝ, in preference to following the more accurate but less generally readable text of Skeat.

manner by the ministers of the prevailing religion, for they caused the copies of it to be so thoroughly destroyed that, whereas the old manuscripts of the "Vision" are many, of the "Creed" not one is known to exist. "Piers Ploughman," itself equally valuable as a record of the condition of language and religion, was thus one of the writings that ushered in that great work, itself equally important as to religion and language, the Wycliffite translation of the Bible. This was made from the Latin Vulgate by Wycliffe and some of his followers about A. D. 1380. No other single work ever exercised so much influence upon the political, moral, literary, and linguistic future of a people as the Wycliffite Bible did, except perhaps Luther's translation of the same Scriptures into High German nearly two hundred years afterward. It was the beginning of a revolution which freed Englishmen from the rule of a foreign hierarchy, and ended in the deposition of the Stuarts and in the Bill of Rights. Although it added little to the English vocabulary, it enriched English expression—we might almost say English idiom—with a strong and peculiar phraseology which sprang from the contact between Hebraic thought and English speech, and which, having been preserved through three hundred years, even to the revised translation of 1611, and having been read and listened to and taken to heart by so many generations of Englishmen, came to affect in a measure the whole popular cast of thought and of speech. It was the Wycliffite version that did this; for although there was, as we have seen, an Anglo-Saxon version of the Bible, this did not spread among the English people, and being almost forgotten and quite incomprehensible to the English people at the middle of the fourteenth century, there was no such connection between it and the Wycliffite version as there was between the latter and the received translation: in fact, there was no connection at all. This translation, completed about A. D. 1380, was revised by John Purvey, a learned Wycliffite writer who had made the subject of translation a profound study, and who sought to render this version more exact and more conformed to English idiom, which end he attained with admirable skill, finishing his work about A. D. 1390. Apart from the peculiar Anglo-Hebraic phraseology before mentioned, this translation tended to modernize the language. It was, as to simplicity of forms of words and the untrammelled construction of the sentence, in advance of the general English writing of its day; and its unparalleled literary influence led to the confirmation of this freedom from grammatical restraint among all English people, particularly those of the middle and lower classes. This could be illustrated only by the examination of very much longer passages than it would be possible to quote within the limits of such an article as this; and it may now be added that having brought our sketch down to the appearance of modern English, we must hereafter concern ourselves rather with literature than with language, rather with the writers than with their materials. The need fits the occasion; for whereas before the production of "Piers Ploughman" the language was all and the literature was naught, we now see rising, in Geoffrey Chaucer, the day-star of English literature—not only a herald of the morn, but one whose bright rays have been neither dimmed nor eclipsed in the lapse of five centuries. Chaucer was a younger contemporary of the author or authors of "Piers Ploughman," having been born A. D. 1328, and having died about A. D. 1400. He was connected with the court, having married the sister-in-law of John of Gaunt, the father of Henry IV. He was pensioned, employed in diplomacy, and made comptroller of the customs. As Langland's poems were addressed to the middle and lower classes, and written in their interest, so Chaucer wrote for the nobles and gentry; and the tone of his poems was suited to the temper of his audience.

Chaucer was a voluminous writer, but his chief works are "The Canterbury Tales," "Troilus and Creseide," "The Romaunt of the Rose," and of his minor poems, "The Flower and the Leaf." Of these the "Canterbury Tales" are the most original and the most characteristic of his genius, although "Troilus and Creseide" is as fine a narrative poem, not of the heroic cast, as exists in any literature. Chaucer is essentially a narrative poet. He is the earliest poet since the revival of literature after the Dark Ages who has awakened an enduring sympathy in the characters and the feelings and the fate of his personages. He is the first, indeed, who portrayed real individuality of character. Each one of the personages in the pilgrimage to Canterbury, which is the occasion of the "Tales," exists to this day in the minds of his readers as a living character that has as real and independent a being as any creature of flesh and blood that we meet in our daily lives. In this respect he is a rival of Scott (in his novels), and almost of Shakespeare. Like the former, he paints them; like the latter, he makes them unconsciously paint themselves.

He is English in all the traits of his mind and his style; and in nothing more so than in his humor. So early (also in "Piers Ploughman") did this peculiar trait of English literature, in which it is unrivalled by that of any other people, appear, and with all its inexpressible and humanizing charms in fullest bloom and subtlest fragrance. As an historical picture of the time in which they were written, the "Canterbury Tales" are as if the veil of five centuries were lifted and we looked in upon a gathering of our forefathers in the free enjoyment of each other's society. But above all Chaucer's other charms is that of his strong and clear imagination. What he described he saw in his mind's eye as clearly as if it appeared before him in the body. We see with him the very personal traits and tricks of the people that he sets before us, no less than the adventures through which they pass or which they relate. There is all the freshest charm of nature in him, joined with the elegance of an accomplished man of the world. So in his language there lingers some of the homely roughness of Early English, while at the same time it is strongly marked with the dainty splendor of the speech that, like some other pretenders, came over with the Conqueror. But he was not remarkable for an excessive or an unusual addiction to the new Romanic vocabulary. Spenser having applied to him, with more felicity of expression than truth, the phrase "well of English undefiled," he was for that reason, and because of his antiquity, accepted, even by those whose intelligence and knowledge should have taught them better, as the greatest exemplar of pure English—whatever that may be; so ready are men to adopt a compact phrase which saves them the trouble of thinking, and which, although full of emptiness, seems to be full of meaning. But it having been discovered that his lines are heavily charged with Romanic words, he was next regarded by Anglian purists as the chief defiler of English. And now that view also has been found, as we have seen, to be entirely unjustified by fact. The truth is, that the phrase in question is a perfect example of those utterly meaningless and worthless fine sayings which obtain acquiescence and currency because of their seeming sententiousness and the high authority of their origin. Chaucer's language was merely that of his time, and, like all really great imaginative writers, he concerned himself much with the ideas of men and things that he wished to present, and little with that of the admissibility of the words in which he presented them. The chief peculiarities of his language, upon which the rhythm of his verse much depends, are the retaining of the old plural in *en*, the infinitive of the same termination, the possessive in *es*, the imperative in *eth*, and the lightly-sounded final *e*, without which a large proportion of his verse is mere prose. Chaucer stands alone, not only in his merits, but in his literary position. He had no fellows; few contemporaries worth mentioning; and after his period "the blanket of the dark" fell upon our literature, through which peeped a few dim and struggling lights whose only function was to make darkness visible.

John Gower, a barrister, born about A. D. 1320, was the chief of Chaucer's contemporaries. His reputation during his life was great. Chaucer himself speaks of him with deference, and calls him the "moral Gower." But the dull, dead weight of his style has sunk him out of sight, and left only his name floating upon oblivion. His "Confessio Amantis," or "Confession of the Lover," is a long nondescript poem, to read which through requires the patient, self-sacrificing courage of a conscientious investigator of the history of our older literature. It has little claim to attention even as a contemporary record of manners and morals.

Of all the poets of Chaucer's day, and even of the fifteenth century, which he ushered in, John Barbour was the only one worthy even of comparison with him. Barbour was, according to the political division of the country, a Scotchman. But political divisions have nothing to do with literature or with language, and Barbour merely wrote in Northern English as Chaucer wrote in Southern. Barbour and his neighbors called their language, and rightly called it, English, and so it continued to be called until toward the end of the sixteenth century, when local pride and political jealousy caused it to be called Scotch—a change of designation which has been the cause of much misapprehension and confusion. Nothing more truly English in speech or in spirit was ever written than this passage from Barbour's principal work—a long epic, or at least historical narrative poem, "The Bruce":

"Ah! Freedom is a noble thing  
Fredome mayss man to haiff liking  
Fredome all solace to man giffis  
He levys at ess that frely levys.  
A noble hart may haiff nane ess,  
Na ellys nocht that may him pless,  
Gyff fredome failyhe: for fre liking

Is yharnt our all othir thyng.  
 Na he that ay bass levyt fre  
 May nocht knaw well the propyrtie,  
 The anger na the wretcheit dome  
 That is cowlpyt to foule thyrdlome.  
 But gyff he had assayit it  
 That all perquer he suld it wyt;  
 And suld think fredome mar to pryss  
 Than all the gold in world that is."

Book I., ll. 225-240.

The seeming difference between the language of this passage and that of the same passage written by Chaucer or one of his neighbors is little more than a difference of spelling, indicative, in some cases, of a difference, unessential, of pronunciation. For instance, the strangest-looking word, *yharnt*, is merely our *yearned*, pronounced almost exactly as it was pronounced by our own grandfathers. Barbour had not Chaucer's imagination, his delicate portrait-painting touch, his wit, or his humor, but he was a lively narrator and a strong and earnest thinker. Many passages of his poem show him to have been the possessor of true epic power. His language in all essential points shows a rapid passing away of even the traces of the old English. He preserves the present participle in and indeed, *com-and*, *pleas-and*, *purches-and*, but the final *e* counts for nothing with him; and although he often uses the old Saxon *sua*, it becomes *sa*, on its way to *so*, within a few verses.

No less remarkable than the sudden uprising of such a poet as Chaucer, and we may even say of Barbour, is the fact that within their century there came no writers of either poetry or prose who were worthy of being called their followers. For nearly two hundred years after the death of Chaucer the darkness which we have already mentioned fell upon the English mind. For this there were two reasons that we can now see; perhaps others hidden from us by the distance of time. The first is the violent repression of all free thought which was brought about by the efforts of the Church to crush Lollardism and extinguish the very embers and sparks of the fire kindled by the Wycliffites; next the desolating War of the Roses, which broke out A. D. 1455, and desolated England with civil war and its consequences for quite half a century, although the war itself lasted but thirty years. Of the anti-Wycliffite writers the most eminent was Bishop Pecocke, who had some vivacity of style if no strength of thought. The most remarkable prose-book of the latter part of the fifteenth century is Sir Thomas Mallory's "*Morte d'Arthur*," compiled and translated from the French about A. D. 1470—a work which in its animation, and sometimes its simplicity and tenderness of style, does something to relieve the literary barrenness of its century. Mallory's language is remarkable for its freedom from Romanic words, to which fact it owes much of its directness and its strength.

At this period printing was introduced into England by Caxton, who printed his first book, "*The Game and Playe of the Chesse*," in 1474. Caxton was a translator and an adapter as well as a printer, but not even his wonderful mechanical art had at first much influence upon either literature or language. Of poets, or writers of rhyming verse, in this period we have Occleve (about 1370-1454) and Lydgate (about 1370-1450), whose names only need be mentioned in a sketch like this.

It was in the North that the best literary work was done at this period, although Andrew of Wyntoun, a clerical chronicler in verse who flourished about the beginning of the fifteenth century, is little more than a rude rhymester, the value of whose work is chiefly historical. But James I. of Scotland, in his "*King's Quair*," shows fancy, fine conceit, and the fruit of a careful study of Chaucer, whose works soon began to exercise a great influence upon our poetical literature. Robert Henryson (or Henderson) not only studied and imitated him, but wrote a continuation of "*Troilus and Cresseide*," which he called "*The Testament of Fair Cresseide*," which has been with some reason deemed not unworthy of being printed in company with Chaucer's poem. Of all the extreme Northern English poets, Henryson and James I. show most the influence of the Southern language and literature. Henryson, who lived until about A. D. 1500, is the author of other poems of merit, among them the beautiful pastoral "*Robin and Makeyne*," which was reprinted in the Percy Collection. A poet known as Henry the Minstrel, or Blind Harry, composed a long poem of which the life of William Wallace was the theme. It is a genuine strong piece of poetical "*making*," quite Homeric in a rude and humble way and full of hatred of "*the Saxon*;" Blind Harry himself being probably a good a Saxon or "*Anglo-Saxon*" as there was to be found south of the Tweed. After this period the so-called Scots literature shows a wider divergence in spirit and in form from that of the South, or of England proper.

The first part of the sixteenth century produced in Sir Thomas More, King Henry VIII.'s second lord chancellor, the first English prose-writer of merit after Chaucer, whose prose, although not equal to his poetry, was, like that, the best of its kind that England saw for more than a century. More was a man of learning for his time, wise, humorous, penetrative, and of noble impulse and purpose. He wrote many controversial works of timely interest, and in Latin his famous "*Utopia*." Of his English writings the most important is his "*Life and Reign of Edward V.*" (called his "*Life of Richard III.*"). In this his narrative power and his characterization of the personages whom he sets before us give him a conspicuous as well as an early place in the true historical English literature. His writings were produced between about A. D. 1515 and 1535, when he was beheaded. About the same time was written Sir Thomas Elyot's political work, "*The Governour*." It was theology, however, which now again gave new life to English literature, upon which William Tyndal and his followers conferred a benefit only inferior in degree to that which they bestowed upon the cause of freedom of conscience and purity of religion. Tyndal made the first translations of parts of the Bible into English from the original Hebrew and Greek. But although he went to the original tongues, he did not lay aside the Wycliffite version, but on the contrary he kept it in mind, if not before his eye, and seems to have endeavored to preserve its phraseology as far as was consistent with a faithful rendering of the original text and a necessary conformity to the general speech of his own day. To this endeavor we owe the continued life of that grand, strong, simple phraseology which English-speaking men recognize at once as "*the language of the Bible*," and which has for more than four hundred and fifty years exercised an elevating and purifying influence upon the English language and literature. Tyndal's translation is the most important literary and philological fact between the time of Chaucer and that known as the Elizabethan period. Tyndal was also a voluminous writer in commentary and controversy, and a stout and a successful disputant with Sir Thomas More. His English, like his thought, is notably vigorous, manly, and clear, and he with his followers—among whom John Frith, a Kentishman, was conspicuous—were the salt of English literature in the first part of the sixteenth century—a salt which has not yet lost its savor, which, let us hope, it never may lose to the taste of men of English blood. These men wrote in a simpler, homelier style, and in more nearly unmixed English words, than any writers after the beginning of the third quarter of their century. Archbishop Cranmer, and notably Bishop Latimer, were in their sermons and controversial writings apostles of simple English as well as of gospel truth. Latimer preached to the common people in their daily speech and with the most unstudied homeliness of diction and illustration. About this time there was an effort at English purism. Sir John Cheke, one of the few Greek scholars in England, began a translation of the New Testament, in which, as in his other writings, he was studious to represent Greek words by English equivalents, and went so far as to coin such words as *fore-shewers* for prophets, *hundreders* for centurions, and *again-birth* for regeneration. His friend Roger Ascham wrote his "*Toxophilus*" less to teach his countrymen how to draw the bow, which they had drawn pretty well at Hastings and at Agincourt, than to show them an example of a pure, idiomatic, and elegant English style, which he did most effectually. In this effort he was seconded heartily by Thomas Wilson in his "*Arte of Rhetoricke*" (A. D. 1553), and thirty years later by George Puttenham in his "*Arte of English Poesy*." All these critical writers condemn with little reserve what Wilson calls "*inkhorne terms*." But praiseworthy in certain respects as their efforts were, Anglo-Saxon and Norman-French were by this time too thoroughly welded together to be torn apart by criticism; and the addiction of the age to theological literature, which, written by "*clerks*," was filled with words and phrases transferred directly from the Latin, tended strongly to further Romanize the language.

Passing by the Northern poet, Gawin Douglas, we come upon the poets and prose-writers who were to usher in the brightest period of the world's literature since that outburst of Greek genius which took place in the age of Pericles.

John Skelton, Lord Surrey, and Sir Thomas Wyatt were almost contemporary poets, but the first was in every respect singularly unlike the last two. Skelton was the more learned, and in his day had the greater reputation, Erasmus having styled him the light and ornament of English letters. But Erasmus doubtless had in mind only his Latin verses, which are esteemed by scholars as remarkably pure; for anything written in a "*vulgar*"—i. e. a living—tongue was even then regarded as much unworthy the considera-

tion of such a scholar as Erasmus. Skelton's English poetry is fantastic, extravagant, sometimes so incoherent as to be almost incomprehensible, and often so coarse as to be repulsive. But he introduced liveliness of movement and freedom of versification, much needed in English poetical literature, and with all his coarseness he was not without brightness of fancy and grace of expression. His "Philip Sparrow," a poem of nearly 1400 lines, has many passages distinguished in these respects. In his verse we find Romanic words still often, if not generally, accented in the Norman-French way—e. g. *licour, colour, succour*. He died A. D. 1529.

Sir Thomas Wyatt, a traveller, a courtier, a satirist, and a writer of lyric poetry, was born A. D. 1537, and published his poems in 1557. He and his friend Lord Surrey (Henry Howard)—who translated part of the "Æneid," introduced blank verse into English poetry, and first wrote English sonnets—were the first true refiners of modern English style. They became the models of grace and elegance to their contemporaries and immediate successors. They died within a short time of each other, the former A. D. 1542, the latter on the block A. D. 1547.

We can only mention the names of Thomas Tusser (A. D. 1523–80), who wrote "A Hundred Points of Good Husbandrie," and whose verses have value only as bucolical antiquities; George Gascoigne, a dramatist, satirist, and critic of merit, who was one of the earliest of our writers of blank verse (A. D. 1536–77); and Thomas Sackville, earl of Dorset (A. D. 1527–1608), the author, with Thomas Norton, of the first regular English tragedy, "Gorboduc, or Ferrex and Porrex," which was also written in blank verse. But more than a passing notice must be taken of Sir Walter Raleigh, whose bright intellect, daring spirit, and chequered life make him one of the most conspicuous figures in English history and literature. Born (A. D. 1552) in the ranks of the gentry, but without advantages of fortune, he was a soldier, a courtier, a discoverer, a politician, a poet, and an historian; and in each and all of these various functions he won the applause and the envy of his contemporaries and the admiration of posterity. He was praised by Spenser, and his praise added to Spenser's glory. His poetry is remarkable for manly simplicity and freshness of feeling, mingled with sententiousness; his political writing for sagacity and knowledge of mankind; and his "History of the World" is full of wisdom, and closes with one of the grandest passages in English prose. He was beheaded in 1628, through the envy of the mean and crafty James I. and the envious persecution of a leading party of the court.

Somewhat like Raleigh in the circumstances of his life, although not at all so in the character of his mind, was Sir Philip Sidney. A younger scion of a noble family, he too was a soldier, a courtier, a scholar, and a poet. According to all accounts, he was the most accomplished, the most admirable, and the most lovable among English gentlemen of his day. Being elected king of Poland, he was prevented from accepting the honor by Queen Elizabeth, who was unwilling, as she said, "to lose the jewel of her times." He was a patron of literature as well as a man of letters. His claim to notice as an author in the history of English literature rests upon his "Arcadia," a collection of romantic and chivalric tales bound together with a slender thread of plan, somewhat longsome and wearisome, but full of graceful and animated passages; some poems, generally cold and conceited, but in a few instances lofty in tone and lovely in imagery; but chiefly upon his "Apologie for Poetry," the earliest example of æsthetic criticism in our literature, and admirable for the beauty of its style and the soundness of its critical judgments, few of which have been set aside or superseded. Sidney first recognized the fact that the English language had been freed from the trammels of formal grammar. He was born A. D. 1554, and fell in 1586 on the field of Zutphen in Holland, giving up to a wounded soldier the water that was brought to slake his own dying thirst, saying, "Thy necessity is greater than mine."

Sidney has the credit, which he probably deserves, of having made possible the poetical career of one of England's greatest poets, Edmund Spenser. Spenser, born we know not exactly when, but about 1533, after having written "The Shepherd's Calendar," it is supposed at Penshurst, the seat of the Sidneys, where his friend Sir Philip took him to reside for some years, received a grant of 3000 acres of crown land in Ireland, whither he went and where he wrote the first three books of his "Fairie Queen," when, going to London to have them printed, Raleigh presented him to Queen Elizabeth, who, in consideration of his poem, gave him, in addition to his lands, a pension of £50, quite equal to \$1500 now. There and then he wrote, among other poems, "Mother Hubbard's Tale." Returning to Ireland in 1592, he wrote two more books and two

cantos of a third of his great poem; his series of eighty-eight sonnets; "Amoretti," celebrating his courtship of the lady whom he married; his "Epithalamion" on his marriage, "Colin Clout's Come Home Again," "Astrophel," and other poems. Driven from his home by some of the insurgents in Tyrone's rebellion, he returned to London, and died there in 1599. If not the greatest of the poets of the Elizabethan period (which may be regarded as including the half century from 1575 to 1625), Spenser was second to one only, and he was the greatest of all those who lived entirely in Elizabeth's reign. Among all English poets he has but two superiors—Shakespeare and Milton—although it is only in the elevation of his aim and in the fine and luminous flame of his fancy that he surpasses Chaucer. Spenser is the most purely poetical of all English poets. His great work, "The Fairie Queen," is poetry and nothing else. It is not dramatic, or theological, or satirical, or, strictly speaking, narrative; and although it did fashion "the twelve moral Virtues," it is not didactic after the weary fashion of most moral poems. It is allegorical, but its peculiar merit is not in the allegory; rather is the allegory somewhat of a hindrance to the reader who is not capable of setting the didactic purpose of the poem aside and enjoying for itself the golden wealth of its rich fancy. In its language it was somewhat old-fashioned for Spenser's own day. He used not only words that were not then familiar household words, but forms and inflections that had passed away; for instance, the old plural in *en*.

Among the Elizabethan writers a theologian like Richard Hooker (A. D. 1553–1600) must at least be mentioned. His sagacity and the logical clearness of his thought gained him the title of "the judicious," and his style places him high among the masters of English prose.

John Lyly's writings mark a change in the character of that prose. He introduced a fanciful and almost fantastical style of writing. He affected fine phrases, and wrote for courtiers and those who would have finer bread than is made of wheat. His language is much Romanized when compared with that of his immediate predecessors. The title, "The Euphuist" (one who speaks well), is derived from his principal work, "Euphues and his England," which had much influence, and even brought about a style of speech and writing called euphuism. But it would be very wrong to assume that this work is a mass of fanciful folly in affected language. The book is full of good sense and knowledge of the world. He also wrote six court comedies, which have little genuine dramatic interest, but which are very elegant and highly-finished productions of their kind. Born A. D. 1553, he died A. D. 1600.

Fulke Greville, Lord Brooke, "friend to Sir Philip Sidney," a poet, dramatist, and critical writer, whose style is cumbersome, but whose thought is far-reaching and weighty, can only be thus mentioned.

In the galaxy of poets that lighted up the Elizabethan sky even a merely superficial glance distinguishes William Warner, Samuel Daniel, Michael Drayton, Bishop Joseph Hall, Joshua Sylvester, and George Chapman, the first translator of the whole of Homer's poems into English, and whose version, often inexact and rude, has an occasional sinewy strength and pithiness and a felicity of phrase which his more polished and scholarly successors have not attained. Chapman was also a dramatist, but his dramatic work, although always indicative of poetic ability, was loose in structure and in style confused and headlong.

But we must hasten to the consideration of that remarkable school of writers, the Elizabethan dramatists proper. At this period the theatre was the chief intellectual entertainment of all classes and conditions of men, from the highest to the lowest. It filled the place now occupied by the novel and the newspaper. Young men of literary ability who found themselves in need of money in London turned to the stage as a means of supplying their necessities. The proprietors of the theatres kept poets in their pay, and ordered plays to be written sometimes by one, sometimes by two, and sometimes by half a dozen of their retainers. Conspicuous among these dramatic adventurers was Christopher or "Kit" Marlowe, a man of genius, but of genius wild, irregular, ill-trained. Both mind and man (if a man may be separated from his mind) lacked moral balance. The fierce extravagance and gilded bombast of his style can hardly be overated; but from this turbid mass flash out gleams of brightest poetry. His characterization is often so strong as to be mere caricature, but it is characterization; his personages have individuality; and he first introduced the modern style of dramatic writing. To him also we owe the introduction of free and flowing blank verse upon the stage. His principal dramas are "Faustus," "Tamburlaine the Great," and "Edward II." Born about A. D. 1564, after a life of wretched irregularity he

was killed in a brawl, A. D. 1593. Collaborers with Marlowe were George Peele (about 1552-98) and Robert Greene (about 1560-92), men of much lighter weight and smaller calibre; the former an agreeable versifier and capable of tenderness; the latter essentially comic in the bent of his genius, giving us foretaste both of the high and the low comedy of after years. With these men there was a crowd of others who have left names, and even works, known to literary antiquarians, but long ago forgotten in literature and on the stage; but from among them sprang one in all supreme—the greatest poet, the greatest dramatist, the brightest intellect of recorded time.

William Shakespeare, the son of a Warwickshire yeoman and a lady of the minor gentry of that neighborhood (both of English or "Anglo-Saxon" blood), left Stratford (where he was born A. D. 1564) at about twenty-one years of age, and went to London as an adventurer. There he became a player and a playwright; obtained an interest in the company which played at the Blackfriars and Globe theatres; and by the plays which he wrote for this company—writing them as daily labor, just as a journalist now-a-days writes leading articles and criticisms—he made himself "the greatest name in all literature." To attempt here a criticism upon Shakespeare's genius would be futile. Briefly, it may be said that he owed nothing either to his predecessors or to his contemporaries, if we except the language in which he wrote and the form of his dramas, which were those of his time. He attempted nothing new; he simply was new himself—the most original, inexplicable, and hitherto absolutely unexplained fact in the history of literature. He seemed to know the secrets of nature and of man's heart, and to penetrate the depths of wisdom and of philosophy by intuition. He was a creator of his kind, for at a touch of his pen he spoke men and women into an existence individual and immortal. His style can hardly be described, it cannot be analyzed, and it has never been imitated. And there was no limit to the capacity of his genius. He sounded man's nature and the range of human thought from the top to the bottom of its compass. The grandest and the profoundest of all writers, he was at the same time not only the most delicate and the most fanciful, but the most comic. There is no tragedy, no philosophy, no pathos, no fancy, no humor like Shakespeare's tragedy, Shakespeare's philosophy, Shakespeare's pathos, Shakespeare's fancy, and Shakespeare's humor. We say all that we can say when we call them Shakspearian. To mention the titles of his principal dramas is quite needless. All the world knows that "Hamlet," "King Lear," "Othello," and "Macbeth" are his greatest tragedies, but it may well be said that his wisest play is one never played now and too little read—"Troilus and Cressida." He wrote at first in conjunction with other playwrights, after the manner of his time, but his facility in composition soon freed him almost altogether from the trammels of collaboration, and nearly all the great comedies, histories, and tragedies that bear his name are of his own unaided production. His Sonnets are inferior in thought and in expression only to his best plays. They alone would have won him immortality. His most inferior works are those upon which he labored most and rested the only literary fame he coveted—his poems "Venus and Adonis" and "Lucrece." He attained his purpose and retired to Stratford in the prime of life, a prosperous gentleman; and there he died A. D. 1616, entirely regardless of his poetic fame, having no predecessors or successors except in the order of time. None of his contemporaries were like him. There was an Elizabethan period of poetry and of the drama, but no Shakspearian school of either.

Chief among Shakespeare's contemporaries was his friend Benjamin Jonson, who for some time was regarded by the critical, but never by the public, as his superior. But gifted as Jonson was, the difference between them is so great as to be absolutely immeasurable. Jonson's best comic vein, as in "Every Man in his Humour," "The Alchemist," and "Bartholomew Fair," is simply a humorous—and yet not very humorous—picture of what passed before his eyes—persons and manners. His tragedy is an unsuccessful attempt at the imitation of classic models. In some of his tragedies founded on classic subjects—*e. g.* "Sejanus"—no inconsiderable part of the speeches are translations, more or less free, from Latin authors. He was overlaid with his learning. He was nevertheless a robust thinker, and at times a graceful one. Some of his minor poems, particularly his songs, have a peculiar charm which makes them the best known of all his works. He wrote one of our earliest English grammars, and in his "Timber" some of our earliest literary criticisms.

Francis Beaumont (1586-1616) and John Fletcher (1576-1625), two gentlemen by birth, wrote together, although we have many plays by Fletcher alone. They were poets, wits, and dramatists, but not of a very high order, although

of the high imaginative school. Comedy was their forte, and they first brought upon the English stage the comedy of intrigue. Their works are very voluminous, and suffer from a diffusion of powers by no means exhaustless. If they had written less they would have written better. Their most meritorious works are "The Maid's Tragedy," "The Elder Brother," "Philaster," and "The Faithful Shepherdess," the last of which was written by Fletcher alone, who had more fertility, more constructive power, and a livelier fancy than Beaumont.

Among the second-rate men of this period whose names only can be mentioned here were Philip Massinger (1584-1640), who had tragic powers, but who was destitute of fancy and humor; John Ford (1586-about 1639), whose forte was pathos; John Webster and John Marston, who dealt in the tragedy of horrors; Thomas Dekker, who had in a marked degree both pathos and humor, but whose wretched life gave him little opportunity to finish his work; John Middleton, a man of pleasing mediocrity; and Thomas Haywood, the most voluminous of them all, that being his chief distinction. James Shirley (1594-1666) closes the array of Elizabethan dramatists, and is the link between the times of Elizabeth and James and those of Charles and the Commonwealth.

Among the great intellects of the Elizabethan era only one man—and we might almost say hardly he—is more conspicuous than Francis Bacon. His universal misnomer is a notable recognition of his greatness. He became lord high chancellor and a peer, his title being Lord Verulam, but the man was far above his peerage, and he is called Lord Bacon. His distinction was in this, that he was the wisest man of modern times, almost the wisest of the sons of men. To no man since the revival of learning may the term "philosopher" be so well applied. As a scientific investigator he has had many superiors; his scheme of inductive philosophy may not be original; but if he had not written the "Novum Organon" he would yet have taken the stand which he has held for the two centuries, adown which from his sun-like mind has poured a blaze of intellectual light; for he had the grandeur and the poise and the far-reaching power which make a central luminary, and whatever he uttered bore the stamp of his supremacy. To English literature, strictly speaking, his contributions were not large, for the most of his writings were in Latin. His "Essays," by which he is chiefly known to general readers, were written in English, and they alone would have made his name immortal. Such a solid body of clear, compact wisdom was never uttered to the world from an uninspired source before his day or since. They show in every page the largeness, the breadth, and depth of his great intellect. In style they are models of concentration, giving results, not processes, and yet revealing the foundations of eternal truth upon which their judgments stand. Bacon was born in the reign of Elizabeth, A. D. 1561, and, living through that of James I., died in 1626. It is worthy of remark that there is no evidence in the writings of either that he and Shakespeare, the two brightest intellects of modern times, strictly contemporaries and living in the same place, knew of each other's existence; the reason of which strange fact is that one was a statesman and a philosopher, the other a player and a playwright.

In the reign of James, Robert Burton (1576-1640) produced the "Anatomy of Melancholy," a hash of curious learning made piquant by the original spice of splenetic humor and jocular sneers with which the quoted passages are seasoned to bring out their flavor. It is so filled with Latin that it is hardly an English book, but it is a typical specimen of a school or fashion of learned writing which prevailed about this time; and notwithstanding its pedantic air it has been, and ever will be, a source of delight and a quarry of suggestion to a large class of highly-cultivated readers, and greatly so to those who themselves are writers. The names of Donne (1573-1631), a metaphysical poet; of Sir Thomas Overbury (1581-1613), the author of "The Wife;" of Richard Sibbes (1577-1635), a Puritan divine; of John Hales (1584-1656), a theologian and the author of "Golden Remains;" and of William Drummond of Hawthornden (1587-1649), a Scotch poet of merit and a historian of Scotland,—must be mentioned in an attempt to give a view of English literature at this period.

A notably important fact in regard to the Elizabethan era in literature is, that the English language, which was fully formed at the beginning of the sixteenth century, was used in that era with a freedom from formal restraint that since then has been unknown. The parts of speech changed places at the will of the writer. Not only were adverbs used as adjectives and adjectives as adverbs, but adverbs as nouns, and not only were nouns, but even pronouns, used as verbs. A like freedom reigned as to other parts of speech and in the construction of the sentence. Thus was born at a blow, in full strength and activity, the



genius of the English language, which is that the nature and quality of a word depend not upon its form, but upon its place in the sentence and its logical relation to other words. Thus the English of the Elizabethan period was more truly and absolutely English than that of any period before or since. This freedom prevailed most remarkably in the writings of the poets and the dramatists of the period, and chiefest of all the latter. But it pervaded all writing and all speech. That it was prevented from degenerating into chaotic license is probably due in a large measure to the preparation and diffusion of the revised or King James's translation of the Bible, which was published in 1611. In this translation, which was made with extreme care and the interchanged labor of forty-seven of the most competent scholars in England, the language of the previous versions was not only kept in view, but retained whenever it was consistent with the original, and sufficiently modern to be comprehensible without losing the dignity which pertains to antiquity, or taking on the strangeness which goes with novelty. The translators touched the sacred old structure with reverent hands, and while they renovated and strengthened it they did not whitewash the mellow tints of time with glaring newness. This book was at once published abroad throughout England, and since that time it has been printed and reprinted and scattered, and read daily by people of English race as no other book was ever read by any other people. Its influence upon English literature has been as great as—perhaps, alas! we should say even greater than—upon the morality of English life. It has been the treasure-house and the stronghold of the English language. It contains the best, the purest, the manliest, and the sweetest English that was ever written. Its narrative style is beyond that of all other writing in its own or in other tongues for simplicity, for clearness, and for strength. No exhortation is like its exhortation; no other counsel comes to us clothed in such impressive dignity of phrase. In it the rich and glowing diction of its Oriental original is preserved, and yet tempered with something of the cool directness, the honesty, and the homely freshness of the Anglo-Saxon nature. Its influence upon the English language has been the most pervading and the most wholesomely conservative that was ever exercised by a single force. Its authority has surpassed that of any possible Academy. It is a marvellous book; and whatever our faith or our lack of faith in the literal truth of all its declarations, it cannot be read with too much of admiration or of thankfulness.

After the death of Bacon and of James I. a few names of note attract our attention as we pass to the period of the Commonwealth: George Wither (A. D. 1588–1667), a poet chiefly sacred, nervous in style, and remarkable for his simple, clear English; Thomas Hobbes (A. D. 1588–1679), a writer upon social and moral subjects, a strong, clear, but not always logical thinker, and our first master of regularity and symmetry of style: he translated Homer into homely halting verse; Thomas Carew (died 1639), a tender and graceful writer of light amatory verse, which, based upon French models, has the merit of character; Robert Herrick (1591–1634), who, writing both sacred and amatory verse, is known chiefly by the latter, in which he clothes exquisite conceits in a rich, pulpy style; Isaac Walton (1593–1683), a meek and pious angler, whose love of nature and simple pedestrianism of life and style win him admirers generation after generation: he wrote "The Complete Angler" and the lives of Donne, Hooker, and other divines; George Herbert (1593–1633), whose collection of short poems called "The Temple" had an amazing popular favor, twenty thousand copies having been sold, according to his biographer Walton, in a few years. Herbert belongs to the metaphysical school of Donne. His thoughts are almost a continued succession of quaint conceits and are steeped in ecclesiasticism; but they are pervaded with the spirit of true piety and uttered in English notably simple and manly.

To the time of the Commonwealth and the Restoration belongs Edmund Waller, who was born A. D. 1605 to a large estate, and who devoted himself to politics and to literature. His verse unites grace and dignity, although he is sometimes tempted into extravagance. His lines "On a Girdle" express one of the most exquisite amatory fancies in our love-literature. He had a charming fancy, but little imagination. Contemporary with him were Thomas Randolph (1605–34), whose poems are tame, but in whose plays there linger echoes of the Elizabethan grandeur and freedom; Sir William Davenant, playwright and poet-laureate, but a poor creature; Sir John Suckling (1609–41), a dainty poet and an amorous; and the gallant Sir Richard Lovelace (about 1618–58), whose songs give the soul of chivalry and true love voice, but who loved honor more than love, whose cheery voice reaches us through his prison bars, and only dies with him in misery.

But all the poets of this period were eclipsed by the grand and luminous shadow of a man who was a school-master and Latin secretary to the Commonwealth council of state—John Milton. Milton was of a Roman Catholic family of the minor gentry, but was born into a middle-class condition in life, his father having been disinherited for embracing the Protestant faith. His father, however, acquired money enough to retire into country life and to give his gifted son a university education (at Cambridge), to enable him to devote himself to study at home for five years after taking his master's degree, and then to travel on the Continent, particularly in Italy. He was summoned home by the beginning of the great civil war, in which he at once ranged himself with his pen—which being in the hands of a man "supremely great" was "mightier than the sword"—on the side of the Parliament. He went heart and soul into the struggle, and wrote many controversial works which need not here be noticed. Their value was chiefly for their time, and neither in them nor in any other of his prose works did his genius show, except fitfully, its peculiar power. Indeed, his prose, although strong in thought, is in style involved, cumbrous, and awkward. Of these the ablest are "Eikonoklastes," "A Defence of the People of England," "Tetrachordon," including "The Doctrine and Discipline of Divorce," "The Tenure of Kings and Magistrates," "A Tractate of Education," and "Areopagitica, a Plea for the Liberty of Unlicensed Printing." But it is as a poet that Milton lives in the world's memory, and of modern epic poets he is incomparably the greatest. His earlier and minor works have a serene and lofty grace of expression, united with a sustained power, that preludes the coming epics. But their merits, great as they are, are less imaginative than fanciful, although the fancy is of the very highest order. "L'Allegro" shows that he could even be playful. The phrase "the light fantastic toe" is quoted by thousands yearly who not only do not know whence it comes, but who would be surprised at learning that it was written by the grave Puritan author of "Paradise Lost." His sonnets have been much praised of later years, particularly since Wordsworth's saying that in his hand the sonnet "became a trumpet." And the opinion that most of them are unworthy of his genius, heavy in thought rather than weighty, cumbrous in style rather than stately, must perhaps be set down as peculiar to the present writer. Milton's genius did not adapt itself easily to small things. Like some huge birds he could not take a short flight gracefully. He needed space and time to soar on high and show the steady strength of his vast sweep of wing. These he found in the subject which he chose early for his great epic poem, upon the writing of which, after long previous incubation, he spent seven years. This poem has the singular advantage of the grandest theme, the theme most interesting to all Christendom, and the most suggestive of sublime thought, that could have been chosen. Had its author failed, even measurably, the subject would certainly have been taken up by some poet in after years; but occupying it absolutely and triumphantly as he did, it was ever afterward foreclosed against all comers. The style of the "Paradise Lost" in its finest and most characteristic passages has an almost indescribable grandeur and strength. Its lines are adorned with a wealth of illustration compelled from all literature and all history, sacred and profane; and its author marches along his royal road of verse like some great conqueror whose triumph is made splendid with the spoils of subject peoples. But these are the mere tokens and decorations of his own power. His thought and his purpose are always supreme. He is able to handle such subjects as omnipotence and archangelic rebellion, primeval purity and the ruin of a race, transcendent love, redemption, "fate, free-will, foreknowledge absolute," and to keep himself up to the lofty level of his stupendous theme. At least he very rarely falls below it; and on one occasion, at least, when he does so—the introduction of gunpowder and artillery into the fight between Satan and the Almighty—his error may be assigned to the unavoidable anthropomorphism of his machinery, and the then comparative novelty and terror of the engines of death which he used. There were neither fire-crackers nor revolving pistols in Milton's day. In the "Paradise Lost" and the "Paradise Regained" the poet worked out to the utmost bound of possibility mere hints in the sacred writings of the Hebrews and the Christians, and thus became the originator of many of the popular views of theology since his day. Milton is not, properly speaking, an English poet or an English prose-writer. His style and the very character of his thought are eminently un-English. His spirit is Hebraic, his form that of Latin and Greek models. His last work, and one of his greatest, "Samson Agonistes," is remarkable in this respect. In its form it is modelled upon Æschylus; its spirit is caught from Joshua, from Ezekiel, and from Isaiah. The hatred between the One-

God-loving race and the Gentile had had no such fierce and terrible utterance since the return from the second captivity. In one remarkable respect Milton is eminently un-English: he is entirely without humor, that peculiarly English, or at least Teutonic, quality of mind which manifests itself in some degree in almost every other eminent writer of that race. In all his controversial writing, savage as it is, there is no touch of humor. His only effort in this way—the suggestion that while the archangel and Adam talk in Eden, as Eve prepares their meal of fruits, there is “no fear lest dinner cool”—is one of the least happy among his few unhappy thoughts. Milton sold the copyright of the “Paradise Lost” for £5, and a further payment of £5 upon the sale of 1300, and £5 upon the sale of 1300 more. Milton received the first additional £5, the second edition having been published in 1674; and his widow parted with all her right in the copy for £8 upon the publication of the third edition in 1678; which must be regarded as a remarkable success for a poem of such a character at such a time. And yet Milton, celebrated as a controversial writer and a scholar almost from his youth, did not achieve fame as a poet during his lifetime. The “Paradise Lost” was not appreciated highly, not to say at its full worth, until after a series of criticisms by Addison in the “Spectator,” and “Comus” and his other minor poems were first brought into general notice by Pope and Warburton. Milton, great as he was, does not stand in the front rank of poets—that is occupied by but three men, Homer, Dante, and Shakespeare—but first in the second rank without a doubt is the author of the “Paradise Lost.” Milton, who had been blind for some years before he began to write out his great work by others’ hands, died in London A. D. 1674. The creator of “Eve” married three wives, one of them “a saint,” and was separated for a time from his first, not the saint. Of his three daughters, one was so unlettered that she could not write at all, and another could not spell her own name rightly.

Abraham Cowley (1618–67) was a contemporary of Milton of whom great things were thought during his lifetime and for many years afterwards. Milton himself, with that misappreciation of contemporary work so common even with great intellects, said that the three greatest English poets were Spenser, Shakespeare, and Cowley; an opinion extravagant to absurdity. Cowley produced no work of large design, but made translations and wrote “Pindaric Odes,” “The Mistress,” a collection of amatory verse, “Davideis,” elegies, and the like. He belonged to the metaphysical school of Donne, of whom he was a weak imitator. His cold conceits and extravagant fancies are passing into deserved oblivion. Sir John Denham (1615–68) was his superior in every natural gift, and wrote in a much higher school, philosophical but cold. His “Cooper’s Hill,” his best work, will always command admiration for its nervous thought and fine imagery. It contains the fine apostrophe to the Thames:

“Oh, could I flow like thee, and make thy stream  
My great example, as it is my theme—  
Though deep, yet clear; though gentle, yet not dull;  
Strong without rage; without overflowing, full;”

which is perhaps the most-to-be-admired example of that mosaic verse which was so much in vogue in the early part of the next century.

Of the prose-writers of the period of the Commonwealth, the most conspicuous and characteristic are Sir Thomas Browne (1605–82), Thomas Fuller (1608–61), Jeremy Taylor (1613–67), the earl of Clarendon (1609–74), and Richard Baxter (1615–91). Browne wrote “Religio Medici,” “Pseudodoxia Epidemica, or a Treatise on Vulgar Errors,” “Hydriothaphia, or a Treatise on Urn-Burial,” and “The Garden of Cyrus.” But notwithstanding the nature of these subjects and the fact that he was a physician, the interest of his writings does not consist in any contribution that he makes to morals, to science, or to the history of art. Their charm is only in the strange, fantastic thoughts which he weaves around his subjects in language which would have won him the applause of John Lyly the Euphuist. His vocabulary is so Romanized that it is hardly English. Jeremy Taylor, a Cavalier clergyman who became bishop of Down and Connor, has been called the Shakespeare and the Spenser of English prose. The latter comparison is the better. His style is like a rich tapestry full of glowing color and striking figures, that would be startling but for their beauty and their harmonious succession. Through the splendor of his fancy there runs a vein of sweet and tender yet glowing piety. His “Holy Living” and “Holy Dying” beget even in this faithless day a religious fervor in the reader. He has the honorable distinction of being the first earnest advocate of complete and absolute religious toleration, his argument for which is set forth in “Theologia Eclectica, a Discourse of the Liberty of Prophecy.” Fuller exhib-

ited in the highest, most typical form the witty divine—a character assumed by many of the clergymen of his period, who filled their sermons even upon the gravest themes with quips and quiddities and puns. He has the credit of being one of the wittiest, although not one of the most humorous, of English writers. The cracking of his jests is incessant, and although they are not always brilliant, they are rarely forced. His principal works are “The Holy and Profane State,” “History of the Holy War,” and “The Worthies of England.” Clarendon was the first of our regular historians. His “History of the Rebellion and Civil Wars” is valuable chiefly because he was a witness of the facts which he relates with his judgment of the actors. His style is poor, often cumbersome, and often incorrect. Baxter was also a typical man. He was almost a perfect example of a clergyman who was a purely religious writer, rather than ecclesiastical or even theological. Fervor is his chief characteristic. His style is pure, and for its purpose it can hardly be, and never has been, surpassed. He wrote much, but is now chiefly known as the author of the “Saint’s Everlasting Rest” and the “Call to the Unconverted.”

But above all the prose-writers of this period, and high among those of any country or any time, rises one mighty figure—that of the Puritan tinker of Elstow, John Bunyan. “The Pilgrim’s Progress,” the book which has won its author a fame that like an English oak strengthens and broadens with the lapse of centuries, is an allegory purely religious in its original purpose; and of all allegories ever written it is the one which most effectually attained its end. But in its literary character, with which we have to do here, it is a work of fiction, a tale of human experience and of human passion, a story of trial, of struggle, of sorrow, and of triumph. Thus considered, it is matchless: in all literature there is nothing like it. Of its millions of readers, of all climes and all ages, comparatively few think while they read of its allegorical meaning. They are absorbed in the fortunes of Christian, of Faithful. To them Apollyon is the fiend and Giant Despair is the giant of which all the other fiends and giants of poetry and romance are the faint and feeble and theatrical imitations; and Greatheart is such a champion of distressed womanhood as might have shamed Cervantes into leaving his immortal satire unwritten. The youth who when he first reads it does not rush on “as if he would devour the way” must have a dull mind or a sluggish nature. The secret of all this is Bunyan’s marvellous union of dramatic insight and dramatic power with a vivid and fiery imagination, beside which the imagination of all other prose-writers is pale and feebly imitative. Moreover, the style of the “Pilgrim’s Progress”—not always correct, according to the laws of pedants and grammarians—shows a mastery of English in which its writer has no rival. It is an unconscious mastery, and it unites in absolute perfection strength and delicacy. Of no book except the Bible, and perhaps Shakespeare’s plays, have so many copies been printed; and of no book without exception, we may be sure, have so many copies been read through and through again. It has been translated into nearly all the languages of the world; and of all peoples above the level of barbarism it has taken a mighty hold. Bunyan wrote another allegory of almost equal power, “The Holy War,” and his other works show his peculiar vigor of thought and of style. But the “Pilgrim” is his Moses’ divining-rod. Bunyan was born in the humblest condition of life A. D. 1628, and after a life of poverty and persecution died A. D. 1688. A monument has been erected to him in his native village, and his statue stands in the new Houses of Parliament.

To the period of the Commonwealth we owe the appearance of the newspaper, which was to have such an influence upon society and upon literature. News-letters, as they were called, had been published earlier in the century, the oldest known being “News Out of Holland,” published in 1619; but it was not until the exciting times of the Long Parliament that the genuine newspaper was demanded by the eagerness of the public for information as to what was taking place from day to day. Published at first once a week, newspapers at last came to be published every other day.

The political, religious, and social influences which were dominant during the Commonwealth were of an ascetic character, and tended strongly to the repression of the lighter forms of literature. For several years the theatres were closed, the drama was crushed, and lyric poetry languished. Upon the Restoration the repressed forces of society burst forth, and with the extravagance of reaction ran riot in high carnival. One of the earliest of the enduring fruits of the rank new growth was “Hudibras,” a satirical poem by Samuel Butler (1612–80). The germ of this highly witty and humorous although coarse performance was in “Don Quixote.” In Butler’s poem the hero is

a Puritan knight in whom selfishness and hypocrisy take the place of the crazy chivalry and extravagant gallantry of the Knight of the Rueful Countenance. He too has a squire who greatly aids the dramatic movement of the composition. "Hudibras" was of course unfair to the Puritans, but it is choke full of knowledge of human nature, which is ventilated in witty expressions that succeed each other so rapidly and so sharply that it is like the letting off of a pack of fire-crackers. Not only Puritanism, but astrology, one of the weaknesses of the age, suffers dreadful exposure under the author's remorseless knife. Butler was the first English poet to make free use of double rhymes, upon the ridiculous effect of which many of his fine points depend. The couplet

"Compound for sins they are inclined to  
By damning those they have no mind to,"

is a characteristic specimen of the gnomic portions of this immortal *jeu d'esprit*.

The dramatists of a period to which the court of Charles II. gave the tone were, as might be expected, not only free and gay, but licentious to the last degree. They revelled in the violation of external decency, and the nature of their plots was such that it would seem as if they were intended to illustrate the life of their royal master. All that they sought to present on the stage was amorous intrigue and wit; and it must be admitted that in both points they succeeded to admiration. Of the minor poets and wits of this period we shall make brief mention only of Charles Cotton (1630-87), who, besides his indecent verse, wrote the second part of the "Complait Angler" and translated Montaigne into sound and nervous English; Sir George Etherege (about 1636-94), who wrote three plays, the best of which is "The Man of Mode," and who is the father of the modern comedy of intrigue; Sir Charles Sedley (1639-1701), a writer of exquisite wit and no less charming style; Wycherley (about 1640-1715); and the earl of Rochester (1647-80), the most indecent and perhaps the most gifted of them all, and who is the author of the best epigram (written on the bed-chamber door of Charles II.) in the language, for which he may be forgiven much:

"Here lies our sovereign lord the king,  
Whose word no man relies on;  
He never says a foolish thing,  
And never does a wise one."

The chief poet of this period was John Dryden, the son of a Puritan gentleman, and who was born A. D. 1632. He began to write as early as 1649, but his most active period was from 1662 to the end of the century, his death occurring in 1700. Dryden began his poetical career in the school of Donne and Cowley, and in the extravagant absurdity of his conceits he out-Heroded Herod. Whoever wishes to learn what conceit is in poetry may best learn by studying it in the form of monstrous and loathsome caricature in Dryden's "Lines on the Death of Lord Hastings." But there was other stuff than this in the man, who merely began, as most young geniuses do, whether in literature, in music, or in painting, by imitating some one of their predecessors. Dryden, however, was nearly forty years old before he showed his power, which is that of an impetuous flow of versification, embodying cogent argument, stinging satire, or graphic portraiture. Of passion, of tenderness, and of pathos he showed none in his poetry, having, it would seem, none in his nature. He is fierce, but never warm, impetuous, but never earnest. He shows great strength, but not the greatest, which always carries with it a delicacy of touch to which weakness can never attain. His sentiments are never of the highest or the purest kind. He belongs to the race of time-servers and men-pleasers. But his satirical power is almost equal to Juvenal's, and his portraits of his contemporaries—as, for instance, in "Absalom and Achitophel," the best of his more important works—are grand historic caricatures, heroic in scale and in spirit. His best lyric composition, "Alexander's Feast," was once thought the finest thing of the kind in English literature, but time has been gradually, and surely and justly, diminishing its reputation. He wrote thirty plays, both comedies and tragedies. They have little poetic merit and no real dramatic power. They were, however, written as many of the best works in literature were written, merely for the money they would bring. But in the prefaces to some of these plays Dryden stepped upon the field of dramatic criticism, of which he showed himself a master. They are the earliest work of the kind in our language, and they remain among the very best. Dryden was not a great poet, but he seems like a great poet in arrested development. In another age, under different circumstances, he might have developed into a great poet if he had been more richly endowed with wider and warmer sympathies and deeper feeling. But lacking those he was suited to his time and he fulfilled his function. The

perpetuity of his fame is due to the splendor of his style and the vigorous freedom of his versification. He was in these respects, and by his power of crowding an epigram into a couplet or touching off a portrait in a quatrain, the introducer of a new school in poetry, which prevailed during the early part of the century succeeding his death.

The latter part of the seventeenth century was adorned by several prose-writers of eminence other than those already mentioned: Ralph Cudworth (1617-88), Andrew Marvel (1620-78), Algernon Sydney (1621-84), Sir William Temple (1628-98), Isaac Barrow (1630-77), John Tillotson (1630-94), Robert South (1633-1726), and Gilbert Burnet (1643-1715); as to whom, however, we can spare room enough only for their names. But one man of this period, John Locke, demands more particular attention, as being an original thinker and one of the most eminent of England's philosophical writers. Locke is indeed the father of political and social ideas which since his time have shaped the political and the social development of the English race in Great Britain and America. In his "Considerations of the Consequences of Lowering the Interest and Raising the Value of Money" he first taught the political and commercial necessity of absolute good faith on the part of government as the creator of the legal representative of value and the medium of exchange of commodities, and that the issue of a depreciated currency was a breach of good faith. In his "Letter concerning Toleration" he not only nobly sustains the arguments of Milton and Jeremy Taylor on the same subject, but he broaches the theory now established and acted upon, that the function of government is to make secure the personal liberty and the civil interests of the individual, and that when it attempts to do more it oversteps its proper limits. His "Treatises on Civil Government" develop and enforce this important political theory, resting it chiefly on an implied contract between the governing power and the governed. His "Thoughts concerning Education" have controlled, and wisely controlled, the action of the English peoples almost until the present time, although the cold austerity of his views has been modified by a warmer infusion of parental feeling. But it is his "Essay concerning Human Understanding" which has given him his most enduring fame and power, in that he was the first to popularize the study of mental philosophy, and to turn the mind's eye of the whole world inward upon itself. To John Locke more than to any other writer is owing the introspective character of the literature, even the imaginative and fictitious literature, of the present age. Of Locke it was justly and admirably said by Mackintosh that "his writings have diffused throughout the world the love of civil liberty, the spirit of toleration in religious differences, the disposition to reject whatever is obscure, fantastical, or hypothetical in speculation, to reduce verbal disputes to their proper value, to abandon problems which admit of no solution, to distrust whatever cannot be clearly expressed, to render theory the simple explanation of facts, and to prefer those studies which most directly contribute to human happiness." His style has the fault of being in spirit unimaginative and in form too diffuse and vague. He was born in 1632 and died in 1704. He is to be read not for his manner, but his matter.

Contemporary with Locke were two distinguished men of science, one of them of the first eminence—Robert Hooke and Sir Isaac Newton. Hooke (1635-1703) was an investigator and an inventor, but chiefly a critic and a disputant, presuming, ill-tempered, and insolent. He did not hesitate to attack Newton's theory of light and colors. Newton (1642-1727) is admitted to have been the greatest master of exact science that ever lived. His discovery of the law according to which the force of gravitation acts, and of the refraction and composite nature of the ray of light, are the most important in their kind of modern times. His genius, although sublime and far-reaching, was eminently practical; and to him England was indebted for the regulation of the dire confusion of her coinage. His works hardly come within the range of pure literature, but the splendor of his genius and the grandeur of his fame forbid them to be passed by without notice.

Locke and Newton were the great literary and philosophical ornaments of the reign of William and Mary, which was sadly in need of all the glory that could be shed upon it by their genius; for the Revolution of 1688 crushed literature far more effectually than that did which brought in the Commonwealth; one reason of which doubtless is that there was a much feebler thing to crush. For twenty years the annals of literature are bare of interest except that which attaches to Locke and to an early performance of Matthew Prior's "The Country Mouse and City Mouse." But Prior's career (1664-1721) stretched well into the eighteenth century, in the first quarter of which appeared that galaxy of admirable writers known as the wits of Queen Anne, among

whom Prior must be reckoned. The others were Swift, Pope, Steele, Addison, Gay, Garth, and Arbuthnot; of whom the last three, with Prior, may be passed without further notice.

Jonathan Swift, Irish by birth (1667), but the most English of men by blood and nature, first appeared in literature by the publication in 1704 of his renowned "Tale of a Tub" and "Battle of the Books," the former a religious satire, the latter a literary one, both highly flavored with a coarse kind of comedy. The success of these works was very great, and their reputation has continued even to the present day. But it is safe to say that only their reputation has survived; and that there are few even of the most cultivated readers now-a-days who can read these comic allegories (for such they are) with much enjoyment of their wit, or even with a very keen appreciation of their satire. But their writer has few equals as a wit or as a satirist in any literature. When he stepped upon the broad field of human nature he produced that which will be the source of delight and instruction until human nature has become other than that which he found it. It is as the author of "Travels by Lemuel Gulliver" that he commands the widest circle of readers. This production had a political purpose, like most of its author's works, and contains allusions to and caricatures of some of the statesmen, churchmen, and other public men of that day; but the genius of its author impelled him to deal with mankind even more than with party, and his satire is upon the human race. This is indeed the weakness as well as the strength of Swift's writing—his contempt for his fellow-men. His own personal tastes, no less than his personal feelings, put in a strong appearance in all his writings; and nothing does he show with so little reserve as his aversion from his kind. The disgust which he makes the king of the horses in his "Houyhnhnms" feel for the Yahoos is plainly but an utterance of his own sentiments. Christ tells us to love our enemies: this Christian minister seems to have hated his friends. But notwithstanding this unpardonable sin against the holy spirit of humanity, notwithstanding an indecency which does not consist in a public exposure of those ardent passions which the least reserved of men conceal, but in a revelling in physical filth, Swift's insight into men's motives is so keen, his satire is so splendid, as well as so savage, his wit and humor are so fine and so continuous, and his style so simple and so nervous, that great pleasure and good counsel can be extracted from almost all that he wrote. He has been compared to both Rabelais and Cervantes. He was far below either in spirit and purpose, but more like the former than the latter in his style. He wrote poetry, or rather verse, which had all the characteristics of his prose, and no others, being entirely without imagination, fancy, or beauty of form. His best known works, in addition to those already mentioned, are the "Drapier Letters," "Polite Conversation," "Directions for Servants," and "Modest Proposal for Preventing the Children of Poor People in Ireland from being a Burden to their Parents, and for making them Beneficial to the Publick"—to wit, by eating them. He died in a state of wretched imbecility A.D. 1745; and it is not improbable that his intense egoism made him somewhat mad, with a selfish method in his madness, during no small part of his life.

Alexander Pope, born A.D. 1688 of Roman Catholic parentage, began to write verses in his childhood, and before he was thirty years old had amassed a moderate fortune by his pen, and had taken a position which makes his name the most illustrious in the literary roll of the eighteenth century. Pope's first work of conspicuous merit was the "Essay on Criticism," written when he was but twenty-one or twenty-two years old. Containing no new or striking views of literature, it is yet admirable for the soundness of its judgments and the epigrammatic elegance of its style. His "Rape of the Lock," a mock-heroic poem—in fact, a burlesque social epic—is the most charming and exquisitely finished composition of its kind ever written. Pope was, like Dryden, whom he began by imitating, a satirist, and, like Swift, an egoist. But, unlike either of them, he had tact and delicacy, and was an accomplished man of the world. Where one used a broadsword and the other a bludgeon, he used a rapier. His mind had also a strong philosophical turn, and this he showed in his "Essay on Man," which is the finest didactic poem in any language, unmatched for closeness of thought, felicity of illustration, and delicacy of finish. He never wrote with passion or with strong imagination, but in his "Epistles of Eloisa to Abelard" and "Sappho to Phaon" he did attain a warmth of feeling which is almost like the fervor of real love; and in writing of his own feeble, crippled, weary physical life ("Epistle to Arbuthnot") he utters his woes with a simple pathos which is touching and dignified. With the assistance of some minor versifiers of

the day he translated Homer, making a brilliant and very readable version, which has the one great defect of misrepresenting the original both in form and in spirit. He edited Shakspeare, but his real editorial work is of little worth, and the only valuable part of the edition is in the preface, which is full of excellent criticism written generally in admirable English. Pope was not a great poet; he was rather a colossal epigrammatist and the most skillful of versifiers. He wrote almost always in the ten-syllable heroic couplet, which he brought to the highest perfection of which it seems to be capable. He died in affluence A.D. 1744, having established a school of poetry, and leaving hosts of imitators, who filled the first half of the eighteenth century with evidences of how easy it was to imitate his form, but how hard to attain his finish or to approach his style of thought. His last important work was the "Dunciad," a savage satire not easily understood now by those who are not familiar with the literary squabbles of his day. Satire has its place in literature, and

"is of use

To teach good manners and to curb abuse,"

but personal satire is not always admirable, or even justifiable; and it is sad to reflect how much fine ability has been prostituted to the mean purpose of giving personal pain.

Two of the eminent men of this period are not only nobly free from the reproach of injurious motives and of egoism, but remarkable for the humanizing and elevating purpose of their writings: they are Richard Steele and Joseph Addison. To the former we owe the introduction into our literature of the brief periodical essay, which since his time has held such an important place in our literature; and we owe to him also the bringing to light the remarkable powers of the latter, the master of this kind of writing. Steele began the publication of the "Tatler" in 1709. It appeared three times a week, and only a few numbers had been published when he induced Addison to become one of its regular contributors, the others being Swift and Hughes. Addison wrote about fifty papers. Afterward, in the "Spectator," Addison assumed a more important position, and wrote most of the papers which gave that publication its unrivalled reputation. The purpose of Steele and Addison was the elevation of English society in intellectual and moral tone, and in manners. This they accomplished by a series of papers which have never been surpassed in the easy charm of their style, and in which wit and satire were directed, not against individuals, but against grossness, meanness, and frivolity, and which did more than any one other single agency to diffuse a taste for literature, for art, and for all the refinements of social life among English-speaking peoples. Addison's style, although not nearly so correct as it was once supposed to be, deserves for many qualities all the admiration that it has received. For its constant grace and its general clearness, for lambent humor, for good-nature, wit which like Ariel's music gives delight and hurts not, for a certain tone of social elegance, and for a purity far remote from squeamishness, it has no superior, hardly an equal. Addison's literary criticisms in the "Spectator" first raised that department of English literature into a recognized art. To him, as it has been said above, English literature owes the establishment of Milton's fame. In this respect, as in matters of society, he was a benefactor to the English people. Nor was Steele much behind him. Less profound and subtle than his great colleague, less exquisite in his humor, he had a larger heart and a richer nature, and there is a warm cordiality in his writing, the lack of which is Addison's chief defect. But throughout the papers published by this admirable pair there is a dignified familiarity which has a peculiar charm, and the characters to which they introduce us become our valued acquaintances, and almost our friends. Sir Roger de Coverley is not only an historical type, but a man that we know and love and admire. Steele and Addison both wrote plays, the former a few comedies of some merit, the latter a cold, didactic, classical tragedy, "Cato," which enjoyed for a time a considerable reputation. But it is as the essayists of the "Tatler," the "Spectator," and the "Guardian" that their names live in our grateful memories. Addison died in 1719, Steele in 1729. Like Pope, they established a school, and their century was filled with their imitators, whose writings, often not without merit, demand no particular attention. But we must mention Lady Mary Wortley Montague (1690-1762), whose letters are models of the familiar epistolary style.

We must turn back a few years for a brief consideration of three dramatic writers who gave some brilliancy to our stage in the reigns of William III. and of Anne—William Congreve (1670-1729), John Vanbrugh (1606-97), and George Farquhar (1678-1707). Of these, Congreve was the man of highest aims. He was poetical, if not a poet, and wrote sententious verse in a dramatic form. His

tragedy, "The Mourning Bride," contains some passages which are still remembered; in his comedies his wit keeps up a continual flash as of heat-lightning. But he created no character and had no real dramatic force. Vanbrugh had what Congreve lacked, and lacked what Congreve had, except wit. His plots are ingeniously constructed, and his characters are strongly if not truthfully drawn. Farquhar's comedies are chiefly remarkable for a flow of animal spirits. But no one of these men added much to the real glory of the English drama.

In the year when Addison died there appeared a work of fiction which has been more widely read than any other in English fiction, except perhaps "The Pilgrim's Progress." It was "The Life and Strange Surpassing Adventures of Robinson Crusoe, Mariner." Its author, Daniel Defoe, was then fifty-eight years old, having passed his life until that very mature period chiefly in writing an almost incredible number of political pamphlets in favor of liberal or Whig principles. "Robinson Crusoe" immediately commanded the attention of all sorts and conditions of men. It was read with avidity, and not only with avidity, but with credulity. It was not looked upon as a novel, a fiction from beginning to end: it was accepted as a plain, unvarnished narrative of fact. And in the quality which caused it to produce this impression is its great and its only merit. Defoe has, in a greater degree than any other writer, the art of giving to fiction the air of reality. So impressive is the real-seeming of his stories that when, as we are reading, we pause for a moment and reflect that they are not true, we are startled; for then it seems as if our own lives and all that goes on around us might also be fiction. This effect is a consequence of a certain strength of imagination; but it is also due in a great measure to the continuous relation of trifling, matter-of-course, and utterly insignificant events, which, being told naturally, seem as if they were part of a life passing minute by minute before us—an inferior kind of imagination and of constructiveness, reducing that which is produced by it to the lowest level of the real school of art. Defoe was a manly and an incorruptible political writer; but as a literary artist he had the grand and fatal defects of a want of passion, of sentiment, and of tenderness, and also of any remarkable insight into character and power of portraying it. His "History of the Plague" is as real-seeming as "Robinson Crusoe," and is almost as purely fiction. His other works are now little read, and his satirical poem, "The True-born Englishman," is known chiefly by name. Born in 1663, he died in 1731.

After Swift and Pope and Addison and Steele had ceased to write there was a long dearth of originality in English literature. But contemporary with them, or immediately following them, we have to notice among the poets Matthew Prior (1664-1742); Isaac Watts (1674-1748); Edward Young (1681-1765); Thomas Warton (1687-1745); John Gay (1688-1732); William Collins (1720-56), whose "Odes" are among the best we have; and, far superior to all the others, yet still a poet of the third or fourth class, James Thomson (1700-48), author of "The Seasons" and "The Castle of Indolence." Among the prose-writers of the period the following demand honorable mention: Richard Bentley (1662-1741), eminent as a classical scholar and critic; Lord Shaftesbury (1671-1713), whose "Characteristics" are elegant, independent, thoughtful, but not profound; George Berkeley (1684-1753), who became bishop of Cloyne, and who broached an ideal system of philosophy, the cardinal principle of which was that perception is all that we know of reality; and Lord Chesterfield (1694-1773), the apostle of etiquette and good breeding.

In the middle of the eighteenth century the English people were startled by the sudden appearance in fiction of *nature*, an element which had been previously unknown therein. Defoe's power had been that of reality, which is akin to nature, but is not nature. The new style was introduced by Samuel Richardson, a man born in humble life, bred to a mechanical trade, and finally a bookseller. He at the age of fifty-two produced "Pamela," which was followed by "Clarissa Harlowe" and "Sir Charles Grandison." The success of these books, particularly of the first and second, was prodigious. But as we look back at them, and wade through the endless succession of letters from and to their high-strung, sentimental heroines, we wonder at the avidity with which such masses of moral "spooning" were devoured, and can attribute such appetites only to a long course of starvation. Or, as Scott, in his explanation of this phenomenon, says, "Had we been acquainted with the huge folios of inanity over which our ancestors yawned, we should have understood the delight they must have experienced from this unexpected return to truth and nature." Richardson was minute, like Defoe, and his personages being flesh-and-blood creatures of the period, and his sentiment genuine of its kind, although inordinate in

quantity, he also awakened the keen interest which always watches over the vicissitudes of those whose experience is what we feel that ours might have been. But his books are a weariness to the flesh. It may be possible for some people now to read all of "Pamela," but who for two generations has been able to struggle through "Clarissa Harlowe" and "Sir Charles Grandison"?—the hero of which is like a Washington in plain clothes turned beau, and eternally bowing over the hand of some pretty piece of female propriety, who worships him as if, instead of being a man, he were a fetish. But Richardson was the occasion of the appearance of a real master of human nature. Henry Fielding (1707-54), a gentleman by birth and a man of liberal education, was tempted to write a burlesque of "Pamela;" and, as in the case of some other performances of like motive, the burlesque proved more true to nature than the original. Fielding's novel was "Joseph Andrews;" and as Pamela's chief object of life was to preserve through six or seven volumes the point of female honor, so Joseph, her supposed brother, devotes himself to the assertion and preservation of his continence against the wiles of the opposite sex. The vigor and spirit of Fielding's style and his creative power have never been surpassed. He showed that highest ability in fiction, the power of creating personages which are at once individuals and types. His Parson Adams, Lady Booby, Squire Western, Tom Jones, and Amelia have a vitality and a truth far above that which is producible by the most elaborate work in the realistic school. They come from a knowledge of the real, from which the truth of highest art eliminates the non-essential. They are created from within, not built up from without. Fielding's humor is rich, free, and pervades his comic scenes like the natural atmosphere. That he was sometimes coarse, according to modern standards of taste, is the fault of his time. Tobias Smollett (1721-71), who soon appeared upon the field, was a much coarser artist. His object seems merely to tickle his reader into laughter by a succession of scenes which seem like farce put into narrative form. But he has fine touches of satirical humor, and his "Peregrine Pickle" and "Roderick Random" and "Humphrey Clinker" will always give pleasure to readers of robust tastes and strong stomachs. In the latter part of his life he wrote a continuation of the history of England from the point to which it was brought down by Hume, who next engages our attention.

David Hume (1711-76) was a Scotchman, who first appeared in the field of philosophy, in which he showed himself an original and daring thinker. His philosophical works are a "Treatise on Human Nature" (republished as "Philosophical Essays concerning the Human Understanding"), "An Inquiry concerning the Principles of Morals," and "The Natural History of Religion." In the treatment of these subjects he disregarded authority and accepted belief, making fact and reason his only guides. He was by nature a doubter and an inquirer. These works placed him in the front rank of modern moral and metaphysical writers, and produced an effect which seems destined to be permanent. His views as to the possibility and the necessity of miracles arrayed against him all the theologians of his day; but a large number of the ablest and most sincere theologians of the present time accept his views, as being sound in the main and not at war with the interests of true religion. Having taken this position, he turned his attention to history, and wrote in three instalments what is known as his "History of England," bringing his work down to the Revolution of 1688. This work is not of high authority as to matters of fact, and it is strongly tinged with the writer's personal prejudices. But its happy arrangement, the clearness and vivacity of its style, its charity and toleration of spirit, notwithstanding the obvious prejudices before referred to, make it one of the most interesting of modern histories, as it was the first of the modern school of historical writing. Hume's style is too strongly marked with Northern peculiarities to be regarded as a good example of standard English.

Contemporary with Hume, but younger than he, was Edward Gibbon (1737-94), who produced between 1776 and 1788 his "History of the Decline and Fall of the Roman Empire," a work upon which he was engaged for twenty years. The magnificent plan of this history, the vast extent of time which it covers, its colossal erudition—it being the fruit of original investigation of facts hidden for the most part in the dimmest recesses of the Dark Ages—and its imposing style, make it the greatest work of its kind known to literature. Its style, however, is too conscious, too pretentious, too much infested with Romanic words and Gallic forms of thought, to be regarded as really English. It is Gibbonese.

Forming one of a group of three contemporary historical writers of eminence was William Robertson (1721-93), who wrote the history of Scotland, of Charles V., and of Amer-



ica—works of sound and unpretending merit, written in an agreeable style, somewhat too strongly marked with Scottishisms.

The middle of the eighteenth century was adorned by the brief but highly-finished poems of Thomas Gray (1716-71), whose function in poetry seemed to be to show how high a point could be reached by a man who had a poetic nature, strong poetic feeling, and an exquisite ear for rhythm, but who was without genuine poetic inspiration. Gray's "Elegy in a Country Churchyard" has probably been more widely read than any other poem in the language, and it has certainly furnished more phrases to our collection of household words than any other that ever was written; almost the whole of it has become a part of familiar speech. It is a beautiful union of tender thoughtfulness and graceful expression. Contemporary with Gray was William Shenstone (1714-63), a poet of considerable merit, whose best-remembered work is "The Schoolmistress," an admirable imitation of Spenser's style, but more admirable as a poetical picture of a type and of a time.

To this period, too, we owe the works of Laurence Sterne (1713-68), one of the greatest humorists in English or in any other literature. His is the only humor that could be named with that of Shakespeare or of Cervantes. His satire has the charm of a delicacy so exquisite that it seems like pungent aroma filling the atmosphere of his thought. His style has a corresponding daintiness, although it is sometimes disfigured with affectation. Admiration of "The Life and Opinions of Tristram Shandy" and of "A Sentimental Journey through France and Italy" has grown with the passage of each year since their first appearance.

Throwing the shadow of its sad humanity all athwart the latter half of the eighteenth century stands the burly bulk of Samuel Johnson, who was born in Litchfield A.D. 1709, and died in London A.D. 1784. Johnson was one of the most miscellaneous, and really one of the most desultory, of writers. He was a poet, a dramatist, an essayist, a biographer, and a lexicographer. In fact, like many other literary men of equal and of less note, he wrote for bread that which he was called upon to write; but he impressed upon all that he did write the stamp of his own strong individuality. His purely literary fame was acquired chiefly as a moral and a critical writer. Not always just, not always right (who is?), he is distinguished by a love of truth and of purity, by sturdy independence and colossal common sense. Of original thought he produced little, but he added to axioms the charm of novelty by the earnestness and the weight with which he gave them utterance. His style, too ponderous and too formal, has nevertheless the great merit of clearness and of strength; and it would be well if many of the shambling, slipshod writers of the present day would take a hint from his advice in regard to Addison, and give their days and nights to the study of "the Johnsonian period." His "Rambler" essays, which he wrote twice a week for two years, exhibit in their most characteristic form his merits and his defects as a writer. If heavy sometimes in style, they are always laden with the weight of humanity. Johnson's "Dictionary," having been compiled before the establishment of the modern school of comparative philology, has comparatively little etymological value, but it was the first English dictionary made upon the proper principle of an investigation of the history of words as exhibited in English literature; and it has been the model and the quarry of almost all subsequent works of its kind. Johnson is, however, best known through the minute report of his daily life and his intercourse with his literary friends furnished in his memoirs by James Boswell. He was a sort of king in the literary circles of his time, and exercised a personal influence the effects of which have not yet quite passed away. He was often overbearing, and sometimes even brutal; but nevertheless he stands, rugged, sad, tender, generous, true, a solemn figure to be admired, and even loved.

Among his eminent contemporaries two must be passed by with mention inadequate to their merits or their fame—Adam Smith (1723-90), who has the honor of being the founder of the science of political economy; and Sir Philip Francis (1740-1818), who under the signature of "Junius" was a terror to the statesmen of his time, and even of his party; and who remains the great English master of invective. The style of the letters of Junius is still worthy of all the admiration of which they were ever made the subject; and that of the best political leading articles in the journalism of subsequent times owes much to those celebrated letters, which may be said to have founded the modern school of anonymous and irresponsible journalism.

It is remarkable that of the great masters of modern English, four of the greatest were by birth and early education Irishmen—Swift, Sterne, Goldsmith, and Burke—

and of these the foremost is the last. Edmund Burke (born 1736) is beyond all doubt the greatest master of English prose. Goldsmith is his equal in purity, simplicity, and grace; but in Burke there is a fulness of thought, a wealth of words, a sustained power of utterance, a grand sweep of the period, with a subtle yet most naturally wrought richness of illustration, to say nothing of mere accuracy of expression and clearness of construction, which place him far beyond all other writers. Burke's mastery of language is like Beethoven's mastery of melody and harmony. His department of literature is that of philosophical statesmanship, in which he stands side by side with Cicero, if not a little before the great Roman. The saying that he to party "gave up what was meant for mankind" is one of those glittering fallacies of thought which poets have unfortunately the power of perpetuating. On the contrary, his fault as a party-man was that he thought too much of mankind and had too much poetic feeling—thought perhaps not always logically, and sometimes with too much sentiment of the highest kind, but rarely in unwisdom. Indeed, he is the wisest of all modern politicians. His "Reflections on the Revolution in France," "Letter on a Regicide Peace," and "Letter to a Noble Lord" are his principal works. Of his purely literary essays, that on "The Sublime and Beautiful" was at first widely known and read. But among the earliest fruits of his laborious life it is that of the least permanent value. His strength grew with his years, and his most powerful as well as his most brilliant efforts were made after he had passed his meridian, and even just before his death, which took place in 1797.

Of Goldsmith (1728-74) Dr. Johnson well wrote, "Nul-lum quod tetigit non ornavit," and he touched many things, but he lives in literature as the author of four works of very various form: a novel, "The Vicar of Wakefield," a comedy, "She Stoops to Conquer," a poem, "The Deserted Village," and a satirical criticism of society, "The Citizen of the World." He wrote other poems, many essays, and much criticism, all charming in style and full of humor and a gentle wisdom, but the works named above are his masterpieces. The "Vicar of Wakefield," faulty in construction, is matchless and immortal as a gentle revelation of the weakness of human nature, and is the first of our novels of domestic life; and "She Stoops to Conquer" is, whether for its construction or its humor, the best comedy of the same range in English dramatic literature.

The eighteenth century was rounded with the life of a poet, William Cowper (1731-1800), who to minds of a religious tone and unspectacular cast speaks in accents which cherish and comfort them and sustain their faith. He is pre-eminently the poet of Christian morality, of true piety, and of all the softer and sweeter social graces. Incapable of bitterness, he was not incapable of gentle and dignified satire; and although his style has too much of the formality and conscious precision of his time, he has many passages marked with great sweetness and freshness of feeling. His longest and most ambitious original works are "The Table Talk" and "The Task," but incomparably his best are his "Lines on my Mother's Picture" and "John Gilpin," an outburst of pure fun and humor strangely and delightfully incongruous with his usual style. He translated Homer very ambitiously, but without corresponding success.

Robert Burns (1759-96), who died only four years before Cowper, was the greatest writer of English poetry born north of the Tweed. He is regarded as a "Scotch" poet, but even his "Scotch" poems are in a mere dialect of the English language, as has been remarked above; and some of his more serious poems, and not a few of his songs, are in as pure standard English as any compositions of his contemporary, Cowper himself. As a lyric poet, Burns, when we consider both the number of his poems and their merit, must be placed at the head of his class. No songs so full of the direct utterance of passion, of tenderness, and of love-lit fancy exist in the English language—hardly in any other; and his idyls spring from the soil like grass, and with the purple bloom and the sweetness of heather. Entirely uneducated, he was fashioned by Nature from his cradle to be her singer. The very trials of his shifting life, the very failings of his unstable character, were to him sources of the purest poetic utterance. He indeed did learn in suffering what he taught in song. Having wrecked his life upon his passions, and wreaked his woes upon expression, he died in misery, and left a name around which burns a glow of tender glory. Two of his countrymen deserve mention among the poets of their land—James Hogg (1772-1835) and Allan Cunningham (1785-1842).

In the eighteenth century the English race began to manifest its power in a new quarter of the world. The men who had left the old England, and had crossed the

Atlantic to found a new England free from some of the civil and religious restraints which galled them in the land of their birth, were, very many of them, not only energetic and enterprising, but intelligent, and of more than moderate intellectual and social culture. In New England education was one of their earliest cares. Colonial literature has, however, nothing worthy of notice in a sketch like the present (for the Mathers, Increase, the father, and Cotton, the son, produced nothing that has any intrinsic literary value) until we reach Jonathan Edwards (1703-58), a theological and metaphysical writer whose power was at once recognized in the mother-country, and whose "Enquiry into the Freedom of the Will" is still the stronghold of the necessitarian theologians. He merited the judgment pronounced by his biographer Mark Hopkins, that he was a man of considerable learning, extensive reading, sound judgment, and great argumentative acuteness. The next author of eminence among his countrymen was Benjamin Franklin (1706-90), the great apostle of common sense. Franklin was a philosopher, but in his company Philosophy wore her homeliest garb and addressed herself by the simplest means to the most practically useful ends. He was above all things "utilitarian," of which school in social science he was one of the founders. He is hardly better known for his discoveries in electricity and the great diplomatic services he rendered the colonies at European courts than for the prudential maxims of his "Poor Richard's Almanac." His style is very plain, clear, and convincing. Among Franklin's younger contemporaries were the men who roused the colonists to resistance to the tyrannical government of George III., and finally brought about the severance from the mother-country—John Adams (1735-1826), Thomas Jefferson (1743-1826), Patrick Henry (1736-99), Thomas Paine (1737-1809), Jonathan Trumbull (1750-1831), Philip Freneau (1752-1832), and Alexander Hamilton (1757-1804). Of these, Adams was sound in judgment, logical in reasoning, a lawyer, and a man having respect for authority and demanding respect for it; Jefferson a calm but earnest and persistent advocate of equality before the law in all things, whose authorship of the Declaration of Independence not only secures him immortality, but gives him some claim to having helped to light the fires of the French Revolution; Patrick Henry an orator of masculine tone and fervid phrase, equally daring and dexterous; Thomas Paine an intellectual iconoclast and a rebel against all authority, whose "Common Sense" and "Rights of Man" have done more to spread skepticism, if not to quicken it, than any other books ever written; Philip Freneau a poet of genuine patriotic feeling and lyrical skill; Hamilton a statesman of true formative power, who was endowed with the ability of uttering his schemes and putting his arguments in a style of remarkable elegance and force. He was the principal author of "The Federalist," a series of papers which did much to bring about the formation of the American Union. But the place of all these men in literature is not a notable one, and is very inconsiderable compared to that which they filled in the great political movement of their time. They had very little influence on the literary tone of their own country, and are hardly discernible in the great stream of English literature which now flows yearly fuller and stronger with the impouring of its American tributary. But it was not until well on in the first quarter of the nineteenth century that Anglo-American writers showed native, independent power.

The period succeeding the American war of Independence and the French Revolution was one of great activity in English literature, all departments of which were filled by a throng of new writers who sprang up with the spontaneousness of mushrooms, but not with their shortness of life. And now, as there are no longer any material or significant changes in language to be noticed, as authors crowd upon us—authorship having become so common that we all write, learned and unlearned—and as we have reached a period within the memory of living men, our remarks, even upon writers of eminence, must be more brief than they have been heretofore, and it will be convenient for the reader that we shall consider the various departments of literature each by itself.

*Poetry.*—The bonds of continuity between eras, however unlike, are rarely if ever entirely wanting unless they are broken by some prolonged as well as violent political and social convulsion, such as we have remarked in the case of the Wars of the Roses; and the link that binds the poetry of the eighteenth century to that of the nineteenth is George Crabbe (1754-1832), in whose works both the form and the spirit which more or less pervaded English poetry from the time of Pope to that of Wordsworth are so manifest, yet with the modification produced by a tendency towards the contemplation of simple nature and of the reality of lowly life, as to win him the *sobriquet* of "Pope in worsted

stockings." Crabbe's poems show close observation, a loving sympathy with nature, and not a little shrewd humor. Walter Scott (1771-1832), who followed soon after him, was very unlike him in the choice of his subjects and the style of his versification. Scott is the poet of chivalry and romance, and the story of his poems is always removed from modern times; he writes loosely and freely, but with great spirit and vivacity of movement; his fancy flies low, but his imagination is strong, and his love of nature and of the external signs of man's presence, as churches, castles, and buildings of all kinds, is very great. No poems ever received so quickly so large a share of public attention as his. They effected an entire change in the poetic taste of the time. After working his peculiar vein out, he turned his pen to prose fiction, and we shall meet him again in the ranks of the novelists. He was replaced in public favor, as a poet, by Lord Byron (George Gordon), (1788-1824), who, entirely unlike him in the spirit of his poetry, had some strong points of resemblance to him in the form and structure of his compositions. Like Scott's, Byron's principal poems are narrative, and have a freedom of versification and ease of style entirely opposed to the eighteenth-century manner. The heroic couplet and the epigrammatic period had disappeared from English literature, perhaps for ever. Byron's style is rich, sensuous, and brilliant; his motive, rarely high or pure. He is satirical, but because of a contempt for his kind rather than a hatred of what is bad and base. His descriptions, whether of natural objects or human action, are truly splendid; and in some passages, notably in his greatest work, "Childe Harold," he rises into the higher regions of poetry. But the tendency of his writings is debasing, less because of their sensual and epicurean tone than by reason of their derangement of the moral perceptions and their defiance of the moral sense. His heroes are unnatural combinations of incongruous qualities; his women mere compounds of beauty and unrestrained passions; and a gloomy and fierce egoism pervades his writing. But he is the richest in style and the most copious in fancy of all modern English poets. He was followed in public favor by his friend Thomas Moore (1779-1852), a poet of Irish birth, who wrote "Lalla Rookh" and "The Loves of the Angels," but whose real excellence was in lyric compositions. Moore's songs are charming in their tenderness, their lively fancy, and the sweet cadence of their verse, but they do not rise into the highest range of lyric writing. They smack of society, and have about them the odor either of the drawing-room or the dinner-table. Next in the galaxy of poets which distinguished the reign of George IV. we have to notice Thomas Campbell (1777-1844), a Scotsman by birth and a Celt by blood, who yet stands high in the annals of English literature. His "Pleasures of Hope" and "Gertrude of Wyoming" are his longest and his most ambitious poems. They are full of bright fancy, generous sentiment, and earnest humanity of feeling. But his lyric poems are his best, and they are of a very high order. They have the true fire and energy of the highest lyric school, mingling in rare combination fancy, passion, and reflection. His critical and biographical writings added largely to his literary reputation. Percy Bysshe Shelley (1792-1822) and John Keats (1795-1828) should be noticed here, although greater names are awaiting us. They both lived uncompleted lives, neither of them producing a work which attained the excellence of which they seemed capable. Shelley's life was one of revolt against society, and his longer poems are an utterance of his rebellious spirit. His minor poems express the exquisite tenderness and sweet fancies of a really lovely nature. Keats's "Endymion" and "Eve of St. Agnes," full of beautiful passages, lack the coherence and consistency of style requisite in poetry of a high order; but perhaps it may justly be said that he died too young for us to know the real calibre of his mind.

Among the poetical writers of this period these must be mentioned: the brothers Horace (1779-1849) and James Smith (1775-1839), the authors of the famous "Rejected Addresses," parodies or burlesques of subtle humor and inherent merit; Mrs. Felicia Hemans (1794-1835) and Miss Letitia E. Landon (1802-35), graceful and sentimental poetesses; Robert Montgomery (1807-55), the author of "Satan" and other religious poems; Theodore Hook (1788-1841), the author of irreligious poems and jests that belied his name; Joanna Baillie (1762-1851), known as the authoress of an elaborate series of "Plays on the Passions" which could not be played and are never read; and Sir Thomas Noon Talfourd, a common-law judge, whose one tragedy, "Ion," made a lasting reputation for himself, and for more than one representative of its title part, and is read with delight by those who eschew the theatre.

At this time appeared what was very loosely styled the Lake School of Poets, the first and chief of which was

William Wordsworth (1770-1850), whose poem, "An Evening Walk, addressed to a Young Lady from the Lakes of the North of England," was probably the occasion of the name given to him and his imitators. Wordsworth began to write in the old style, as appears by some poems written in 1786 which he preserved. But reaching manhood, he broke loose from this style, owing his emancipation chiefly to the influence of German literature, which then began to be much read in England. The reflective cast of this literature suited his mind, and he made himself the most meditative—we might almost say, the most ruminative—poet in English literature. He set out to reform English poetry, and his effort was toward an admirable end—simplicity and truth to nature. One means by which he hoped to attain his end was, in his own language, "by fitting to metrical arrangement a selection of the real language of men in a state of vivid sensation." He failed in accomplishing this end, which is incompatible with the requirements of any poetry; and one result of his efforts in this direction was the putting in some form of verse, generally a sonnet, almost every incident of an externally prosaic life. All his best works had their excellence (as his friend Coleridge said) in a treatment entirely at variance with his own theory, in conforming to which he produced of what was good only some short and simple poems of a remarkably picturesque beauty; but the rest of his verses, wrought out according to his theory, excited only the ridicule of his contemporaries, and have fallen into merited oblivion. Wordsworth in the best manifestation of his powers was a descriptive philosophical poet. He lacked passion, had no dramatic power, even enough to take himself out of himself, and his constructive ability was small. Of lyric power he had none whatever, and his versification has no peculiar charm. But in two styles of poetry he is without a superior, almost without an equal, in English literature. The first, which is almost peculiar to himself, is marked with a thoughtful and tender simplicity in the expression of the feelings of very humble people. It may be regarded as a very refined and elevated style of ballad-writing, the fidelity of the best old ballad style to the facts of nature being carefully preserved. The other style—and that in which the greater part of his best poetry is written—is speculative, deeply penetrative into the human heart and the relations of man with God and nature. It is grand, but when prolonged becomes somewhat wearisome. His sonnets, which are very numerous, are, with a few conspicuous exceptions, cold and dry, and seem, too many of them, to have been written under the pressure of a sense of duty. He wrote much, and we cannot here spare the room even to enumerate his important works. He was made poet-laureate in 1844, succeeding Southey, whom we next notice. Robert Southey (1774-1843) wrote much verse, but little poetry. What he might have produced had he concentrated his efforts we cannot tell. But he surely might have been one of the first of English prose-writers. The amount of writing that he did in verse and prose is really prodigious. But the essence of poetry is concentrated thought, or at least concentrated expression of thought; and that he lacked. He was in all things diffuse, although clear and simple and manly in style. His English is much admired by the best critics. But he was without originality even in style. Of all his verse not a line or a phrase has passed into the phraseology of common life except one—"deeply, darkly, beautifully blue"—which owes its circulation to Byron's having quoted it. Of all his works only his rambling, humorous "Doctor" is now read; but he was one of the most conspicuous literary personages of his time.

Younger by a year or two than Southey, and his friend and Wordsworth's, was Samuel Taylor Coleridge (1772-1834), a man who, if he had been content with being only a poet, would have been a poet of the highest rank, excluding the three who stand together—Homer, Dante, and Shakespeare. Coleridge began life by being an enlisted dragoon; he next projected a Utopian republic on the banks of the Susquehanna; next he became a Unitarian preacher; he afterward turned Trinitarian and Tory; and he passed the remainder of his life writing and talking with a marvellous mingling of grandeur and subtlety, but leaving nothing complete except a few short poems. He was one of the last of the great talkers, the very last being Macaulay; and like him he spoke soliloquy. Referring to his Unitarian period, he once said to Lamb, "Charles, did you ever hear me preach?" "Samuel," replied the stuttering wit, "I n-n-ever heard you do anything else." All this is characteristic of the man. He was a grand intellectual torso, or rather a succession of unfinished clay models of what he might have been. The author of "The Ancient Mariner," of "Christabel," of "Love," of "Genevieve," of the "Hymn to Chamouni," of "The Devil's Walk," of the lines upon "Cologne," and the translator of

"Wallenstein," had the capacity of a great poet of very varied powers. But he was beset by the demon of criticism, that foe of the creative faculty; he could not resist the temptation to wander away into the fields of metaphysical speculation; he sapped his mind and shattered his body with opium-eating; and so he ended his life, a splendid wreck, leaving the wealth that he bore scattered upon the shores of immortality.

Mentioning Samuel Rogers (1763-1855), the banker-poet, the author of the "Pleasures of Imagination," a writer who formed himself rather upon the eighteenth-century models, and who, as Byron said, "when he was delivered of a couplet took to his bed and tied up his knocker;" and Thomas Hood (1798-1845), one of the most charming of our humorous poets, and one who combined his humor with a pathos peculiarly his own, whose "Song of a Shirt" and "Bridge of Sighs" have touched, and will ever touch, all true hearts with sadness,—we pass to poetical writers of our own day.

Chief among the elders of our living poets are Bryant, Longfellow, and Tennyson. William Cullen Bryant (born 1794) first commanded public attention by a poem, "Thanatopsis," written when he was nineteen years old—a grand monody upon the end appointed for all living, the inspiration of which was perhaps caught from a passage in "Measure for Measure," and which has taken a place among the classic poems in our language. After accomplishing threescore and ten years he has made a translation of Homer which disputes the palm of superiority with all its predecessors. Between these periods of a laborious life he has written not much poetry, but none unworthy of the fame he won so early and has sustained so late. In purity of style, in the finish of his verse, in the elevation of his thought, and in his loving portraiture of nature he is unsurpassed among living poets. His writings make us wish that poetry had been the business and not the mere adornment of his life.

Henry Wadsworth Longfellow (born 1807), on the contrary, has passed his life in the pursuits of the higher literature. His two earliest books, "Outre Mer" and "Hyperion," were prose, but the prose was that of a man of poetical temperament. Then came the "Voices of the Night," which at once commanded the attention of the whole English-speaking public, and which have been translated into German and into other languages. Since then he has given the world many volumes of poetry which have enjoyed as great a popularity in Europe as in America. Mr. Longfellow's poetry has the rare quality of addressing itself directly to the minds and hearts of all men. High and low, educated and uneducated, all acknowledge its charm. Singularly refined in his every utterance, he is the most popular of living English poetical writers. His poems are galleries of characters uttering sentiments that sink into the general heart. To his original works he has added a translation of Dante, the singular fidelity of which to the original in thought and in form shows no less his mastery of his own tongue than his thorough and subtle knowledge of that of the great Florentine poet.

Alfred Tennyson (born 1809), who succeeded Wordsworth as poet-laureate, has since the death of his predecessor held the first place among living British poets. It would seem in his case almost that the poet was made, not born, for his first volume, published in 1830, gave no promise of his future fame; and it was not until twelve years afterward, when Longfellow had published his "Voices of the Night," his "Ballads and Other Poems," his "Poems on Slavery," and had in press "The Spanish Student," by which his style of versification and the character of his thought were fully displayed, that Tennyson published his second volume, "Poems chiefly Lyrical," in which the "Morte d'Arthur" and "Locksley Hall" gave unmistakable indications of his genius. These facts dispose of the assertion, which has been unwarily made, that the New England poet is an imitator of his British contemporary, a somewhat younger man and a very considerably later poet. Since the publication last mentioned, Tennyson's poetic faculty has grown greatly, and with it his fame. Tennyson is eminently a poet whose powers have been developed, almost made, by discipline and by culture. Like Wordsworth, he has held himself apart from the world, consecrating his life to his Muse. His style is elevated, pure, and deeply thoughtful. He deals with the great problems of the human soul—but incidentally, none of his works having a distinctly metaphysical or even a moral aim. His "In Memoriam" is in this way very characteristic of his mind, and with his "Idyls of the King" presents the highest manifestation of his powers. He always writes with a high aim, but always shows a consciousness that he is doing so. The deficiency of his poetry is in spontaneity and energetic utterance. He rarely catches "a grace beyond the reach of art." But some of his lyric

poems, like the one beginning "Break, break, break on thy cold gray rocks, O Sea!" have an exquisite charm of sentiment.

If the dramatic writing of the day were worthy of classification as literature, Robert Browning (born 1812) should be regarded as at the head of the dramatic poets of the day. This place would be his, not so much by virtue of his plays as because all that he writes is imbued with the purest and highest dramatic spirit. He is not only the greatest English dramatist of the age, but the greatest since Shakspeare. He has that power so admirable, so rare, of creating living personages whose characters become known to us not by description, but by their own actions and utterances. In these characters he entirely loses his own identity, and even, it would seem, his own consciousness. He thinks their thoughts and feels their feelings. This is true in what seem to be descriptive poems; and the well-chosen names of two of his volumes, "*Men and Women*" and "*Dramatic Lyrics*," show a consciousness on his part of this power. His versification is often rough, his style careless, his thought involved; but those who understand him forgive these defects (which he sometimes compels into charms, if not into beauties) for the delight they take in his rare dramatic genius. He married Elizabeth Barrett (1809-61), the most eminent of English poetesses, whose "*Portuguese Sonnets*" (in which the love crowned by that marriage is covered by a very transparent veil) are admirable for fervor and freedom of utterance, and whose "*Aurora Leigh*" is in fact a novel of Society wrought skilfully into a charming narrative poem.

James Russell Lowell (born 1819) and Matthew Arnold (born 1822) are exemplars of the union of the poetical and the critical faculty in an uncommon degree. No one can read Mr. Lowell's "*Legend of Britanny*," his "*Sir Launfal*," his "*Commemoration Ode*," and his minor poems without wishing that he had given his life to the development and the perfection of the great natural poetic gift which they indicate. As a humorist he has few equals, and he is most widely known by the "*Biglow Papers*," a series of humorous satirical poems in the rustic New England dialect, of which Lowell is a perfect master. His critical essays, collected in "*Among my Books*" and "*My Study Windows*," are marked by searching independence of thought and the fruits of a wide range of reading, enlivened by touches of his rare and racy humor. Of Matthew Arnold's poems, his dramatic "*Sohrab and Rustum*" is the finest exhibition of his power in this direction. It has the true antique grandeur, with the antique simplicity and directness. His essays and critical writings, which are numerous, are marked by unusual subtlety of thought and an exquisite finish of style. He is perhaps the most polished living writer of English.

Algernon Charles Swinburne (born 1837), the most prominent, if not the most admirable, of the younger English poets, first commanded attention by his poetical drama, "*Atalanta in Calydon*," which is remarkable for its exquisite fancy, its wealth of language, and its strong infusion of the old Greek spirit. His other dramatic poems, although not equal to this, delight admirers of strong passion and unreserved utterance. A volume of "*Poems and Ballads*" exhibits the same qualities in a greater degree, clothed in a versification the external richness and strength of which compel an admiration sometimes unwillingly given to such exhibitions of nakedness of soul and body.

But there are two kinds of nakedness, both of soul and of body: the purer kind never was seen in a more alluring form than in the poems of William Morris (born 1833), whose "*Jason*" and "*Earthly Paradise*" have placed him high in the second rank of English poets. Mr. Morris goes to the legends of ancient Greece and of the Middle Ages for his subjects; and he tells these old tales with such vividness of imagination, such picturesque and sensuous richness of description, and such sweet simplicity of feeling that he renews and freshens all their old beauty and adds to it a charm of his own. His versification is remarkable for its easy flow and for the luscious richness of its sound. But his great strength lies in his imagination. He sees before him the subject of his verse. As a narrative poet he has no superior or equal but Chaucer, of whom he professes himself the scholar; and thus, in our day at least, we see the cycle of English poetry returning to the point whence it started.

Of the poets of minor fame we must mention Whittier, who has produced some fine—perhaps the purest modern—examples of true ballad poetry—high praise, for the true ballad, one of the most charming forms of lyric composition, is, in modern days, among the rarest of poetical productions; and the author of "*Barclay of Ury*," "*Maud Muller*," and "*Barbara Frietchie*," always pure, fervid, and direct, will be remembered when many a more vol-

uminous and ambitious writer is forgotten; T. W. Parsons, the master of a true and strong poetic utterance; Jean Ingelow; Bret Harte, whose humorous poems in dialect have qualities regarded as peculiarly "American;" Bayard Taylor, who has made the best translation of "*Faust*;" Richard H. Stoddard, George H. Boker, Edmund C. Stedman; and Walt Whitman, who amid heaps of commonplace rubbish in fantastic form has dropped some lines weighted with thought and true feeling.

The principal dramatists of the present century are Sheridan Knowles, Dion Boucicault, Tom Taylor, and Robertson, but no one of them has written a play which has any value except upon the stage. In the English language dramatic literature seems to have ceased to exist. Richard Brinsley Sheridan (1751-1816), belonging partly to the last century and partly to this, is the last of the dramatic school. But even his comedies are comedies of wit, not of character, and the wit is always that of Sheridan, not of the personages who utter it.

*Novels*.—In no department of literature has the increased intellectual activity of the present century been so copiously manifested as in that of prose fiction. The writers of novels are to be numbered now-a-days by the hundred. Merely mentioning the names of Hannah More (1745-1833), the authoress of "*Celebs in Search of a Wife*" and other writings of a pious-social purpose; William Beckford (1760-1844), whose "*Vathek*," originally written in French, does not for its merit deserve a notable place in English literature; Anne Radcliffe (1764-1823) and Matthew Gregory Lewis (1775-1818), (called "Monk" Lewis, from the title of his most celebrated work), both of whom revelled in horrors and mysteries; and the two sisters, Jane (1776-1850) and Anna Maria Porter (1781-1852), the priestesses of the goddess of sensibility—all of whom belong rather in spirit, as they do much in time, to the eighteenth century—let us pass to the consideration of the later and stronger writers of fiction, only the most eminent and characteristic of whom can be noticed here. The great novelist of the century and of our language—and, it is not too much to say, of the world—is Sir Walter Scott, who, as we have seen, holds also so high a place among its poets. "*The Waverley Novels*," so called from the title of the first one of the series, are chiefly historical—that is, their plots are interwoven with historical incidents, and some of their principal personages are figures taken from history. In correctness of historical detail, as also in correctness of style, they are open to adverse criticism. But trifles of that kind are, or ought to be, disregarded by even the best-informed and most cultivated readers as they are borne onward upon the strong, steady stream of the story. Scott was simply the greatest writer of stories that ever lived. His imaginative realization of his personages, and his dramatic evolution of their characters and management of their intercourse with each other, are inferior only to Shakspeare's, from whom to him, in imaginative writing, criticism may take one great leap. No other writer but Shakspeare has filled the world's memory with such a throng of living figures, so varied in their types, so lifelike and real-seeming in their action. He spends little time in analyzing motives and in dissecting character; but with strong clear touches, every one of which has meaning, he places the man or the woman before us, and we know them, as we know our friends or our enemies, for ever after, and at once we become interested in their feelings, their actions, their experience, and their fate. Scott is a singularly healthy writer. There is hardly a morbid passage or an injurious one in any sense in all his works. We rise from them refreshed, delighted, invigorated, elevated. In narrative power, in truthfulness, in picturesqueness, in lifelike action, in the clear management of a complicated action, in united strength and delicacy of portraiture, in grandeur of movement, in humor, and in charm of style he is without a rival. Miss Jane Austen (1775-1817), who followed him as a younger contemporary, is one of the best of English domestic novelists. Her works will always be read for their intrinsic interest and as faithful and pleasing pictures of the society of her time. George P. R. James (1801-60) was an imitator of Scott, and although a prolific writer and a favorite with the public of his day, he has shared the fate of all imitators, and is now little read. But the author of "*Philip Augustus*" and "*One in a Thousand*" was a novelist of no mean powers. Edward Lytton Bulwer (1806-74), afterwards Lord Lytton, in his first novel, "*Pelham*," introduced to the world what is distinctively known as the novel of fashionable society. He afterwards extended his field and wrote historical novels, sentimental novels, novels descript and nondescript. A man of high culture, of various acquirements, and a writer of considerable power, he commanded for many years the admiration of a wide circle of readers. But he was in no way original; his sentiment was equally

false and excessive; his style was artificial; he had no dramatic power; and his personages have no true life or character, but are bundles of clothes with something in them that talks what Edward Bulwer thought. No one of them lives except Pelham, a typical high-class dandy of the latest Georgian era. His best works are "The Caxtons" and "My Novel," written in imitation of Sterne.

Benjamin Disraeli (born 1805)—the son of Isaac Disraeli (1768-1848), an accomplished Hebrew who was converted to Christianity, and who is widely known as the author of "The Curiosities of Literature," "The Amenities of Literature," and "The Calamities of Authors"—is the author of several novels, the earliest of which is "Vivian Grey" (1825) and the last "Lothair" (1870). His works are brilliant, and have always commanded attention, but they are fantastic, extravagant, and untruthful as representations of human nature or of society at any time or in any country. Most of them have a political or a social purpose, and are believed to contain portraits of contemporary politicians and other persons of distinction. But "Henrietta Temple" has been regarded by some critics as one of the most natural love-stories ever written. His last book, "Lothair," is directed against the proselyting policy of the Roman Catholic Church. His writings indicate a strong prepossession in favor of the Hebrew race. His chief distinction is in the field of politics. He has been twice chancellor of the exchequer, and is now premier.

Charles Dickens (1812-70), a man not of high but of singularly original powers, next appeared upon this field. He was a humorist, and found congenial subjects among characters of low, or at least of humble, life. Of these his caricatures—for he rarely drew except to caricature—are infinitely amusing. His attempts to rise above this plane were, with one notable exception, "The Tale of Two Cities," conspicuous failures. His sentiment is generally exaggerated, and his pathos often false. But as a humorist, pure and simple, he is unrivalled in the present generation. William Makepeace Thackeray (1811-63), also a humorist, was a writer of a very different stamp. His novels are satires upon society. But his style is pure, his satire delicate, his caricature little exaggerated, and his pathos is true and often profound. His personages generally belong to the cultivated classes of society, and his representations of gentlemen and ladies, both as to their manners and their motives, are always worthy of admiration. The author of "Vanity Fair," "Pendennis," and "Henry Esmond" has a high and a permanent place among English writers of fiction. Charles Kingsley (born 1819) is the author of novels of very considerable merit, among which are "Alton Locke," "Yeast," and "Amyas Leigh."

Among the many women of the day who have written novels, Charlotte Brontë (1816-54), the authoress of "Jane Eyre," holds a conspicuous place. Her few works are chiefly remarkable as giving, with great subtlety of perception and boldness of utterance, the woman-view of man's character, and as to women their view of themselves in relation to man. Very introspective and analytic, they dissect motives with a hand at once bold and delicate. In this respect, however, as in all others, she must yield to the writer who appeared under the name of "George Eliot," but whose real name was Marian C. Evans (born about 1820), and who is one of the most conspicuous persons in English literature of the present day. "George Eliot's" constructive power is small; she is not a great teller of tales. In her subtle analysis of character and revelation of motives she allows the movement of her story to lag; she crowds her canvas with too many figures, all painted like miniatures, until she and the reader both begin to forget the main purpose in hand. To this criticism, however, her earlier sketches, her first novel, "Adam Bede," and above all "Romola," are in a great measure exceptions. "Romola," as the history of two lives, and in the revelation of character and the motives—the unacknowledged and almost self-unknown motives—of its principal male character, Tito—is a marvelous work of art. "George Eliot," like the generality of female writers, is most successful in describing what she has seen. Her personages are studies from life, but she has a vivid imagination and great dramatic power. Her views of life and of human nature are gloomy and depressing. Her style is in all respects admirable.

Charles Reade (born 1814) has written many novels which by their vividness of portraiture, their vivacity of movement, and their humor have taken a firm hold upon the public. Whatever the nicely fastidious may think of the taste of much that he has written, even they cannot fail to be interested in the fortunes of his personages. His effects are theatrical, and sometimes seem as if they were contrived for the stage. He leaves little impression of received power. His best works are "Christie Johnstone," "Peg Woffington," and "The Cloister and the Hearth;"

the last an historical novel which needed only condensation to have taken a high place among works of that class.

To prose fiction America has contributed little, and of that little the works of but one author are of a very high order. In the last century, Charles Brockden Brown (1771-1810) wrote novels which have some power of enlisting the attention, but the morbid tone of which made them repulsive, and they have been wisely allowed to pass into oblivion. James Fenimore Cooper (1789-1851) attained a greater and more enduring celebrity. This was chiefly, however, because his scenes were laid in frontier life, among hunters, trappers, and Indians. They pleased those whose taste delighted in adventure, and in Europe they commanded attention because they were regarded as peculiarly "American." As tales of adventure they are interesting to those who are not fastidious as to the truthful seeming of what they read; but they have no value as studies or pictures of human nature. The characters are impossible, and the style is poor, mean, and unpolished. They are chiefly adapted to the tastes of very young men and boys. Cooper's sea-novels are of greater merit, if not of a higher order. After Cooper there was no American novelist worthy of special notice until the appearance of Nathaniel Hawthorne (1804-64), whose "Scarlet Letter" at once commanded the admiration of the whole literary world. Hawthorne was a writer of the most marked originality and at the same time of the highest finish in style. His novels are highly dramatic; but their dramatic power is as unlike that of Scott's, for instance, as can be. He deals with the inner life of his personages. We see them indeed, but chiefly we live their lives. His death cut short what promised to be a brilliant career, but he left enough behind him to secure an enduring fame. Edgar Allan Poe (1811-49) produced no novel, but as a writer of tales, the strange incidents of which he had the singular power of making seem not only probable, but actual and real, he attained distinction at home and abroad. He writes like a gifted reporter of extraordinary and incredible scenes which pass before his eyes. With him it is difficult to draw the line where the possible ends and the impossible begins. His fanciful poems and his trenchant criticism added to his reputation, but he does not take a place among those who have nature as a model. Probably no modern work of fiction was so widely read as Mrs. Harriet Beecher Stowe's (born 1812) "Uncle Tom's Cabin;" but the interest which it excited was due chiefly to the sensitiveness of the public mind all over the world upon the subject of slavery in the U. S. The same lady's other novels, although superior to that which made her known, have failed to receive anything like equal marks of public favor.

The novel of modern society has attained what would seem to be its highest and most perfect development in the voluminous works of Anthony Trollope (born 1815). His discernment of character is subtle and true; his appreciation of social relations and of their effects upon external and internal life has never been equalled, and it would seem cannot be surpassed, because it is perfect. He is not specially humorous, or satirical, or sentimental, or sensational; and yet humor and satire and sentiment and sensation all appear in his novels, simply by their being so true a reflex of individual and social life. Reading one of his novels is like being a secret observer of the lives of other people—so much so that it sometimes carries along with it a sense of shame. We feel as if we had not a right to be thus watching our neighbors, and following them into the inmost recesses of their souls as well as their houses. Mr. Trollope's effects are produced only by the choice of characters and the grouping; the charm of his stories is that of simple nature, but nature as it is seen in the most highly cultivated and complex society. If they are ever tame and commonplace, it is because that society is tame and commonplace; and their many characters which are noble, and their many passages which are colored with the warm hues of strong or tender feeling, show that all that is artificial and conventional in modern society does not repress, but sometimes tends even to heighten and to quicken, the emotions of unchanging human nature. In the completest contrast to the novels of this author are the vivid and picturesque sketches of California life, in prose and verse, of Francis Bret Harte (born 1831), who has rapidly attained the reputation of being the first writer of fiction whose works are marked by a peculiarly "American" tone and atmosphere; and possibly there may be something in them of this kind which is not due only to their characters and the social conditions which they represent. However this may be, their interest is peculiar and their humor delicious.

Thomas Hughes (born 1823) became celebrated as the author of "Tom Brown's School-days" and "Tom Brown at Oxford," two novels written for very young readers; but, like all good books of that kind, they were full of interest



for those of riper years. The manliness of tone in these books, their sound morals, far removed from all priggish pretension to goodness, and the thorough understanding of boy-nature which they show, have made them classics in their kind. In style they are as simple and as manly as they are in spirit. Charles Shirley Brooks (1815-74) should be mentioned as a society novelist of very considerable powers; and William Wilkie Collins (born 1824) as the author of tales remarkable for their striking and well-contrived but not very probable plots.

Among the crowd of novelists of the day whose very names cannot be mentioned except in their aggregate form of Legion, that of William Black is rising into distinction. The author of "A Princess of Thule" can hardly fail to take a high place in fictional literature. The most vivid and truthful presentation of American social life in the great centre of its wealth and commerce that has yet appeared is "Never Again" by William Starbuck Mayo, M. D. (born 1812), a book of which the humor, the knowledge of the world, that mark its every page will cause regret that it is, and will probably remain, its author's only novel. George William Curtis (born 1824) has also written one novel, "Trumps," but he will rather be remembered as the author of "Prue and I," a series of confessions of a simple-minded old bookkeeper of exquisite tenderness and sweetness of sentiment, and of the "Potiphar Papers," a burlesque of New York society, and of his "Howdjit" travels, in the style of Kinglake's "Eothen."

*Essayists and Miscellaneous Writers.*—Few tasks are more difficult than the classification of books and their writers; and as to the latter, those of the present century are in many cases so various in the subjects which they respectively treat that this difficulty increases as we approach our own day. But turning to the past generation, where shall we place William Cobbett (1762-1835), who wrote upon politics, gardening, language, and what not? It is chiefly as a political essayist, however, that he will be remembered. His writings show strong common sense, strong prejudices, independence of thought, set forth in a direct, manly, incisive style. William Godwin (1756-1836) wrote a novel, "Caleb Williams," the fame of which still lives, but his chief distinction was that of a political essayist and historian of robust mind and strong liberal tendencies. His wife, Mary Wollstonecraft (1759-97), by her "Vindication of the Rights of Woman" took the lead in a movement which seems to be still advancing. Charles Lamb (1775-1834) will be always read, and always loved, for the gentleness of soul and the exquisite humor, sometimes falling into mere personal whim, which appear in his "Essays of Elia" and his correspondence. To him there could not be a stronger contrast than Walter Savage Landor (1775-1864), who had all the virtues and most of the faults peculiar to the Anglo-Saxon race, and embodied them in his writings, although his peculiarities of temper kept him so at war with his kindred, and even his country, that he passed most of his life in voluntary exile. His "Pericles and Aspasia," "Imaginary Conversations," "Last Fruit off an Old Tree," and "Dry Sticks" show a wide range of learning and strong critical sense, but narrow sympathies, and an absence of that great lubricator of the friction of life—humor. John Wilson (1785-1854), although he wrote some poetry, is remembered for his "Christopher North" papers upon literature and sporting subjects, which were published in "Blackwood's Magazine," of which in its earlier years he was editor. His critical taste was sound, but much of his writing is mere animal spirits put on paper, and he was chief of a school all of whose pages reek with the fumes of whisky and tobacco, which cannot, however, entirely becloud their strong sense and their scholarship. For whisky and tobacco Thomas De Quincey (1785-1859) substituted opium, to which we owe his "Confessions of an Opium-Eater," and perhaps its effects may be traced in "Sursum Corda" and in many of his subsequent voluminous writings, which are crowded with the evidences of a wide range of desultory scholarship, with subtle criticism, rich fancy, and a peculiar humor, all embodied in a style of remarkable richness and splendor. William Hazlitt (1778-1830) was the nineteenth-century embodiment of the ideal literator. He lived from early manhood until his death, not very happily, upon the miscellaneous products of his pen as a contributor to various periodical publications of his day. He was consequently able to do little as we may be sure he would have liked and was able to do it. But as a critic of literature and art and of society he holds a high place, which he owes in a great measure to his manly and thoroughly English style. James Henry Leigh Hunt (1784-1859), another writer of the same sort, has less force, but is always graceful and pleasing. But the great modern master in English of grace and ease, and of a lambent humor much like that of Addison, is Washington Irving

(1783-1859), whose "Sketch Book," "Knickerbocker's History of New York," and "Legends of Sleepy Hollow" do more to secure his enduring fame than most of his more ambitious works, including his "Life of George Washington." Notably unlike Irving in every way is Thomas Carlyle (born 1795), whose style is rugged and whose humor grim, but who is a critic of the first class, and whose "Sartor Resartus" is a subsoil plough driving deep beneath the surface conventionalities of society. A like purpose prevails in his "Latter-Day Pamphlets" and "Hero-Worship." It is to be remarked that Carlyle's peculiar style—so peculiar that it has been called "Carlylese"—does not appear in his earlier works. Mr. Carlyle the reformer appears as a scornful, scourging critic, and in that spirit he has written his historical works, "The French Revolution" and "Frederick the Great." To him Ralph Waldo Emerson (born 1803) has been not very happily compared. The purpose of the two writers may be the same, but their manner is entirely different. Emerson has the calm observance and the serene thoughtfulness of a philosopher, and he shows a strong love of external nature of which Carlyle seems scarcely conscious. His style is aphoristic and epigrammatic; but although both his prose and his poetry are full of wisdom, they not unfrequently degenerate into commonplace, or what would be commonplace were not what is common in it used with such a keen knowledge of its significance and its relations. Perhaps Caroline Elizabeth Norton (born 1808), a miscellaneous writer who inherited some of the talent of her grandfather, the great Sheridan, should not be left unmentioned.

Among the wits of the generation which is passing away two were pre-eminent—Sydney Smith (1771-1845) and Douglas Jerrold (1803-57), but their wit was almost their only point of likeness. Jerrold's wit was a scourge, while Sydney Smith's was the genial laughter of a lover of his kind. His essays touch many of the most important topics in which men of these times are interested, and they are loaded with sagacity. His style is remarkable for its clearness and manly dignity. Another wit whose wisdom is greater than his wit is Oliver Wendell Holmes, M. D. (born 1809), of whose writings his "Breakfast-Table" books—the "Autocrat," the "Poet," and the "Professor"—exhibit his mind and his style at their best. They present a curious and careful study of that variety of human nature which is found in the New England of the nineteenth century, and are threaded through and through with gentle satire. The study of human follies and human weakness and of the conventional forms of modern society which took Holmes to the breakfast-table and Sydney Smith to the dinner-table, drove Henry David Thoreau (1827-62) to a hermit's life, in which he lived in a cabin of his own building, chiefly upon beans of his own growing. He studied birds and beasts and inanimate objects for the purpose of reflecting severely upon man. But his love of nature was genuine, his love and knowledge of literature great, and his own style beautiful. He cannot be read without forgiveness for his gentle mistaken misanthropy. Arthur Helps (born 1817) has won for himself a peculiar, and if not a very high, we may be sure a long-enduring, place in literature. Without the least affectation of singularity, either in the style or the plan of his works (all of the most important of which are in the form of essays with dialogues upon them), with little that is strikingly new in his thought, he commands the respectful attention of a large circle of the very highest class of readers. This he does by the very clear and earnest way in which he brings up and presses home half-forgotten truths which concern the daily life of all cultivated people. We may think that we have heard what he says before, but we are almost sure to think that we never heard it said so well. He presents homely common sense in the most elegant dress. He has written two novels, "Realism," over which his Friends in Council entertain themselves and his readers with wise and witty chat, and "Ivan de Biron." Among other writers of this class in America even such a sketch as this must notice Donald Grant Mitchell (born 1822), a polished satirist of society and an observant critic of rural life; Thomas Wentworth Higginson (born 1823), whose essays are strong protests against physical and mental weakness; Edward Everett Hale (born 1822), whose sermons, essays, and sketches all show a strong, clear, subtle mind, a lover of freedom, and a Christian of the Broad Church; and William Dean Howells (born 1837), whose pictures of European and New England life are marked with penetrating observation, humor, and a charming grace of style.

*Criticism of the Arts of Design*, like those arts themselves, sprang up late, and at first grew feebly, among the English-speaking peoples. George Hogarth's (1697-1764) "Analysis of Beauty" and Sir Joshua Reynolds's (1723-

92) "Lectures," although not without suggestions of some value, are chiefly distinguished as the works of eminent painters. And Burke's "Essay on the Sublime and Beautiful" is all awry from its purpose. Its very style lacks all its author's peculiar charm. Rev. Archibald Alison (1757-1839) wrote "Essays on Taste" which promoted culture in this respect, but which are now rarely referred to; but Sir Uvedale Price's "Essays on The Picturesque," published in 1810, may still be read with profit, and have since been reprinted. Mrs. Anna Jameson's (1797-1860) works upon Christian art contain much that is valuable, both of history and criticism. But it was not until the appearance of John Ruskin (born 1819) that we had a truly subtle, profound, and thoroughly qualified critic of fine art—one who to his critical perceptions joined the ability to communicate them with beauty and impressiveness of style. Mr. Ruskin's chief distinction as a critic is that he never writes without making his hearers think, even when they smile at his utopian theories of society and of political economy. James Jackson Jarves (born 1818) has written with knowledge, thoughtfulness, and honesty about art, and particularly ancient art; and Philip Hamerton is a pleasant and safe drawing-room companion to the lover of art who does not care to be profound.

Criticism has been raised to a special branch of literature during the present century, toward which the establishment of the great British Reviews, the "Edinburgh," the "London Quarterly," the "Westminster," and in America the "North American," contributed largely; their influence and example have been such that now no magazine or newspaper of the first class, either in Great Britain or America, appears without such critical reviews of literature in all its branches, of art, and of science, as fifty years ago were produced nowhere, and which, with allowance for much ignorance, presumption, and bad taste, on the whole guide the public mind aright. In this department of literature many of the writers who have already been mentioned attained distinction.

Of those not hitherto mentioned, Lord Francis Jeffrey (1773-1850), William Gifford (1757-1826), and John Gibson Lockhart (1794-1854) deserve special mention. They were all severe, as well as able and generally honest, in their criticism, and did much toward the formation of the public taste in the early part of the century. Henry Hallam's (1778-1833) "Literature of Europe" contains a mass of various learning and generally sound critical opinion. It is, and will probably remain, the standard work upon its subject in the English language.

*Philology*, using the word in its widest sense, includes all writing upon language, even the well-known grammar of Lindley Murray (1745-1826), the American Quaker who for so long gave the law of the construction of their language to all English-speaking people. But comparative philology, which alone is worthy of the latter half of its name, is the product of the present century, and had its rise in the discovery and study of the Sanscrit language, the oldest known representative of the speech of the Aryan or Indo-European peoples. This discovery, which is due to Sir William Jones (1746-94), established a connection between the modern world and that of pre-historic times, and revealed the bond which binds together all the Indo-European peoples. But before this discovery an analytic philologist (or etymologist) of great ability, John Horne Tooke (1786-1812), had appeared in England. His "Diversions of Purley," although not without errors, is a monument to his learning, sagacity, and fine linguistic sense. In the last and the present generation Joseph Bosworth (1788) has investigated the field of Teutonic and Scandinavian languages; George P. Marsh (born 1801) has philosophically recorded the growth of the English language and its literature; Robert Gordon Latham (born 1812) has, with a profound and a vast range of knowledge, developed theories of ethnological philology, has dissected the English language, written its grammar on philological principles, and completed an English dictionary based upon Johnson's. William D. Whitney (born 1827) has pushed his investigations of the Oriental languages and of the wide field of the higher philology to what seems almost the verge of attainable knowledge; James Hadley (born 1821) has shown that he might have been his rival; Max (Frederick Maximilian) Müller (born 1827) has delighted and stimulated all students of philology by his brilliant generalizations in the "science of language" in its broadest sense; March has produced his great Anglo-Saxon grammar; and Trench and Farrar and Garnett and Helfenstein and Craik and Skeat and Childs have distinguished themselves by works of narrower scope, but hardly of less interest. The Early English Text Society, under the management of the able and indefatigable Frederick J. Furnivall, has published a great mass of well-edited English writing of the twelfth, thirteenth, and fourteenth cen-

turies, and made accessible to eager students materials which they are using for the elucidation of the philology of their mother tongue.

*History.*—In no department of literature has a greater change been manifest during the present century, both in form and in spirit, than in history. This change—the result of the combined influences of the comparative system introduced by Niebuhr, of the strong tendency toward a positive or scientific treatment in all branches of intellectual endeavor which rest in any way upon facts, and of the increased appreciation of the value of the minutest matters of record which show the intellectual, moral, and social condition of a whole people, the middle and lower, as well as the noble and educated classes—has caused the historians of the modern school to extend their researches, to enlarge their plans, and to endeavor to portray upon a vast field not only the great vicissitudes of nations and the eminent individuals who controlled, or seemed to control them, but the whole political, moral, and social life of the people and the periods whose stories they undertake to tell. Hence, histories are now at once more fragmentary and more minute than they were of old. These changes, however, do not appear in the earlier historical writings of the century; but they increase as it advances.

*English History.*—Dr. John Lingard (1771-1851) wrote a history of England down to the abdication of James II., which is valuable for its research, the mass of facts accumulated, its calm tone, and its skillful arrangement. But it was written from the Romanist point of view, with a Romanist purpose; and its value is seriously impaired for Protestant readers by its skillful perversions and suppressions of fact. Sharon Turner's (1768-1847) "History of the Anglo-Saxons and of England during the Middle Ages" is the only thorough and systematic presentation of its subject in the English language. Trustworthy as to fact, it is deformed by an ambitious, involved, un-English style. Lord Mahon (Earl Stanhope, born 1805) must be mentioned as the faithful and thoughtful, although somewhat spiritless, historian of England from 1718 to 1783. Sir James Mackintosh, who failed to do all that his unquestioned abilities gave reason to expect, produced a compact "History of England" (3 vols., Lardner's "Cyclop.") remarkable for a clear and philosophical treatment of political and constitutional questions. But the great constitutional historian of England is Henry Hallam (before mentioned). He is learned, thorough, candid, and, although liberal in tendency, judicially calm, as becomes his subject. His "History of Europe during the Middle Ages" has the same qualities, but lacks picturesqueness of presentation. The subject of the constitutional history of England has been ably continued by Sir Thomas Erskine May (born 1815). Sir Archibald Alison (1792-1867) is the author of a "History of England" from the beginning of the French Revolution to the Restoration of the Bourbons, which has the great value due to an industrious collection and systematic arrangement of facts by an almost contemporary writer. But it is diffuse, prolix, and deformed by a style both pretentious and ungraceful. It is best read in his own abridgment of it. Thomas Babington Macaulay (1800-59) produced, in his "History of England from the Accession of James II.," the most striking and picturesque historical work of the century. Written with strong partisan prejudices, if not with a partisan purpose, it is filled with masses of moral light and shade, and must be read with corresponding allowance as to facts and its representation of individuals. But in its grouping of facts, in its pictures of social life, and in the splendor and the graceful ease of its style it is without a rival in our literature. The great research upon which it was founded and the minuteness of its picture-painting made it impossible for the author to bring it down, as he had intended, to a period within the memory of living men. Its five octavo volumes cover a period of only fifteen years. With its author's essays upon the characters of Bacon, Milton, Addison, Walpole, Johnson, Byron, and Hastings, it forms a body of historical writing of almost unequalled splendor and interest. James Anthony Froude (born 1818) has produced a very valuable history of England during the times of the Reformation. His investigations have led him to take new views of the characters of Henry VIII. and Elizabeth, which the authorities quoted by him seem to support; but upon the much-vexed question as to the characters of the two Maries of Scotland and of England he ranges himself at the head of their condemners. On the history of Ireland he has also written vigorously and after much original research. Edward A. Freeman (born 1823) is the author of a "History of the Norman Conquest" written from an entirely new point of view, in which he presents a philosophical appreciation of the causes which led to the invasion, of the condition of insular and continental society at that period, and of the social and political conse-

quences of the conquest. Its great merit gave him at once a high position in historical literature. The various biographical works of Mr. John Forster (born 1812) have so marked an historical bearing that he deserves honorable mention as a writer in this department.

*Continental History* has been illustrated by two English writers of eminent ability. Thomas Carlyle's "History of the French Revolution" is rather an expression of the spirit of the time of that great event than a record of its facts, a knowledge of which is almost assumed by the writer. But it is perhaps the most complete and characteristic manifestation of its author's peculiar genius. His "History of Frederick the Great" is truly historical, and presents new results of original research. It is written in "Carlylese," and is full of fantastic and grimly humorous passages, but its truly historical value is nevertheless very great. John Lothrop Motley (born 1814) has taken the highest position as the historian of the Netherlands and the Dutch Republic. To the results of patient research and logical analysis he adds the attraction of a fervid style and an almost enthusiastic love of his subject.

*The History of the United States* has been written by George Bancroft (born 1800) with a minuteness of detail which often produces the impression that he looks at small and commonplace occurrences through the magnifying and glorifying medium of their consequences. His style may also be regarded as often too ambitious for the subject immediately in hand. But as a whole his work is worthy of the admiration it has received and of the authoritative position it has attained. Richard Hildreth (1807-65) wrote his "History of the United States" in a style directly opposite. It is cold, dry, unpicturesque, and rigidly judicial. But as a clear and well-connected record of facts it is of great value, and may be safely relied upon. James Parton (born 1822) has produced several biographies of eminent citizens of the U. S. which have an historical purpose and value.

Southern America, and Spain as connected with it, have been illustrated by the labors of William Hickling Prescott (1796-1859), perhaps the most charming of all English historical writers, and inferior to none in patient research. His histories of Ferdinand and Isabella, of Philip II., and of the conquest of Mexico and the conquest of Peru, are rightly regarded as the most fascinating series of historical works in our language. Arthur Helps has written a "History of Slavery," which, animated by a thoroughly humane and loftily philanthropic spirit, presents his subject with his characteristic calmness and reserve.

The history of Greece has been written by William Mitford (1744-1827) with learning and the feeling of a true scholar for his great theme; Bishop Thirlwall (born 1797) has also produced a valuable history of the Hellenic peoples; but the work which displaces all others in English literature upon this subject is that of George Grote (1794-1871), who seems to have penetrated the very heart of Greek life, political, social, moral, and intellectual. His "History of Greece" and his "Plato" seem to present to us all that we can hope to know of the national experience and the best intellectual period of the great people who were the sources of modern civilization.

Roman history to the end of the Second Punic war has been treated by the manly pen of Thomas Arnold (1795-1842), a worthy disciple of Niebuhr, who added a certain simple English tone and charm to the manner of his master. His "Lectures on Modern History" are also admirable in the same way. Herman Merivale (born 1808) wrote a "History of Rome under the Empire" which supplements acceptably Arnold's more vigorous work. Henry Hart Milman (1791-1868), a poet, and the author of "Fazio," a powerful and successful tragedy, wrote a "History of the Jews," a "History of Greek Christianity," and a "History of Latin Christianity," which form an admirable trilogy of religious history.

Of war histories, the two most important are Sir Edward Creasy's (born 1812) "Fifteen Decisive Battles of the World," in which the author treats only of such battles as have had a manifest effect upon the course of civilization; and Alexander William Kinglake's (born 1802) "History of the Crimean War" (yet unfinished), which as to fact is a clear result of careful investigation, but which in spirit is a fierce impeachment of the emperor Louis Napoleon. Perhaps the volume of William Russell (the well-known London "Times" correspondent) upon the same subject should here be mentioned. Of the histories of the civil war in the U. S. none have much value; all having been written by partisans living too near the events which they describe.

An entirely new kind of historical writing has been produced by the speculative and investigating spirit of the age. It is the history, not of nations or of men, but of

man. Pre-eminent in this department is the "History of Civilization," left unfinished by Henry Thomas Buckle (1822-62), who sought, and with an admirable if not a perfect measure of success, to discover and describe the successive evolution of the moral influences which brought about the changes in the course of the history of the modern world. Of a like kind are the "History of Rationalism" and the "History of Morals" written by William Lecky (born 1838)—works which do to a certain extent pluck out the heart of the mystery of man's moral nature and social life. And historians who deal with mere external facts now go beyond the historical period, and we have in such books as "Pre-historic Times" and "The Origin of Civilization," by Sir John Lubbock (born 1834), and "Pre-historic Man" by Daniel Wilson (born 1816), ingenious attempts, marvellously successful to a certain point, in reconstructing the physical life of man at those dimly remote periods of which there is neither record nor tradition.

Books of travel are so considerable an element of modern literature, whether regarded as a means of literary entertainment or in their more important function of diffusing a knowledge of mankind and enabling us to study it under different climes and different forms and degrees of civilization, that they cannot properly be passed over even in the briefest compendium of literary history. But so vast has been their number in these latter days that only those can be noticed here which have some peculiar literary excellence, or which mark a period, or which have exercised some notable influence upon opinion.

John Ledyard (1751-88) belongs in time to the eighteenth century, but he is noticeable as being the first of that series (almost school) of travellers who set out with a purpose of establishing, verifying, or illustrating some cosmical fact—who are discoverers, not of new countries, but of the geographical relations and topographical condition of countries already known. Ledyard was the first of those travellers who have set out with the purpose of examining the Polar regions, and he made his journeys on foot; but after he had reached Yakootsk in Siberia the jealousy of the Russian government interrupted his journey, stayed his further progress, and thrust him out of the country. He afterwards undertook to discover the source of the Niger, but died in Africa with his purpose unattained. He did discover what he wrote in a passage that will never die—that in all climes, amid the snows of Siberia or on the sands of Africa, woman is gentle, kind, compassionate, and helpful. Among the many British travellers who have described, or professed to describe, the condition and the character of the people of the U. S., Frances Trollope (1778-1863) did more than any other to form the opinion upon that subject which has prevailed in Europe until very recently. She was a keen observer, wrote in a clear and very pleasing style, and many of her most damaging assertions were literally true. But she entered the country at its then wildest and most uncultivated parts, the frontier towns of the South and West, and did not become acquainted with the society which two centuries had developed in America until she was about leaving the country; and of this she said little. She thus produced at once a very amusing book and a very erroneous impression, which the passage of a century will hardly obliterate. Another woman, Harriet Martineau (born 1802), of masculine traits of mind, treated the same subject in an entirely different spirit, and after careful and candid study produced in her "Society in America" a somewhat successful attempt at a calm and philosophical appreciation of the American people and American political institutions. It will always be valuable as a record and an analysis of the facts and the spirit of American life at the time when it was written.

Of Eastern travellers the most conspicuous are Eliot Bartholomew George Warburton (1810-52), the author of some novels, whose studies of Oriental life were embodied in "The Crescent and the Cross," Austin Henry Layard (born 1817), whose series of works giving the results of his excavations and investigations of the ruins of Nineveh are the most valuable contribution to the antiquarian and art history of the East ever made by an Englishman; Alexander William Kinglake, whose "Eothen" tells with such a wonderfully picturesque power the impressions which Oriental landscape, life, and manners make upon a civilized Christian from the West, and which has justly been called the most charming book of travel ever written.

Africa and its geographical mysteries, particularly that of the source of the Nile, has given to Ledyard not a few followers. Of these the most important are David Livingstone (1817-74), who penetrated to the heart of the country, crossing it twice at about 10° S. lat., traversing vast regions before wholly unknown to civilized man, and making geographical discoveries of very great importance;

and Sir Samuel White Baker (born 1821), who followed the wonderful river up to a great lake which is one of its two principal reservoirs, and which he named the Albert N'yanza. The records of their toils, exposures, perils, observations, and discoveries by these two distinguished explorers have an interest which reaches the degree of fascination, and takes them to a certain extent out of the region of geographical science into that of general literature.

Their rival in the interest of his contribution to the literature of exploration, if not in the value of his discoveries, was Elisha Kent Kane (1820-57), eminent among those for whom the North Pole and a possible north-west passage from the Atlantic to the Pacific has had an irresistible attraction. His narrative of his experience in this region of icy blankness has the interest of romance with the stamp of literal truth, not surpassed even by the fiction of Defoe's "Robinson Crusoe."

Conspicuous among American explorers, both in regard to antiquities and geography, is Ephraim G. Squier (born 1821), whose works upon the mounds of the Mississippi Valley and upon Nicaragua, Honduras, and contiguous regions of Central America are recognized as having a great and permanent value. John L. Stephens (born 1805) has also in his "Travels in Yucatan and Chiapas" revealed to the modern world a mass of interesting fact concerning the relics of the extinct races of Central America.

Frederick Law Olmstead (born 1822), first known by his "Walks and Talks of an American Farmer," afterwards wrote "A Journey in the Seaboard Slave States," "A Journey through Texas," and "A Journey in the Back Country," which are historically perhaps the most important books of travel that have been published in regard to this century, giving as they do, with all the candor and charity consistent with a love of freedom, an exact description of the social, moral, intellectual, and physical condition of the Southern States of the American Union a few years before the war of secession. Bayard Taylor (born 1825) has visited no previously unknown, or even very remote regions, but the extent of his travels, his careful observation, sound judgment, good-nature, and agreeable style have gained his works in this department of literature a wide popularity.

*Philosophy.*—The philosophical writers of the English-speaking peoples during the present century have shown the influence of German or of Scotch thought, or have been chiefly critical of other writers or of earlier schools. Thomas Reid (1710-96), although belonging in time to the last century, belongs by affinity to the Scotch metaphysical school of the present, which he may be said to have founded by his "Inquiry into the Human Mind on the Principles of Common Sense" and his "Essays on the Intellectual Powers," "Essays on the Active Powers," etc. He opposed the theory of Locke, and found in the innate and instinctive powers and consciousness of the mind the prime source of its knowledge and its stimulus to action. The objections against this theory were answered with great ability by Dugald Stewart (1753-1828), the next in order of the Scotch metaphysicians, whose "Elements of the Philosophy of the Human Mind" and "Dissertation on the Progress of Metaphysical and Ethical Philosophy," the former by its acute analysis, the latter by its wide-reaching knowledge and attractive style, take a high place in philosophical writing of the second or non-originate class. Among works of this class Sir James Mackintosh's "View of the Progress of Ethical Philosophy" should be mentioned. Chief of this school, and perhaps ablest of modern metaphysicians, is Sir William Hamilton (1788-1856), whose writings upon the philosophy of perception, on eclecticism, and on logic are the fruit of a profundity and grasp of his deep and subtle subjects which, whatever may be thought of their absolute soundness, even their opponents regard as efforts in the very highest style of metaphysical dissertation. William Whewell (1795-1866) took an enviable position in this department of literature by his work on the inductive sciences. And here should be mentioned Richard Whately, archbishop of Dublin (1787-1863), whose treatises on logic, on rhetoric, essays on some of the difficulties in the writings of Saint Paul, and whose anti-Tractarian "Cautions for the Times," and indeed all his writings, even those of a specially ecclesiastical character, are philosophical in tone and style, and almost so in purpose, and whose wide range of knowledge and vigorous intellect made a strong impression upon the general thought of his day. John Stuart Mill (1806-73), by his "Examination of Sir William Hamilton's Philosophy," his "System of Logic," and his "Dissertations and Discussions," etc., takes a high place among modern philosophers of the Positive school, although he cannot be regarded as a disciple or an apostle of Positivism according to Comte. His philosophical principles have been ably criticised by Dr.

James McCosh (born 1811), who by a series of works, all opposed directly or indirectly to the positive and material tendencies of the day, has taken a prominent position on the conservative and religious side of philosophy. Of the same school was Dr. Francis Wayland (1796-1865), who gave to the American branch of the literature of morals and philosophy an admitted claim to the highest respect and consideration. Dr. Laurens P. Hickok, b. 1798, by his "Rational Psychology," "Logic of Reason," "Empirical Psychology," and "Moral Science," has securely laid the foundation of a truly spiritual philosophy. George Henry Lewes (born 1817) should be mentioned as a contributor to philosophical literature by his "Biographical History of Philosophy," "Aristotle," and "History of Philosophy from Thales to Comte"—works of a philosophical interest and value not always merely historical. Nor should Henry James (born 1811), a subtle and aggressively independent thinker upon the philosophy of religion, and the master of a singularly impressive and suggestive style, be passed over; nor Dr. Mark Hopkins (born 1802), in virtue of his "Lectures on Moral Science" and "Love as Law and the Law of Love;" nor George Ripley (born 1802), the author of "Discourses on the Philosophy of Religion" and "Letters on the Latest Form of Infidelity."

*Theology.*—As every clergyman is supposed to be more or less a man of education and of intellectual ability, and as every settled minister of a parish or congregation is required to prepare at least one sermon in every week, the amount of writing more or less theological in the English language is beyond computation, and increases weekly. Of this a quantity unaccountably large is printed. We can, however, notice here only a very few even of the more distinguished clergymen who have made themselves known in literature in the present century. Robert Hall (1764-1831), a Baptist minister who for eloquence has been compared to Burke, and for fanciful richness of illustration to Jeremy Taylor, is distinguished not only by his sermons, but by his "Christianity Consistent with the Love of Freedom," his "Apology for the Freedom of the Press," and his "Modern Infidelity." John Forster (1770-1843), also a Baptist minister, was not remarkable for pulpit eloquence, but his essays, particularly those on "Decision of Character" and the "Evils of Popular Ignorance," are among the most thoughtful and weighty productions of their class in English literature. Thomas Chalmers (1780-1847) has probably been unapproached in eloquence and the vigor of his personality by any clergyman of the century. He was the most fervid and earnest of pulpit orators. His "Institutes of Theology," "Commercial Discourses," "Evidences of Christianity," and "Astronomical Discourses" are his principal works. Isaac Taylor (1789-1865), a religious essayist of distinguished learning and ability, has discussed in "Ancient Christianity" the doctrine and the discipline of the early Christians, directing himself to the teachings of "Tracts for the Times," a very remarkable and influential series of religious publications with a strong leaning toward Romanism, of which the principal writers were Edward Bouverie Pusey (born 1800), John Henry Newman (born 1801), John Keble (1792-1866), and Richard H. Froude (1803-36), all clergymen of the Church of England and of the extreme High Church school, and all writers of independent theological works which have had a strong but, it begins to appear, not an enduring effect upon the tone of religious thought among the members of that Church. Frederick W. Robertson (1816-53), a preacher whose sermons produced more effect upon the lives of men than those of any other modern minister of which there is literary record, stood at the very ecclesiastical antipode of the Tractarian men. His style was fervent, strong, and direct, his thought independent; he labored for the bettering of the working-classes, and he was suspected of rationalism in religion and socialism in politics. Doubts which must have occurred to many thoughtful readers as to the literal truth of many passages in the historical parts of the Old Testament, particularly in the earlier books, found strange and unreserved expression in a series of volumes by an eminent mathematician and clergyman of the Church of England, John William Colenso (born 1814), bishop of Natal, the first of which was "The Pentateuch and the Book of Joshua Critically Examined." Bishop Colenso had previously written several mathematical works, and he brought to his task habits of close reasoning and a calculating spirit, which led him to test these books by a standard to which Oriental writers, profane or sacred, never thought of conforming. Coming from such a quarter, his books, which he did not regard as at all impairing the divine origin of the Christian religion, produced a profound impression and very serious disturbance in the English Church, by the Convocation of which they were condemned. Theodore Parker (1810-60), at first a Unitarian minister,

was a doubter of a very different character. His faith was in God and in man, but not at all in revealed religion. A man of wide and varied learning, of independent spirit, of a tender and loving nature, the champion of the oppressed, the benefactor of the poor, his preaching the earnest utterance of his own strong personal convictions, he did much to unsettle the belief and to confirm the disbelief of a very large number of the most intelligent and purest minds in New England. Octavius B. Frothingham (born 1822), the ablest of his disciples, has hitherto published little except from the pulpit; but his ability, his earnestness, and the polish of his style, in which he is superior to his master, make him the leader of rationalistic religion in America. Henry Ward Beecher (born 1813), the ablest member of an intellectually gifted family, and a Congregational minister of the broadest and most liberal theological views, is regarded as the greatest pulpit-orator in America—an eminence which the style of his published sermons perhaps hardly warrants. But the stenographer can report the orator's words, but not the orator. Mr. Beecher is the leader of the most independent and liberal school of Christians in the U. S. His writings are voluminous and various. Among them are "Lectures to Young Men," "Star Papers," a series of miscellaneous essays, and "Norwood," a novel.

*Political and Social Science*, properly speaking, are the product of the present century. Among the English works in this field the most important are those of Jeremy Bentham (1749-1832), to whom, next to Adam Smith, belongs the honor of originating the science of political economy. The mere titles of the various works produced by him in his laborious and self-sacrificing life would fill half this page. The spirit of all of them is concentrated in his famous saying, "The greatest good of the greatest number"—good here meaning material comfort and the happiness consequent thereupon. David Ricardo (1772-1823) published works of authority on the principles of political economy, giving his attention chiefly to the subjects of labor and currency. Thomas Robert Malthus (1766-1824), also a political economist, in his "Essay on the Principles of Population as it Affects the Future Welfare of Society" showed that population always rises to the level of possible subsistence. This work, in the words of Brougham, "divides (with Ricardo) claims to a second place after the 'Wealth of Nations.'" The greatest of Bentham's disciples, John Stuart Mill (1806-73), by his "Essays on Unsettled Questions in Political Economy," his "Principles of Political Economy," his essay on "Liberty," his "Considerations on Representative Government," and his "Subjection of Women," has wrought into a systematic working form the principles of the Benthamite school, of which he was, and will probably long be, regarded as the chief apostle. His works are masterpieces of far-reaching thought and subtle reasoning. Of less note, but of high and well-deserved reputation, are the works of Henry Fawcett (born 1833). Francis Lieber (1800-73), born and educated in Germany, but for the greater part of his mature life a citizen of the U. S., is the author of several profound works in this department of literature, of which the most celebrated are his "Manual of Political Ethics," "Legal and Political Hermeneutics," "Essays on Property and Labor," and "Civil Liberty and Self-Government."

The champion of the "protective" system of political economy as opposed to free trade and all unrestrained commercial intercourse, particularly in articles which are or may be of domestic manufacture, is Henry C. Carey (born 1793), whose "Principles of Political Economy" and various other works embody in stringent phraseology all that can be said on this side of the question. Most of Mr. Carey's works have been translated into nearly all the languages of Europe. Herbert Spencer is the most eminent of recent writers in this department. His works cover the ground of psychology, biology, what he calls "sociology"—i. e. the philosophy of society—and morality, which it would be difficult to separate from the latter. In a word, he has attempted to work out a complete system of practical philosophy. His views on education are original and far-reaching. Indeed, he is one of the clearest and coolest thinkers of the age.

Of British writers upon education, one of the most important subdivisions of this department of literature, and which has recently received attention commensurate with its importance, the Rev. Henry Parr Hamilton (born 1794), the variously learned Francis William Newman (born 1805), and the distinguished physiologist Huxley (mentioned again below), must be mentioned. In America two of the most distinguished are Henry Barnard and Frederick A. P. Barnard. The latter's "Letters on College Government" is regarded as "the ablest treatise on the higher education yet published in the U. S." He is also the historian of the U. S. Coast Survey and the author of

an "Analytical Grammar." Besides these, Horace Mann, Francis Wayland, A. D. Bache, and W. T. Harris have written upon this subject with marked and widely recognized ability.

*Jurisprudence* is hardly a part of literature in the common acceptance of that term, even although we do not regard it as the equivalent of the somewhat old-fashioned phrase *belles-lettres*. But the "Commentaries" of Sir William Blackstone (1723-80) upon the laws of England added a lustre and a charm to their dry and technical subject, and perhaps even deserved the conventional term "elegant" which was applied to them. They have certainly much of the interest of history. Appearing soon after the middle of the eighteenth century, they occupied this field with such a weight of authority that there seemed nothing to be done but to accept them and to comment upon them. For we pass over, of course, mere reports and technical treatises, like, for instance, Fearn on "Contingent Remainders" or Chitty on "Pleading," which have no more literary interest or character than demonstrations of mathematical problems or than tables of logarithms. In this department mere mention must be made of Delolme's (1745-1867) work on the British constitution; "The Federalist," a collection of papers by Alexander Hamilton, James Madison, and John Jay, which had a very important influence in bringing about the adoption of the Federal Constitution of the U. S.; Edward Livingston's (1764-1836) "Plan of the Penal Code of Louisiana" and "System of Penal Law" for that State; John Marshall (1755-1835), whose judicial decisions, according to an eminent British critic, "would have done honor to Westminster Hall in the proud season of British law;" James Kent's (1763-1847) "Commentaries on American Law," which for their style, as well as for their matter, are in Europe, as in America, successful rivals of Blackstone's; Joseph Story's (1779-1845) "Commentary on the Constitution of the United States;" Henry Wheaton's (1785-1848) "Elements of International Law," which has become authoritative; Lord John Campbell's (1779-1861) "Lives of the Lord Chancellors" and "Lives of the Chief-Justices of England;" Theodore Dwight Woolsey's (born 1801) "Introduction to the Study of International Law," which has given him, distinguished as a classical scholar, an authoritative position universally recognized upon its subject; George Ticknor Curtis's (born 1812) "Comments on the Jurisprudence of . . . the Courts of the United States;" and "History of the Constitution of the United States;" Walter Bagehot's work on the "English Constitution;" Sir Henry J. S. Maine's (born 1822) "Ancient Law" and "Village Communities;" and perhaps Sir Arthur Helps' wise treatise on "Government" should be added. This list is incomplete, but it is believed to include the principal works of this class which have been produced in this century, and which can be regarded as within the pale of literature.

Here, between our record of the literature of political and social science, of jurisprudence, and of natural science, is the fittest place to mention Henry, Lord Brougham (1779-1868), who wrote upon all these subjects, and who never wrote or spoke without impressing readers or hearers with the weight of his thought and the intelligent earnestness of his manner. The extent of his acquisitions caused him to be called "a man of vast and various misinformation," and on his being made lord chancellor subjected him to the remark by Sugden, that "if the new lord chancellor only knew a little law, he would know a little of everything." But these were the jeers of specialists envious that the man who was great in their department of intellectual effort could also attain distinction in others; a not uncommon manifestation of human weakness. By his varied and voluminous writings Lord Brougham produced a marked and an enduring effect upon his time; and his efforts were always for the diffusion of knowledge, and toward liberty of thought and of action, subject to good morals and well-established law.

*Natural Science*, like jurisprudence, is hardly literature (whence the distinction so constantly drawn, "science and literature"), but it would be difficult to deny a very high literary quality to the works of many of the naturalists who have given to the present century that scientific eminence which is its peculiar glory. Of these the most eminent are Joseph Priestley (1733-1804), who, living into the present century, labored chiefly in the last, a distinguished leader in the modern school of natural science. He wrote upon government, history, and even upon grammar; but the works by which he impressed the world were those in which he brought natural science to the support of materialism; Joseph Black (1728-99), whose discoveries of the properties of fluids and of latent heat led to great results, and whose lectures became celebrated throughout the world; Thomas Young (1773-1829), the reviver and



demonstrator of the truth of the undulatory theory of light, who first deciphered hieroglyphics by the aid of the inscriptions on the Rosetta Stone, whose "Lectures on Natural Philosophy" are even at this day a treasure-house of scientific truth to the investigator, and whom Tyndall has pronounced to be the greatest intellectual power in England since Newton's day; Sir Humphry Davy (1778-1829), the discoverer of the qualities of nitrous oxide and of the metals of the alkalis, the inventor of the miner's safety-lamp, and whose scientific sagacity was adorned with a charming style which makes his "Salmonia" and "Conversations in Travel" classic books; Sir David Brewster (1781-1868), whose works cover an extended field of science, including biographical appreciations of great natural philosophers, but whose most interesting philosophical writings are those which record his investigations and develop his theories upon light; Sir John Frederic William Herschel (1792-1871), the eminent son of an eminent father, whose principal works are his "Treatise on Physical Astronomy" and "Results of Astronomical Observations at the Cape of Good Hope," which map out the whole starry heavens; Sir Charles Lyell (born 1797), first of English geologists, by whom attention was drawn to the ancient changes in the earth and its inhabitants as illustrated by its geological monuments, and whose books of travel in the U. S. are among the few of much value; William Buckland (1784-1856), who brought a profound acquaintance with geology and mineralogy to the support of religion; Sir Charles Bell (1778-1842), who made surgery one of the fine arts, and by his work on "The Hand, its Mechanism and Vital Endowments," revealed marvels and mysteries of design where the unlearned reader would least expect them; Sir Roderick Impey Murchison (1792-1871), who attained the highest geological distinction by the conception and establishment of his Silurian system, by which he brought under scientific light a formation of rock beneath the old red sandstone; this, named Silurian from the place in England where he studied it, he followed into Norway and Sweden, and finally into Russia, his book recording his geological survey of which vast country is one of the most important works of modern science; Michael Faraday (1794-1867), the most eminent of English experimental chemists; Mary Somerville (1780-187-), one of the very few real women of science the world has seen (the womanhood being as true as the science), whose works on the "Mechanism of the Heavens" and the "Connection of the Physical Sciences" have won the highest approval both for their profundity and their clear and simple style; and Hugh Miller (1802-56), a quarryman who from observations made during his daily labor became one of the leading geologists of his day, adding to exact knowledge a beauty of style and a richness of illustration rarely found in scientific books. He took his place among those men of science who seek to support revealed religion and to reconcile the Mosaic cosmogony with the records of nature. His principal works are "The Old Red Sandstone" and "The Testimony of the Rocks." In 1845 appeared an anonymous volume, "Vestiges of the Natural History of Creation," a work which, at first spoken of slightly by scientific men as the fruit of presuming sciolism, proved to be the first utterance of the new school of development. Its style, no less than its startling views, won it worldwide attention, but as to its authorship, it still remains the "Junius" of scientific literature. Charles R. Darwin (born 1809, grandson of Erasmus Darwin, 1731-1802, author of the "Botanic Garden" and "Zoonomia") is the leader of the school of development. He had published several works on natural science, the high value of which was recognized, when his "Origin of Species by means of Natural Selection" renewed the surprise which followed the publication of the "Vestiges of Creation;" and yet, although it prepared the way for, and led naturally to, his last work, "The Descent of Man and Selection in Relation to Sex," that book was received with a mingling of admiration and horror for the author who seemed to prove that "man is descended from a hairy quadruped furnished with a tail and pointed ears, and probably arboreal in its habits." Louis John Rodolph Agassiz (1807-74) is eminent among the natural philosophers of the century by his works upon fishes, living and fossil, but chiefly by his glacial theory of certain geological formations, which he developed in his "Studies of Glaciers." In comparative zoology and comparative physiology his investigations have been of great importance and interest. He did not accept the theory of development. John Tyndall (born in 1823) is also distinguished for his glacial researches, his analysis of the solar ray, his discoveries as to light and heat, and is one of the school of philosophers to which Darwin and Huxley and the author of the "Vestiges" belong. His writings and his lectures have an intrinsic charm besides their scientific value. Thomas Henry Huxley (born 1825) is distinguished

as the author of "Man's Place in Nature," "Lectures on Comparative Anatomy," "Lessons in Elementary Physiology," and other works, all of a "positive" or quasi "positive" character and materialistic tendency. Of American scientific writers, some of the most distinguished are Alexander Dallas Bache (1806-67), whose place in education has already been mentioned, but who was eminent in magnetic and meteorological science, whose many contributions to the proceedings of the American Association for the Advancement of Science are among the most valuable in the repertory of that society, and whose work as superintendent of the U. S. Coast Survey makes the shore of our northern continent his monument; Samuel George Morton (1799-1851), naturalist and ethnologist, author of "Crania Americana" and "Crania Egyptiaca;" George R. Gliddon (1807-57) and J. C. Nott, whose "Types of Mankind" and "Indigenous Races of the Earth," although criticised severely by men of science and theologians, are filled with effective groupings of significant facts illustrated by ingenious suggestions; Asa Gray (born 1816), one of the most eminent botanists of the day, as he has shown in his various works upon the *flora* of North America; Benjamin Silliman (1776-1864), the geologist and mineralogist; John Torrey (born 1798), botanist, chemist, and metallurgist; and Arnold Henry Guyot (born 1807), who brought to his adopted country a profound acquaintance with physical geography, previously set forth to the scientific world in works of recognized value, and now diffused among younger students by his books of elementary instruction. Among naturalists, John James Audubon (1780-1851) must not be forgotten, because of his close observation of the habits of birds and his great series of life-size paintings of the birds of America. Henry Maudsley's writings upon what may be called mental physiology are of the profoundest scientific and psychological interest, and have a singular literary charm. His "Body and Mind" and "Psychological Essays"—in the latter of which is a subtle appreciation of the character of Hamlet—and his "Physiology and Pathology of Mind," are his principal works. The latter of these works, rich with the lore of various ages and climes, not only interpreting what we are not sure that the greatest intellect the world has produced meant to be interpretable, but seeking to penetrate to the very seat and reveal the very mode of thought, was published in 1873. To such a point has the English language and literature advanced from the rude condition and remote period at which we first considered it. RICHARD GRANT WHITE.

**English Pale**, called also the **Irish Pale**, or simply **The Pale**, denotes in history that part of Ireland which was under English law previously to the final and complete subjugation of Ireland. In a general way, the English Pale may be defined as corresponding with the present province of Leinster, besides Cork, Kerry, Waterford, Tipperary, and Limerick. But, in point of fact, the actual Pale was much smaller than this, and, though of extremely variable limits, scarcely ever reached the dimensions indicated above. The counties of Dublin, Meath, Carlow, Kilkenny, and Louth were almost always within the Pale; Wexford and Waterford, though hardly within the Pale, were firmly English; while Wicklow and Kildare, though nominally within the Pale, were Celtic, and to a considerable extent independent. In strict language *the Pale* denotes the "boundary-line," but it is commonly used for the whole region indicated above.

**English River**, an estuary of South-eastern Africa, communicates with Delagoa Bay about lat. 25° 58' S. and lon. 32° 36' E. It receives several broad but unimportant streams (Tembia, Matto, and Dundas rivers), and is surrounded with mangrove flats.

**English River**, in Iowa, is a branch of the Iowa River. It rises by two forks, the North and South, which unite and flow eastward, entering the Iowa River 15 miles S. of Iowa City.—Another English River enters the Red Cedar River in Black Hawk co., Ia.

**English Roscius, The**, a title often bestowed upon David Garrick (1716-79), the eminent actor. The title of "the Young Roscius" in like manner was given to W. H. W. Betty (1791-1874), an English actor who acquired when a child great fame and fortune upon the stage, though his appearances as an actor in adult life were failures. So also Samuel Foote (1722-77) was called the "English Aristophanes;" John Oldham (1653-83) the "English Juvenal;" Dean Swift (1667-1745) the "English Rabelais;" Mary D. Robinson (1758-1800), a beauty, wit, and Della-Cruscan poetess, was called the "English Sappho." She was a mistress of George IV. Richard Cumberland (1732-1811) was called the "English Terence," and the kings Henry VII. and James I. were each called the "English Solomon." But the whole custom originated from affectation and bad taste.

**English Seventh-Day Baptists.** See SEVENTH-DAY BAPTISTS.

**Engrafting, or Grafting** [a word kindred to the Gr. *γράφω*, to "write;" *γραφίον*, a "pencil," referring to the pencil-shape of the scion or graft], the uniting of a shoot (the scion or graft) of one variety of plant (mostly of fruit trees) upon the stock of another variety, or even another species, so that the scion shall live and grow as if a part of the tree upon which it is grafted. Many reports have been published of trees grafted upon species of widely different genera and orders of plants, but it is believed that such reports are not founded in truth. Whether grafting could be practised in the animal kingdom is disputed; but skin-grafting (the transplanting of a small piece of skin to denuded portions of the human body, there to grow and cover the whole naked patch) is an established operation in surgery; and many reports of the successful grafting of spurs, feathers, combs of cocks, etc. have of late frequently been published, mostly from French sources. These experiments are somewhat damaging to our ideas of personal identity, but there seems to be no reason why engrafting should not succeed upon animals as well as upon plants.

The proper time for grafting fruit trees is in the spring, as soon as the season is warm enough to put the sap in motion. This period comes earlier with the cherry and the plum than it does with the apple and the pear. In many places apple-grafting often continues till the last of May in backward seasons. The best time is when April showers are prevalent, but the scions must have been previously cut. They may be cut in autumn, and buried or stored in a dry, cool cellar, with the lower ends in hard or dry soil. For scions, cut the thrifty wood of the last season's growth from bearing limbs, not water-sprouts. Those shoots found near the top or centre of the head of an old tree are preferred by grafters. Never cut scions from sickly trees or branches. Scions from young trees are apt to grow most vigorously, and those from the upright branches should be preferred. Stocks for grafting, if not grown on the spot, should be transplanted to the nursery at least a year previous to being used, as there is not usually vigor enough in a tree to grow a graft the same year it is transplanted.

In selecting stocks for grafting, care should be taken not to insert a free-growing variety upon one which is slow of growth, lest an unsightly over-development take place above the point of union. In some cases, however, as when dwarfs are desired, the stock to be grafted upon is to be of much smaller growth. Thus, the pear is dwarfed when set on the quince; the cherry on the mahaleb; the apple on the thorn. There are many styles of grafting, but in all the principle is to place the alburnum or sapwood and the cambium (or new wood) of the scion against that of the stock. The hard wood of scion and stock never unites. There is no question but that some stocks decidedly affect, for better or for worse, the quality of the fruit grown upon the graft, but in most cases the effect is not strongly marked.

Among the more important kinds of engrafting we may mention: (1) *cleft-grafting*, very commonly employed where the stock is much larger than the scion. Here the stock is sawn across, its end split once or more, and one, two, or more scions, the lower end flattened into a wedge, are inserted in the cleft. (2) *Crown-grafting* is cleft-grafting when more than one cleft is made; or in other cases it is the insertion of a scion, the lower end of which is cut very thin, into a space between the wood and bark of a large stock, which is cut off, as in cleft-grafting. This method is highly approved. (3) *Splice or whip grafting* is done with a stock of the same size as the scion. They are simply spliced together, tied and waxed, as hereafter shown. (4) *Saddle-grafting* is accomplished by shaping the upper end of the stock into a wedge and cutting a corresponding notch in the scion. (5) *Tongue-grafting* is the reverse of this, the scion forming the wedge. (6) *Peg-grafting*, rarely used, is like tongue-grafting, except that a hole is bored in the end of the stock, and the scion, neatly sharpened into a peg, is fitted exactly to the stock. (7) *Shoulder-grafting* is done by cutting shoulders in both stock and scion, which are otherwise fitted as in splice-grafting. (8) *Budding* is a kind of grafting in which the bud of one kind of tree is inserted under the bark of another. (9) *Flute-grafting* differs from budding in that a ring of bark is taken off with the bud and inserted upon the stock in the place of a piece of bark of corresponding size which has been taken off. (10) *Inarching, or arcaution*, takes place when the scion is not detached from the parent stem until after union has taken place between stock and scion. (11) *Side-grafting* is the insertion of a scion into the side of the stock without cutting the stock off.

In all varieties of grafting, except cleft and crown-grafting, it is necessary to tie the scion to its place. Strips of bass matting or of waxed muslin are generally used. In all cases it is necessary to exclude the air from the cut, either by means of grafting-wax (a mixture of resin and beeswax, softened with tallow) or of clay mixed with horse-dung, a compound now seldom employed.

Grafting succeeds best when the scions have been kept for some time and become partly dried. The scion should be cut before the buds begin to swell. Grafting is done in the spring, but budding may be performed in autumn also.

**Engrailed**, in heraldry, a line or other object edged with small semicircles or crescents, the points of which are turned outward, is said to be *engrailed*. The semicircular marks or dots around the edge of a coin are called engrailments. The term doubtless comes from the French *grêle*, "hail."

**Engratia**, SAINT, lived at Saragossa in Spain in 304. She was persecuted as a Christian under the emperors Diocletian and Maximianus Hercules; and, according to the poet Prudentius, she underwent the most fearful tortures, but notwithstanding the dreadful mutilations which she received, she survived to a great age, and died in the odor of sanctity. Her relics are preserved at Saragossa. She is honored by the Roman Catholic Church on April 16.

**Engraving.** Engraving on precious stones, glass, or metals, in such a manner as to represent the figures or objects in relief, is a very ancient art, and, strictly speaking, a branch of sculpture.

We shall in this article confine ourselves wholly to the engraving, on metal or wood, of figures or designs, in such a way that when charged with any coloring-matter and pressed upon paper or parchment, an exact representation, in outline and shadow, of the engraved figures or designs will be produced. The impressions thus made are called engravings. This term is also applied in popular language to stone-printing or lithography, but as ordinarily there are no incisions made upon the face of the stone, and the processes differ widely from engraving proper, we prefer to treat of this branch of art under its appropriate title.

Engraving, in this restricted sense, is a modern invention, and grew into use and importance with the art of printing, of which, in fact, it forms a constituent part. Whether we consider the difficulty attending its execution, its value in multiplying the essentials of other departments of art, its use in illustrating science and industrial processes, engraving takes an elevated position, both from an æsthetic and a practical point of view.

In giving some account of the technical processes of various kinds of engraving we shall not hold in mind the necessities of the professional engraver seeking aid for perfecting himself in the art, but rather those of the general reader or connoisseur, who seeks the elementary knowledge requisite for an intelligent estimate of the best products of the engraver's skill. It has been well said by Adam Bartsch that it is impossible to convey in writing any but the most general instructions regarding the technical processes of the art. We shall, therefore, in the outline which we propose to give, exclude all details of handling not pertinent to the end we have in view.\*

1. *Wood Engraving*.—This is the most ancient branch of the art, and for the purposes of illustration has been held to be of the greatest value from the time of its introduction. Boxwood is most generally used by engravers, although any hard and close-grained wood may be made available. It is first sawed across the fibre, in thickness equal to the length of ordinary metal types. The surface of the wood is then made smooth and covered with flake-white. Upon this is drawn in fine lines with pen or lead-pencil the design required. In many instances now the expense of drawing is entirely superseded by photographing, directly upon the block, the subject to be engraved; and there is still another process in use whereby the subject is copied by transferring an impression with ink upon the block, which also avoids the expense of drawing and greatly facilitates the work of the engraver. The white or untouched parts between the lines of the drawing are then cut out by means of variously formed chisels and gouges. This process leaves the outlines and shadows elevated, like the faces of type in a printer's form. When the blocks are inked by an ordinary roller, impressions may be taken off upon paper by means of a press. In point of fact, however, the wooden blocks are now scarcely ever used for printing. When the engraver's work upon the wood has been completed, a

\* *Publishers' Note.*—For a more practical view of some of the details of engraving, see the article ENGRAVING STEEL AND COPPER PLATES, ETC., written by a practical steel engraver of New York City. Though the two articles to some extent cover the same ground, their great excellence will, it is believed, warrant the publication of both.

mould of wax is taken from the block, and within this mould a thin plate of copper is deposited by electro-galvanic action. Upon the back of this copper a casting of type-metal is fixed, which by means of tin-foil is amalgamated with the copper, forming a solid plate of sufficient strength to be securely fastened upon a wooden block of the proper thickness for the printer's form. By this means also, a much larger number of clear impressions can be secured than from the block itself. In wood engraving effects are generally produced by parallel lines. In finer work, however, cross-hatching (or the use of lines transversely intersecting each other) is introduced, by which artists approach the delicate transitions and effects of line engraving on steel or copper.

2. *Etching*.—For this process a plate of metal, generally copper, is prepared with a perfectly even and smooth surface. It is then thinly covered with a varnish composed of various proportions of white wax, black and white pitch, and asphaltum. This varnish, technically called the "ground," is spread in a thin coating over the prepared plate, and afterwards smoked to give a black surface, the better to show the drawing of the artist's design. The drawing is made in reverse upon the varnished plate, generally by transfer of a drawing made upon paper with colored chalk. When the outlines are clearly marked upon the blackened surface, they are cut through the varnish by the etching-needle, laying bare the surface of the copper or metal used. The etching-needle is a steel instrument similar to a sharpened lead-pencil, and points of different degrees of fineness are used as a finer or heavier line is desired. When the outlines and shadows of the object to be etched are thus cut through the "ground," a rim, or dike, of wax is made around the border of the plate, and some corroding mixture (generally nitric acid mixed with an equal quantity of water) is poured upon the plate. By the action of the acid the lines laid bare with the etching-needle are bitten into the plate, each with a breadth corresponding to the surface laid bare by the needle. If it is desired that the lines shall be of unequal depth, the acid is poured off, and the lines whose depth is deemed sufficient are in technical language "stopped out" by being washed with water, dried, and covered with varnish, while upon the remaining parts the process of corrosion is continued till the unprotected lines are as deep as the etcher may desire. The ground or varnish is then removed from the plate, the oxidized portions are cleansed, and a proof is taken. If the work is in any part unsuccessful, it may be touched up and rendered more expressive by the "dry-point." This is a fine and sharply-pointed steel instrument, by which scratches or shallow grooves of great delicacy are made on the smooth portion of the plate. Some etchers use the dry-point very little, if at all. Others rely upon it for their finest effects.

3. *Line Engraving*.—This is the most elaborate and costly process for the reproduction of works of art. The metal plates, whether of copper or softened steel, are prepared as for etching, but with a more careful polish. The work of art to be engraved is drawn from the original in the reduced size required for the engraving. The plate is generally covered with a thin coating of wax. The pencil drawing is then laid with its face upon the wax, and gently rubbed by a burnisher. This, as in the preparation for etching, transfers the outline to the wax. The design is then traced through the wax upon the metal with an etching-needle. The wax, when melted off, leaves the outline marked on the plate, ready for the burin. The burin or graver is a square, or lozenge-shaped, piece of steel inserted in a pear-shaped handle, the instrument itself being sufficiently thick not to bend under strong pressure of the hand. The end is diagonally ground, so that one side of the instrument presents an acute angle, which, when pushed forward by the hand, cuts out triangular grooves in the metal. The burnisher, above alluded to, is a piece of hardened steel, smooth and rounded for the purpose of toning down work too deeply cut, or for polishing the plate in case of accident to the surface. The "scraper," also used, is a triangular piece of steel, otherwise shaped like a knife, with its angles brought to a sharp edge, and inserted in a handle. This is used to scrape off the furrow of metal which is raised on the plate by the action of the graver. This raised furrow is called the "burr." Thus equipped, the engraver cuts grooves into the plate which, when filled with ink, come to represent by their curves, crossings, and varying depth and breadth all the outlines, shadows, and transitions of the picture from which he works. Of the combination of other modes of engraving with lines we shall speak hereafter.

4. *Mezzotint*.—This process was invented at a later period than either of those which we have described. It has been attributed to Prince Rupert by some, but on the authority of Heineken to a German military officer named Von Siegen. The plate should be prepared as for the graver. By

the means of a rocker used by the hand, or a machine covered with fine teeth, the whole surface of the plate is covered with a compact series of minute incisions—so compact that if filled with ink the plate would give a printed surface on paper quite black. Upon this surface, thus covered with "burr," the outlines of the picture are drawn, and where lights are desired the burr is removed by the scraper and made smooth by the burnisher. The transitions from the high lights to the deep shadows are delicately marked by the continuously increasing amount of the "burr" which is left on the plate.

5. *Stippling*.—This consists in puncturing the metal plate by dots made with the point of the graver or by corrosion with acid. Sometimes these dots are made by slight blows upon the graver. The greater or less number of these dots gives in printing all varieties of shading. This was a favorite method with Bartolozzi and his school.

6. *Aquatint*.—This method of engraving, now little used, is designed to imitate drawings in India ink, bistre, or sepia, especially those which are on a large scale. The method generally followed is this: The outline of the objects is first etched in the usual manner. The plate, when cleaned, is evenly covered with finely powdered mastic. It is then warmed till the mastic particles are melted sufficiently to cause them to adhere to the plate. Between the particles of the mastic bare spots are left, upon which the acid can afterwards act. Upon those parts of the plate where shadows are not required a thick varnish is laid on with a brush, to protect it. The acid is then poured on as in etching. When the lightest shadows are sufficiently bitten by the acid, those parts are stopped out by varnish, and the work is permitted to go on until the deepest shadows are finished. For landscapes or trees, where special freedom is required, modifications of this process are made which are not sufficiently important for description.

7. *Graphotype*.—This is a modern invention, a description of which we copy from a recent writer: "Finely powdered chalk is spread thickly on a metal plate, and then subjected to hydraulic pressure till it becomes a solid mass with a beautiful white surface, slightly shining, but not inconveniently brilliant. On this surface the artist draws in a glutinous ink, perfectly black, flowing from a finely pointed little brush; the pen cannot be used, on account of the friability of the chalk. The ink glues the particles of chalk where it passes, and when the drawing is complete the white spaces between the lines are easily hollowed by rubbing them gently with a piece of velvet or a light brush. The black lines remain in relief, like the lines of a wood-out. The plate is then dipped in a solution of flint, and so hardened, after which a stereotype cast or an electrototype copy is taken from it, and this is used as a stereotype or electrototype." The effect produced is somewhat similar to that of wood engraving.

8. *Combination of Processes*.—For the sake of clearness we have described the different modes of engraving as distinct processes, but they are quite often combined. In etching, the dry-point is constantly made use of, and not seldom the graver. In line engravings the outlines are often etched, while the most important and expressive parts are worked out with the graver. Stippling is made use of at times to give softness to the expression of the face. In etching, parts of the plate are sometimes made to give delicate shadows and transitions by the "burr" used in mezzotint. In line engraving, short lines or dots are inserted in the lozenge-shaped intervals between the cross hatchings made by the graver.

9. *Handling*.—Every engraver of note adopts some methods of producing his desired effects peculiar to himself. This is technically called "handling." Many of the elements which enter into handling are common to the painter and the engraver. Both alike must attend to drawing, anatomy, and perspective, both linear and aerial; to chiaroscuro, or the general distribution of lights and shadows in a picture, and the various gradations of depth and delicacy of the latter as they recede from the focus of light. They must both alike seek for truth and force in the representation of the outline surface and texture of bodies; they must alike take account of the variations which distance, quality of the light, and atmosphere produce in objects by their manifold changes. In addition to these, the engraver (if he does not engrave his own design) must be a translator of another's thought into a different language. This he can never accomplish without the greatest familiarity with his own language, as well as that of the painter. Literal interpretation will fail as really as in the case of translating a great poem. The chief study of the engraver is so to arrange his lines as to mark the character of each object and feature, distinguish it from every other, and give it the proper prominence and importance with regard to the total scene or event which the picture is designed to represent. The color of the picture, it is true, cannot be, strictly speak-

ing, translated, but it is possible to convey an accurate idea of the relations of the lights and shadows which the different colors embody. Painters select colors with reference to their desire to make special objects prominent, and to attract and fix upon them the eye of the spectator. Now, the engraver, if he cannot imitate the color, can produce by his lines such an effect as shall imitate the *emphasis* which the painter expresses by actual color. From this point of view critics speak of "color" in an engraving. The methods in which different artists express color, flesh, hair, drapery, etc. would extend this article beyond the limits we have set to ourselves. These are best studied by the learner in the works of eminent engravers through a comparison of their methods with each other.

10. *Printing*.—Much of the effect of all engravings is dependent upon printing. In wood engraving, by reason of the lines being raised in relief like types, the difficulty of printing is less than in other branches of the art. It requires, however, to make good impressions, all the accessories for the best work of the printer's art. Clearness, delicacy, and softness in wood-cuts are greatly dependent upon the skill and judgment of the printer. In those departments of the art in which the ink or coloring-matter is received into grooves or dots sunk beneath the surface, the process of printing is much slower and more difficult. The ink is forced carefully into the depressions with a soft ball or dabber, and afterwards the portions of the plate between the grooves, and also the lightly worked parts which represent the lights, are carefully cleaned with a soft cloth and the palm of the hand before it is ready for the press. This process is a slow one, and requires special training on the part of workmen. The printing of etchings is so important that many etchers provide themselves with hand-presses, and work off their own proofs. Hamerton, in his "Etching and Etchers," names specially one house in Paris and one in London which alone he speaks of as capable of good work in printing etchings. A copper plate soon wears so much as to give blurred and imperfect impressions. Two hundred impressions of an etching and five hundred of a line engraving are said to be the limit which a copper plate can furnish without an appreciable deterioration of quality. Since the art of coating the copper plates with a thin layer of steel has been introduced, a much larger number can be produced. Since the time of our countryman, Jacob Perkins, who introduced the use of steel plates, copper has been to a great extent laid aside, so far as line and mezzotint engraving is concerned. Steel has been made especially useful in engraving banknotes, in which especial complications and delicacy of lines are desirable in order to increase the difficulty of counterfeiting. Engraved steel plates, when hardened, are capable of giving to steel cylinders rolled over them, under enormous pressure, a representation in relief of the sunken lines of the plate. These cylinders, when hardened, are made to transfer the lines to other plates of softened metal, which in turn are hardened and used for printing. These plates, when worn, are retouched by reapplication of the same cylinders. In this way plates may be duplicated, or the same plate be made to give an almost unlimited number of impressions.

At an early period the practice of using two or more blocks in wood engraving was introduced. The outline was made by one block, and the different degrees of shading by others. This was called engraving in *chiaroscuro*. This led to printing in gradations of color by means of several blocks, each giving a single color or shade. This has been carried to a high degree of perfection. A similar process has been introduced in lithography. By this means chromo-lithographs, as they are called, have been printed which imitate the colors of small pictures with an accuracy which, though necessarily somewhat mechanical, is really surprising. In all methods which lay on colors by successively applied stones or blocks the matter of printing becomes of chief importance.

11. *Painter-Engravers*.—This is the designation given by Bartsch to those artists who have engraved their own designs, either as studies for paintings or with a purpose of giving them no further representation in color. These works are not translations or copies, as are ordinary engravings, but real autographs—direct expressions of the artist's mind. In the modern tendency to specialize and divide labor, artists have to a great extent laid aside this practice, but with the older artists it was very common. Collectors place a high value upon these autographs. They are becoming rare, and are of course much advanced in commercial value. Bartsch's great work ("Peintre-Graveur," in 21 vols.) is devoted entirely to engravings and etchings of this class.

12. *Relative Artistic Value*.—The relative importance, for art purposes, of the different modes of engraving is difficult to determine. Each has its own advantages and limitations. New processes like the graphotype have not yet

been sufficiently tested to determine their permanent value. Wood engraving has a very decided advantage over the other forms of the art in respect to cheapness and facility of execution and printing. These circumstances adapt it to the purpose of illustrating books, magazines, and newspapers, and also render it liable to degradation through haste and carelessness in execution. In the hands of good artists, however, it is capable of high excellence. The best wood engraving has a softness and grace which are attractive to all. But in all the elements of truthfulness and force the distinct, sharp lines of the etching-needle and dry-point are vastly superior. In etching, the artist must secure his effects by clear outlines, each of which must tell its own distinct story. The softness and amenity of wood engraving are denied to the etcher, but he may accomplish results which are vastly superior in all the higher elements of expression. For this very reason etching is never popular with persons untaught in the grammar of art. It generally fails in rendering the delicate gradations of shadow in clouds, and rarely succeeds in perfect modelling of flesh. But in "freedom, precision, and power" it is superior to all methods of engraving. For this reason, high success in etching requires special capacity, which stands somewhat apart from the art-faculty in general.

Mezzotint, like wood engraving, is popular from its softness and the perfect gradations of tint which it secures. The process is also cheaper than that of line engraving, and the facility with which it can represent strong contrasts in lights and darks and the faces of the young and fair make it a process next in popularity to wood engraving. In the hands of masters like Earlom, McArdell, and Bond it has given us works of great beauty and power. Line engraving, if not the most difficult, is the most laborious method of engraving, and for this reason, as well as for its inherent capacity for force and variety of effect, stands in the first rank among methods of engraving. It is likely, by the time which it consumes and the great manual dexterity which it requires, to become mechanical, and deficient in the breadth, freedom, and boldness of etching. But when, under the hand of a real artist, it combines these elements with perfect moulding of flesh, delicacy of tone, and gradation of shadows, it stands unrivalled among its sister branches of the art. The strength of Goltzius and Cornelius Visscher, the bold relief and brilliant contrasts of Strange and Edelinck, the aerial grace and spiritual expression of Raphael Morghen and Tosehi, are sufficient to vindicate the claim of line engraving to the position which the common judgment has assigned it.

*History of Engraving*.—The origin of this invention is obscure. It is, however, well settled that playing cards were printed from wood blocks in the beginning of the fourteenth century, and this is ordinarily supposed to be the origin of the invention. Papillon, a French wood engraver, and author of a treatise on wood engraving in two volumes (Paris, 1766), professed, however, to have seen a volume of wood-cuts engraved at Ravenna by Alexander Alberici Cunio and his twin-sister Isabella, during the papacy of Honorius IV., A. D. 1285-87. The practice of printing cards from wood blocks continued in various parts of Europe through the fourteenth and fifteenth centuries. In the early part of the fifteenth century images of saints and other religious pictures were produced. A picture of St. Christopher, dated 1423, was until recently regarded as the earliest known wood-cut with a date, but within a few years past it has been claimed that earlier dated specimens have been discovered. At this same period, within the first half of the fifteenth century, began to appear in Holland and Germany those works now known as block-books (see *TYPOGRAPHY*), which were printed from engraved wood blocks. Immediately on the invention of printing with movable type, ornamental letters were cut on wood and used to beautify the printed pages. The Psalter of Gutenberg (1457) was thus ornamented. The idea seems to have been to imitate manuscript of the period, and in 1475 a Durandus was published by Zainer, at Ulm, with an ornamental vignette border to the first page, after which such borders engraved on wood were frequently used. The first book with wood-cut illustrations was a book of fables, printed at Bamberg by Pfister in 1461. Numerous books of the fifteenth century were illustrated with wood-cuts, and the art was extensively practised. We do not know the names of any wood engravers of the earliest period, but towards the close of the century we begin to meet with names. Michael Wohlgemuth is among the first, if he be not the first, wood engraver whose name can be connected with his work. To him are attributed the illustrations of the great "Chronicle" of Schedel, commonly called the "Nuremberg Chronicle," published at Nuremberg in 1493; and he is named in the work as one of the superintendents of its execution.

The early style of wood engraving was rude, but not

without artistic force. In general, however, little was attempted by the early engravers beyond outline representation. Shading and what is sometimes called "color" were unknown at the first. The earliest specimen of shading by cross lines, commonly called cross-hatching, is found in a wood-cut on the title-page of Breydenbach (Mentz, 1486).

Wohlgemuth dealt freely in heavy shading, and other work of his time shows the advance of the art in Germany. It was not, however, until the influence of Albert Dürer began to be felt that the old conventional styles were abandoned. Dürer was a pupil of Wohlgemuth. In 1498 he published his "Apocalypsis." It was the beginning of a new era in the art. Dürer applied to the work of drawing on wood, in so far as they were applicable, the same principles which governed oil painting. The result was that a wood engraving became a history or a poem. Germany at first, and afterward all Europe, felt the new inspiration. Artists appeared in all directions, and the most eminent painters did not disdain to draw on wood. During the sixteenth century a very large proportion of published books were illustrated with wood-cuts. Even statutes and books of instruction in the practice of law were illustrated. Contemporary with Dürer were such artists as Hans Burgmair, Hans Schaufelin, Urse Graff, Wechtlin, Holbein, Lucas Cranach, and many others in Germany. In regard to Hans Holbein's engravings much uncertainty exists. Some inferior work is signed with his name or initials, and pretty much all the good work of the period is attributed to him by his admirers.

Considerable discussion has been wasted on the question whether any, and if any which, of the artists actually cut wood blocks with the graver. The subject is of slight importance. They drew pictures on the wood to be engraved there, and probably directed the workmen if they did not handle the tools. They are as properly called wood engravers as Canova and Thorwaldsen are called sculptors. Lucas Cranach appears to have been the inventor of the application of wood engraving to printing in chiaroscuro, which consisted in the engraving of two or more blocks to be used in impressing different colors on the same print. An engraving of this kind by Cranach is extant, bearing date 1509. Ugo da Carpi in Italy, about 1518, adopted the suggestion of Cranach, or invented the plan anew, and the art reached great perfection in Italy, though almost abandoned in Germany.

In France the art of wood engraving was seized with alacrity in the latter part of the fifteenth century, and applied with great skill to the ornamentation of the borders of pages. The superb books of devotion which issued from the Parisian presses at this period are unrivalled elsewhere. It is impossible, however, to name with any certainty a French engraver on wood until the period of the fine issues of the presses at Lyons, after 1520, when Bernard Solomon, commonly called "Little Bernard," executed very beautiful illustrations of the Bible, Ovid, etc.

The early history of the art in Italy is also obscure. Some Italian publications of the fifteenth century seem to have been illustrated by German workmen or from their designs. Others, however, are unmistakably Italian, the vast superiority of drawing, especially of the human form, being at once visible.

At the close of the fifteenth and beginning of the sixteenth century there seems to have been in the north of Italy, possibly at Venice, an artist on wood who was employed by the book publishers in that city, in Milan, and elsewhere, and who was evidently the father of the art in Italy. Numerous cuts by him are found with the signature *J. A.*, and the name Joan Andrea has been given to him. His name is, however, doubtful. The "Poliphilus" published by Aldus (1499) was doubtless illustrated by him, and is the masterpiece of wood-cut illustration in Italy for the fifteenth century.

The art flourished in Europe till the close of the sixteenth century, when its decadence was manifest, and in the seventeenth century it passed almost entirely out of use, except in rude and worthless styles, of which examples are seen in old chap-books and cheap works for the common people. Metal engraving had usurped its place in the illustration of books. The revival of the art is to be attributed to Thomas Bewick, an English wood engraver (born 1753), whose "British Birds" (1804), drawn and engraved by himself, present manifold instances of rare truthfulness and beauty. His work, at first rude, improved rapidly, and at length took high rank in the art. He was followed by his own pupils and by a succession of others, but it is only since 1830 that the art began to assume the high character which it now possesses. At present few of the eminent artists who draw on wood engrave their own designs. It is consequently difficult to determine the relative contributions to the total excellence of the brilliant

wood engraving of the present day which have been made respectively by the draughtsman and the engraver. The importance of division of labor is so well understood that the draughtsman and engraver are seldom the same person. Some of the best painters draw on blocks for engravers, whose work is to give an adequate representation of the design. Birket Foster, Harrison Weir, John Tenniel, Gilbert Maclise, Stanfield, Leech, Doyle, Creswick, either painters or professional draughtsmen on wood, have been interpreted by Evans, Vizitelly, Greenaway, Palmer, Wright, Dalziel, Folkard, Thomas, Swan, and Williams. (A long list of designers and engravers on wood will be found at the end of the eighth chapter of JACKSON and CHATTO's "History of Wood Engraving.")

The origin of the art of metal engraving has been disputed. Germany claims that the oldest dated specimens are by German artists. Italy claims the invention for Finiguerra, and the claim of Italy is now generally acquiesced in. Maso Finiguerra was a Florentine goldsmith, and according to Vasari, about A. D. 1460, having engraved a metal plate to receive enamel for ornamental use, poured on it some melted sulphur to take a cast, when he observed that the dirt in the incisions had adhered to the sulphur, making a picture in black. He thereupon rubbed ink into the lines of the engraving, and took an impression with wet paper. Since Vasari's time it has been well established that Finiguerra took impressions as early as 1450, and possibly 1445. Baccio Baldini, another Florentine goldsmith, seems to have learned the art from Finiguerra, and executed some plates, among which were nineteen which appeared in an edition of Dante published at Florence in 1481. The first book illustrated with copper plates was "Il Monte Sancto di Dio," published at Florence in 1477, containing three large plates, which are probably by Baldini. The art advanced rapidly to its highest state in Italy. In the commencement of the sixteenth century there were numerous copperplate engravers of great eminence in Italy, at the head of whom stood Marc Antonio Raimondi, whose works mark an important era in Italian engraving, and good impressions of whose prints are now valued at fabulous prices. He obtained the friendship of Raphael, and engraved under the painter's own eye very many of his works. His handling is peculiar, and though his engravings are deficient in "color" and effective distribution of light and shadow, he still holds a position among the very ablest engravers of any time. His scholars, who worked with him while living, Marco di Ravenna and Agostino of Venice, succeeded him and perpetuated his style. Giorgio Ghisi, born in 1524 at Mantua, and Bonasont of Bologna (1498-1570) were engravers of distinction, and also painters. Cornelius Cort, a Dutch engraver (born 1536, died 1578), removed to Italy, where he was brought under the influence of Titian, and introduced a better representation of chiaroscuro and a breadth of manner not before attained. Agostino Caracci (born 1558 at Bologna, died 1602) was a pupil of Cort, and engraved a large number of plates, attaining high reputation, especially for his drawing. Martin Rota, a Dalmatian, whose prints range from 1558 to 1586, was an imitator of the school of Cort. Agostino Caracci, already named, Spagnaletto Guercino, Carlo Maratti, Guido Reni, Salvator Rosa, Claude Lorrain, Canaletti, and Piranesi were also known as painter-engravers, and maintained the reputation of this branch of Italian art. In later years, Volpato, Raphael Morghen, Toschi, and Longhi have produced works representing the great masters of Italy, which take a higher rank relatively than contemporary Italian painting.

Copperplate engraving seems to have been practised in Germany in the middle of the fifteenth century, and German work of the latter part of that century is superior to the Italian. Prints are extant with signatures of unknown artists which antedate those of artists who are known. Martin Schoen (or Schoengauer) of Colmar is regarded as the father of the art in Germany. The dates of his birth and death are in dispute, but his work was in the last quarter of the fifteenth century. He executed a large number of prints which are extant, and of which good impressions are highly prized. He was contemporary with many other copperplate engravers, and seems to have lived until the time of Dürer. The art reached high excellence in Germany in the time of Dürer (who died 1528). Marc Antonio in Italy confessed his indebtedness to Germany by reproducing in facsimile a considerable number of the works of Dürer. Dürer was also, if not the inventor, one of the earliest practitioners, of the process of etching. The principal German engravers after Dürer are his pupil Aldegraver, the two Behams, Altdorfer, Bink, Penz, etc. But the German school proper soon became absorbed in that of Italy, losing its peculiar characteristics. Since the beginning of the nineteenth century, engraving, like all branches of literature and art, has made steady progress in Germany.



Among the large number of distinguished men a few only can be named. C. F. Müller, though he died at thirty-three, is reckoned among the ablest engravers of all time. His "Madonna di San Sisto" is unrivalled. Steinla has a very high repute. The revival of the old religious style of art by Cornelius, Overbeck, and Kaulbach has had its effect upon engraving, and produced a peculiar style of handling, marked by the simplicity, purity, and religious feeling of the great painters just named. Amsler, the Felsing, Merz, and Mandel, though some of them may be charged with mannerism, are artists of great truthfulness and power.

France did not accept copperplate engraving at an early period, and hence contributed little to the early history of the art. The earliest engravings on metal which take rank in history are a collection due to artists employed in the decoration of the palace of Fontainebleau, about the middle of the sixteenth century. A large number of these are described by Bartsch under the name of the school of Fontainebleau. Most of them are anonymous, though they are thought to be the work of the painters themselves. The real history of the French school, as it is ordinarily understood, begins with the administration of Colbert, under Louis XIV. Among those we may name the Audran family, of whom Gerard is by far the ablest. He is said to be the first who united line engraving and etching in the same plate. Gerard Edelineck, though born at Antwerp, is placed in the French school. His facility and skill in execution were remarkable, and he carried "color" in engraving to a perfection never before reached. Nanteuil, the three Drevets, Callot (remarkable as an etcher), Leclerc, Chereau, Beauvarlet, Dupuis, not to name others, produced works in large numbers which are marked with great excellence and power. Wille, though a German by birth, belongs to this school, and is especially noted for his skill in imitating particular objects and articles of dress. It must be admitted that this school allowed their mechanical dexterity to lead them away from the higher ends of artistic expression. French engravers of the present day devote themselves in a great degree to the reproduction of modern paintings. Among these are Desnoyers, who died in 1857, Prevost, Forster, Richehomme, Lignon, Gerard, Prudhomme, C. R. J. François, and Girardet. There is now a society of etchers in Paris, which has published a series of yearly volumes which contain many etchings of great spirit and beauty. Lalanne, Calame, Meryon, Jacquemont, and Hillemecher stand out among other names as etchers of high reputation.

Holland and Belgium have been prolific in engravers. The earliest of note is Lucas von Leyden. He was a contemporary of Albert Dürer, born in 1494. The Sadeler family and Abraham Bloemart carried forward the art, while Goltzius, Lucas Kilian, and Saerendamm maintained the reputation early acquired by their masters. A class of engravers gathered around Rubens who profited by his suggestions. Among these are the Bolswerts, Vosterman, Paul Pontius, and Peter de Jode the younger. As painter-engravers we may name the incomparable Rembrandt, Ostade, Waterloo, Swanenelt, Paul Potter, Berghem, Karel du Jardin, Everdingen, and De Hooghe. These produced their effects mainly by etching, and as they engraved their own designs, their works have a constant artistic value as the autograph expressions of men of genius.

England seems to have had no great artists in wood or metal until a late period. It is probable that some rude wood-cuts were executed there in the fifteenth century, but the best illustrated books then published were illustrated by cuts imported from the Continent until the seventeenth century. The art of mezzotint engraving, in which English artists have greatly excelled, was introduced into England at the time of the Restoration. Hollar, a Bohemian by birth, was among the first English engravers of European reputation. William Faithorne first made mezzotint engraving popular in England. George Vertue, Vivares, and John Brown maintained the reputation of the art till the time of Strange. Strange was born in the Orkneys in 1721, and died in 1792. He was the father of line engraving in England. In this branch he reached at a bound the very highest point of excellence. Good impressions of his works are now sought for at high prices by all intelligent collectors. Woollett (born in 1735) is another engraver of high rank, especially in landscape. Sharpe has a high reputation in portrait engraving. McArdell, Green, and Earlom carried mezzotint engraving to high perfection. Etching has of late been revived in England, and the attention of the public has been attracted to it by the brilliant work of P. G. Hamerton, already mentioned. Turner exercised his genius in etching. Ruskin, his eulogist, has etched many of the illustrations of his works. Whistler, an American by birth, has achieved a high reputation in this branch of art. Haden, an amateur artist, has been given a very high position by Hamerton. Hamerton

himself, in the pages of the "Portfolio," has given many pleasing illustrations of his devotion to this department of engraving, while his writings are likely to add greatly to its popularity among connoisseurs. Cruikshank and Doyle have been known as etchers, but have made the art subservient to caricature.

Engraving in Spain did not flourish until about the middle of the eighteenth century. A considerable number of Spanish engravers are given by historians of the art, but their works are not widely known beyond their own country. Carmona (born in Madrid in 1740) and his pupil, Selma, are names of special distinction.

Unless it be in the department of banknote engraving, Americans have not developed anything which may be called a school of the art. In the department named they are unrivalled, and have shown mechanical and artistic skill which, with proper patronage from the public, would command success in any sphere of the art. Wood engraving has taken relatively a higher rank than the other processes. But it is difficult without doing injustice to make critical estimates of artists of merit who may not have reached their highest degree of excellence, and we forbear to make selections.

The place of engraving in the general study of art is important. It interprets all the fundamental ideas of painting with the exception of color. This, within certain limits, it can suggest, if it cannot imitate: Printing in colors, even if the imitation be mechanical, tends to develop a taste for better things. Autograph engravings, or etchings from artists of distinction, enable the art-student or amateur to study in his own lines the artist's chosen expressions for his thought. In a country like ours, in which access to large collections of paintings is not possible, engraving furnishes the readiest, cheapest, and most practicable means of studying the history and growth of the arts of design in all departments. Architecture, sculpture, and pottery are alike dependent upon engraving for making their results intimately known to the great majority of those interested in their study. Relatively to art in general it sustains the same relation as does printing to literature. It makes the best ideas of the few available for the elevation of the many. As a means of popular education in art, engravings stand unrivalled. No lover of elegant culture can fail to rejoice that so many large and valuable collections of engravings are in the process of formation in all parts of our country.

The literature of the subject is extensive. The collector will find catalogues of the works of the most eminent engravers published as separate volumes, and often many catalogues of the same engraver by various editors. He will find general catalogues of all the important engravers, as "Le Peintre-Graveur" of Bartsch and the "Kunstler-Lexicon" of Nagler. (We append the titles of various authorities which are of most importance to the student of the art: DUPLESSIS, GEORGES, "Essai de Bibliographie contenant l'indication des ouvrages relatifs à l'histoire de la gravure et des graveurs," Paris, 1862; ORTLEY, "Inquiry into the Origin and Early History of Engraving," 2 vols., London, 1816; PALGRAVE, F. T., "Essay on the First Century of Italian Engraving" (in Kugler's "Hand-book of Painting," vol. ii.); J. D. PASSAVANT, "Le Peintre-graveur," 6 tom., Leipsic, 1860-66; BARTSCH, "Anleitung zur Kupferstichkunde," 2 bde., Weiss, 1821; DUSMENIL, ROBERT, "Le Peintre-graveur Français," 10 tom., Paris, 1835-69; BRULLIOT, FRANÇOIS, "Dictionnaire des Monogrammes, Marques figurées, Lettres Initiales," etc., Munich, 1832; BARTSCH, ADAM, "Le Peintre-graveur," 21 vols. and supplement, Vienna, 1803-21; BRYAN, MICHAEL, "A Biographical and Critical Dictionary of Painters and Engravers," new ed. by GEORGE STANLEY, London, 1858; JACKSON and CHATTO, "A Treatise on Wood Engraving," London, 1861; HEINECKEN, "Idée Générale d'une collection complète d'estampes," etc., Leipsic, 1771; "Biographical History of the Fine Arts," SPOONER, New York, 1845; NAGLER, "Neue Allgemeine Künstler-Lexicon," etc., 18 vols., Munich, 1835-48; HAMERTON's "Etching and Etchers," London, 1866.) M. B. ANDERSON.

ENGRAVING MAPS AND CHARTS.—The best maps are engraved on copper, and sometimes on steel, which is, however, at present not much used, being liable to rust. The design is drawn on paper, and is transferred to tracing paper by going over the lines of the drawing with a material composed of Frankfort black and urine. The design is then divided both ways through the centre by lines drawn to match similar lines on the copper plate.

The copper is burnished after all the imperfections are removed. It is then "coaled" over with mahogany charcoal, and is next rubbed with oil and rotten-stone, and afterwards thoroughly washed with soap and water and dried, and then rubbed with whiting. The plate is then warmed and white wax is applied. The wax having melted, a folded

rag is drawn across it until the wax is of even thickness. The plate is cooled, and is then ready for use. The tracing paper, with the design upon it, is laid face downward upon the waxed surface. The tracing paper is rubbed with the burnisher, which causes the transfer of the lines to the wax. The coast-lines, rivers, railways, and common roads are engraved upon the copper by suitable gravers, towns are indicated by the stroke of a punch, boundary-lines are run over by the roulette, and the lines are finished after the wax is removed. Topographic marks (mountains, etc.) are dry-pointed lightly. The wax is then removed by melting; the cut lines are scraped to remove the "burr;" the plate is cooled and rubbed. The topography, coast or water lines, and the necessary lettering are next cut. After this, degree-lines (parallels, meridians, etc.) are ruled in. The mountains or topography are usually bitten-in by acid (see paragraph "Etching" in the article ENGRAVING), the heavy shadings being commonly added by means of the square graver. The tools employed are the eye-glass, burnisher, scraper, roulette, gouge, callipers, rules, gauges, gravers, punches, etc.

At present, maps are not printed directly from the copper plates, but the printing is generally done by the lithographic process, as follows: The copper plate is used for making an impression upon autographic paper, prepared with a coating of starch, gum, etc. in variable proportions. The ink used is a mixture of ordinary lithographic ink with oil, soap, tallow, varnish, etc. The impression is made with great care upon the starched side of the paper. This paper, carefully moistened, is laid upon a polished lithographic stone, "backed" with great care by folds of paper, and then pressed with great force, in a lithographic press, upon the stone. The paper, on being stripped away, leaves, if the work is well done, all its lines beautifully transferred to the stone. After washing and drying, the stone is used for printing as in ordinary lithography. From two to five thousand first-class impressions can be taken from one transfer if skilfully done.

*Lithography* proper [from the Gr. *λίθος*, a "stone," and *γράφω*, to "write"] may be considered as a branch of engraving. It owes its existence to the fact that certain slates of the middle oolite (found in the highest perfection at Solenhofen in Bavaria) and various subcarboniferous and other limestones of greatly inferior quality, found in Missouri, Canada, and other regions, though compact, have a surface of somewhat open grain, capable of absorbing and retaining water, oils, and inks made with fats, etc. Now, if parts of the smooth stone be covered with a drawing in oil, the remaining parts can be wet without wetting the oiled parts. If "fat" ink be now applied to the stone, it will adhere to the dry parts, but not to the wet. By alternately wetting and inking the stone, a great number of impressions can be taken.

There are several methods of drawing upon the stone, besides the transferring process mentioned in the paragraph on map engraving. Drawing is done by the crayon, pen, or brush. The stone is often cut by the needle or dry-point, the latter being true engraving. Engraved stone, however, though capable of giving fine results if great care be used, is ordinarily very much inferior to engraving upon steel or copper plates.

Color-printing on stone, or chromo-lithography, has of late years been employed with surprising success in the production of cheap imitations of oil paintings; for although it is true that the greater part of this kind of imitation is inferior in quality, the best examples are in reality artistic, and are highly admirable. Each color is applied by using a different stone.

In all processes, except in stone engraving with the dry-point, relief is generally given to the design by washing the stone in dilute acid, which attacks the parts unprotected by oil, and thus, when skilfully handled, gives increased clearness to the impression. One of the latest inventions in this line is photo-lithography.

**ENGRAVING STEEL AND COPPER PLATES.**—The origin of engraving on metal, from which printed impressions were taken, dates A. D. 1450. In that year, Maso Finiguerra, an engraver on gold and silver plate, a native of Florence, being engaged on an engraving of a "pax" ordered by the brothers of the church of St. John, and wishing to see the effect of his work, filled the lines cut by his graver with a mixture of oil and soot. A pile of damp linen was, by chance, placed upon the silver plate thus prepared, and the cut lines filled with the black mixture were transferred upon the linen. The original plate of the "Coronation of the Virgin," a niello engraved in 1452 by Maso Finiguerra, is in the Uffizi Gallery at Florence, and the only known impression from it is carefully preserved in the Bibliothèque de Paris.

The first engravings on metal plates for the purpose of printing therefrom, executed in Italy, are found in

the "Monte Santo di Dio" (1477) and in an edition of Dante (1481). Sandro Botticelli, a great painter, supplied the designs and assisted in the engraving; but the oldest copperplate print in existence—a German one—bears the date of 1461. Before the close of the fifteenth century many books were published which were filled with illustrations and maps printed from metal plates. The graver was skilfully used by many eminent painters, such as Albert Dürer, Rembrandt, and Vandyke, while Raphael had Marc Antonio and other Italian engravers transfer his designs to plates for reproduction. The discovery of etching—that is, where the work is "bitten in" on the plate by acid—is attributed to both Parmegiano and to Albert Dürer. The spread of the art of engraving on metal was rapid, and it was known in England as early as 1483. The earlier styles or processes were confined to *line*, executed entirely with the graver, and to *etching*, done by a sharp point or needle. The style called *mezzotinto* or *mezzotint* was probably invented about 1600, for François Aspruck engraved in 1601, by means of a process resembling mezzotint, a series of thirteen plates of Christ and the apostles, and one of Venus and Cupid. In the year 1643, Louis of Siegen, a German officer, employed it for his portrait of Amelia Elizabeth, the landgravine of Hesse-Cassel; and Prince Rupert, the nephew of Charles I., was led to its discovery when living in retirement at Brussels after the year 1649, through observing a sentinel scraping the rust from his gun-barrel; yet the honor of its first invention cannot be ascribed to him. The *aquatint* process, which resembles mezzotint in its results, was invented by J. B. Leprince about 1787. The *stipple* or dot style has been used for a long time in combination with other styles of engraving; it is chiefly employed in the rendering of flesh and in producing copies of statuary. Another style, termed the *chalk* style, has its use in representing sketchy subjects done with the pencil, chalk, or crayon.

Up to the year 1815—except a single print in London in 1805—copper was exclusively used to engrave upon. *Engraving on steel* is an American invention, due to Jacob Perkins of Newburyport, Mass. In 1814 he went to Philadelphia, where he associated himself with an engraving firm for the purpose of carrying his invention into practical operation. The processes for engraving on steel or copper are similar, but the superiority of steel plates, in consequence of their hardness, the sharpness and piquancy of the printed impressions therefrom, and the great number of impressions that can be taken before the plate is worn, renders them preferable for engraving purposes, unless it be for letter engraving when small numbers are required to be taken from the plate.

*Engraving on Steel, the Processes.*—The plate on which the engraving is executed is ground and polished by the plate-maker until its mirror-like surface is free from all scratches or blemishes. The edges are bevelled, so that it may readily pass between the rollers of the printing-press when completed. An etching-ground is then laid upon the plate by the engraver. This ground consists of a mixture of burgundy pitch, rosin and asphaltum; it is applied to the heated plate by "dabbing" it over the surface; it resists acid, but great care must be taken in preventing any dust settling in the ground when heated, else when the acid is applied "false biting" of dust-specks will result. When the ground is cold, the outline of the subject, prepared by finely-traced lines with the "dry-point" on gelatine paper, is transferred upon the ground by laying thereon the traced side of the paper filled with scrapings from a lead-pencil or red chalk, and the back of the paper gently rubbed with a burnisher. The etching process is then commenced by cutting the lines or dots desired with the dry-point through the etching-ground. The width between the lines or dots is carefully studied, and laid in with reference to the final result when "bitten-in." When completed, a wall of wax is placed around the edges of the plate to prevent the acid from running off, and the "biting-in" process is begun by pouring on the acid (generally one part of nitric acid to three parts of water), which is immediately poured off for the more delicate biting, and water washed over the work and removed, and the surface blown dry with a common bellows. The delicate work is then "stopped out" with asphaltum varnish, and the biting resumed until the darkest or heaviest lines are bitten sufficiently. The ground is then removed with turpentine, and such parts of the work needing further biting may be "re-bitten" by laying a re-biting ground dexterously dabbed on the surface, so as to leave each line or dot perfectly clean; and then proceed with the acid as at first. Most plates are etched at first, whether completed in line, mezzotint, or stipple style, the style of the etching being varied according to the manner in which the work is to be finished. *Pure line engraving* is produced by cutting lines, broken lines, or dots on the steel with a tool called the graver; but this style is now

rarely ever used except in banknote engraving, the vignettes of which are engraved in this style, on die steel, which is hardened for transferring to other steel plates; and so any number of copies of the original plate may be duplicated on other softer plates, which, when hardened, are used in printing the engravings. *Line-and-stipple* engraving is rendered by cutting or etching the lines on draperies, and dotting (stippling) the lighter parts of draperies and flesh with the graver or dry-point. *Mezzotint* engraving is produced by laying a "mezzotint ground" over the surface of the etched subject by means of a "rocking-tool" (sometimes termed a "cradle") with fine teeth, which are impressed into the plate by a rocking motion of the tool; after rocking over the plate a great number of "ways," the surface becomes filled with fine dots, which, if printed from, would give a perfectly black tint. The high lights, half tints, and gradations are then "scraped" out with a tool termed the "scraper," and the work finished with the burnisher. This style produces a very soft and pleasing engraving, and with a well-prepared etching of under-work in line-and-stipple is extensively used by some engravers in producing the finest engravings. It is more generally known as the *mixed* style—line, mezzotint, and stipple. Pure mezzotint engraving has become quite obsolete, as it will not admit of being printed from in large quantities, but when mixed with other styles from 30,000 to 50,000 fair impressions may be taken from a single plate. *Aquatint* engraving is often confounded with mezzotint from its resemblance to it, but the process is quite different. An aquatint ground is laid on the surface of the plate by pouring a resinous substance which has the peculiarity of separating its particles so as to leave bare spaces, or eccentric rings left bare, which when exposed to acid are corroded. The laying of the ground requires the greatest dexterity and judgment, and must be done in a dry atmosphere. The tone produced resembles that of a washed drawing in India ink, soft and harmonious. Aquatint engraving is used for reproducing geological specimens, as fossils, shells, stones, etc., with great success.

**Steel and Copper Plate Printing.**—When the engraver has completed his work, a proof of the same is taken, and usually on India paper, which has the quality of taking up the ink more perfectly from the engraved lines or dots, and leaving the precise tone of the work, than ordinary white plate paper. Proofs on India paper are considered much more valuable than plain impressions. The process of plate-printing is as follows, viz.: the paper is "wet down" in alternate layers of wet and dry sheets, and allowed to moisten evenly. Much depends on the even moisture of the paper in obtaining good impressions. The plate is warmed by soapstone plates heated underneath, and the ink rolled upon its surface. It is then removed, and the ink "wiped," by several rags or pieces of millinet, from the surface; and finally the entire surface of the plate is polished with whiting on the palm of the hand. The plate is then placed on the press, consisting of a bed-piece running between two heavy iron rollers, with blankets around the upper roller to prevent injury to the plate; and a sheet of the dampened paper adjusted carefully to the inked surface of the plate, and passed through the press. The impression is then dried, and pressed in a "standing press," to give the surface of the paper its proper finish or polish.

GEO. E. PERINE, *Engraver on Steel*, New York City.

**Engraving, Bank-note**, embraces the chief characteristics of general engraving, with a number of special processes peculiar to itself. It is a combination of the highest style of the art and the greatest perfection in machinery and in the details of the business, requiring a system of accounts and checks, together with discipline and watchfulness, almost unknown in any other pursuit. The variety of its work makes necessary the employment of the best talent in all branches, and the constant demand for something new wherewith to baffle illegitimate imitation brings into use the inventive faculties and skill of the best experts in the business.

Bank-note or vignette engraving, while it is in the order of line engraving and etching as otherwise described, requires special treatment to render it useful for the purposes designed. Boldness must be produced without destroying the delicacy of the work, the object being to render the subject capable of reproduction by machinery without losing in the process the faintest line which the genius of the artist conceived necessary for the perfection of the picture. The great expense attending the execution of these engravings makes this reproduction necessary, so that a limited number of vignettes and pieces of lathe-work, variously combined for different notes, may, in effect, be as practically distinct from each other as if special work had been used for each. The invention of Jacob Perkins, known as the "transfer press," here becomes most potent, and, combined with a thorough knowledge of the manufacture of

steel and its treatment in the various processes of hardening and softening, the power to reproduce the original engraving to an unlimited extent is effected.

The original engraving, or "bed-piece," as technically known, is hardened to a degree rendering it capable of resisting a pressure of twenty tons without breaking the steel or even crushing the delicate engraving. The experience required to determine the precise temperature necessary for complete and perfect hardening here becomes manifest, when it is understood that a degree of heat beyond the extent required will destroy the engraving and render useless the labor of weeks. The bed-piece being properly hardened, a polished steel cylinder or "roll" is passed over the bed-piece, and the engraving "taken up" on the roll in relief. This roll is then hardened, and becomes the "die," to be used indefinitely.

Another and most important adjunct to the business of bank-note engraving is the geometrical lathe. This machine is used in making the "counters" on bank-notes, which are the pieces of work usually containing the denominations. The borders and the backs of notes are also made up of this class of engraving. The geometrical lathe is the invention of Asa Spencer of Philadelphia in the early part of the present century, whose machine, however, merely made an eccentric motion, producing a waved line. Cyrus Durand improved upon this, and added a second motion. Other improvements followed to the extent of five distinct motions, beyond which no further progress was made until within a few years past, when, under the manipulation of C. W. Dickinson of Newark, N. J., the power and usefulness of the invention have been wonderfully developed. The form of the work to be produced is the mental conception of the artist, followed by an algebraic calculation. The machine is then arranged to meet the result of this calculation, and, so far as the machine is concerned, success is certain. The piece of steel to be operated upon is attached to the "chuck" of the machine, which is movable, its motion varying in accordance with the pattern to be produced. An examination of any of these lathe-cuttings reveals to the eye a number of different forms of lines, apparently added one after another, and yet it is really one unbroken line, which, if stretched out, would occupy many thousand feet. The beautiful patterns thus produced by the interlacing of these lines are truly wonderful, and the accuracy of the machine is no less marvellous. To produce the proper depth of line the point often travels at least twenty-five times through the grooves made by it, and frequently in such close proximity to other portions of the same groove that the dividing space is almost imperceptible; and yet the movement is so true that these spaces are never broken down or unnecessarily encroached upon. The piece of steel when completed is hardened, and the "die" produced as before described.

A not unimportant feature of bank-note engraving is the lettering and ornamentation, which are as distinct from vignette engraving as either is from lathe-work. The arrangement of the wording of bank-notes, the style and symmetry of the individual letters, and the necessary ornamental work to blend the whole into perfect harmony, bring into action the best cultivated taste and capacity for designing. In the leading bank-note establishments much of the lettering and ornamentation is done by machinery—inventions conceived and built by their own mechanics, and used exclusively in the execution of their own work.

Bank-note engraving, in its present perfection, is the result of improvements and skill encouraged and fostered exclusively in the U. S.; and in this particular branch of the arts our country is supreme, sending its handiwork to all parts of the civilized world. The American tourist abroad is often pleasantly reminded of home when the well-known imprint of the "American Bank-note Company, New York," meets his eye on the paper issues of the country in which he is travelling. The advantage of thus using the best available talent in the production of these issues is fast gaining ground wherever currency of this nature is required, and the superiority of the American manufacture is everywhere admitted.

C. L. VAN ZANDT.

**Engros'sing** [from the Fr. *grossoyer*, to "write in a large hand"], the writing of a deed in proper legible characters. Among lawyers it signifies especially the copying of any instrument or document on parchment or stamped paper. In the English statute law engrossing signifies the purchase of large quantities of any commodity, in order to sell it again at an exorbitant price, or in order to raise the market-price of the same.

**Engstlen Alp**, a beautiful place of Alpine resort, just S. W. of Engelberg, canton of Unterwalden, Switzerland. It rises 6092 feet, and its beautiful pastures, with the neighboring lake, Engstlensee, the Wunderbrunnen (an intermittent spring), the falls of the Engstlenbach, the glaciers near

at hand, and the loftier snow-clad peaks around, render it a place of great attractiveness to tourists.

**Engström** (JOHAN), a Swedish poet, novelist, traveller, and physician, born April 7, 1794, at Kärnebo, in the government of Kalmar, received his medical license in 1817, and until 1825 was employed as an army-surgeon. Author of "Resa genom Norrland och Lappland" (1834); "Resa genom södra Lappland, Jemtland, Trondhem och Dalarne" (1835); "Nordiska Dikter af Elvin" (1821); "Eols Harpan" (1830); "Förhundsbröderna" (1833-34); "Nybyggarna" (1838); "Björn Ulftand" (1840).

**Engue'ra**, a town of Spain, in the province of Valencia, 46 miles S. W. of Valencia, has manufactures of linen and woollen goods. Pop. 5939.

**Enharmonic** [Gr. *én*, "in," and *ἀρμονία*, "harmony," "concord"], in music, one of the three genera (chromatic, diatonic, and enharmonic) of ancient music. The enharmonic genus of the Greeks was distinguished by the use of small intervals or quarter tones. In modern music, intervals much less than a semitone owe their origin to the slight difference of pitch which the same (nominal) note takes according as it is adjusted to one or another fundamental note or *tonic*. Thus C♯ and D♭ are, at least on keyed instruments, practically the same note, though strictly the former should be produced by  $\frac{1}{2}$  of the whole string sounding; the latter, by  $\frac{1}{4}$ . The passage from one to another of these intervals is called an "enharmonic change," and a change of key so effected, an "enharmonic modulation."

**Enig'ma** [Gr. *αἰνύμα*, from *αἰνιόμαι*, to "speak darkly" (from *αἶψα*, a "fable"); Fr. *énigme*], an obscure question; a riddle; a proposition put in obscure or ambiguous terms to puzzle or exercise the ingenuity in discovering its meaning. Formerly it was deemed a matter of such importance that Eastern monarchs sometimes sent embassies for the solution of enigmas. Among the famous enigmas of antiquity were that which Samson proposed to the Philistines and that which the Sphinx propounded to Œdipus. (See SPHINX.)

**Enkhuysen**, *énk-hoi'sen*, or **Enkhuysen**, a fortified seaport-town of the Netherlands, is in the province of North Holland, on the Zuyder Zee, 30 miles N. E. of Amsterdam. It has a fine town-hall, several churches, a cannon-foundry, and several shipbuilding yards. Butter, cheese, timber, and fish are exported hence. This was once a town of 40,000 inhabitants, and had a great herring-fleet, but the silting up of its harbor has wrought its decay. It still has a fine appearance from without. Its town-house, built in 1588, and the Westerkerk, are the most remarkable buildings. Here Paul Potter, the great painter, was born in 1625. It was founded in 1200, and was sometimes called Enchusa. Pop. 5774.

**Enlist'ment**, the voluntary enrolment of men in the military or naval service. In the U. S. service enlistments are under a detailed officer styled superintendent of the general recruiting service, assisted by other officers, each detailed for two years by the war department. The superintendent's office is in New York. Men are enlisted for five years' duty in every branch of service. Recruits are enlisted (1874) at twenty rendezvous, one at each of the following cities: Albany, Baltimore, Boston, Brooklyn, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Dubuque, Elmira (N. Y.), Evansville (Ind.), Indianapolis, Jersey City, Louisville, New York City (two rendezvous), Philadelphia, Springfield (Ill.), and St. Louis. They are sent for examination and training to two dépôts—one at Fort Columbus, Governor's Island (N. Y. Harbor), and one at Newport Barracks, Ky. Thence they are assigned to regiments by order of the war department.

**En'na**, an ancient city of Sicily, very near the centre of the island, on a lofty hill, almost inaccessible except at a few points. It was anciently a place of great importance. Its site is now occupied by the decayed town of CASTRO GIOVANNI (which see). Enna is memorable as a seat of the ancient worship of Demeter, and the shore of a small lake near by was the scene of the mythical rape of Persephone, a favorite subject with poets and artists. Comparatively few remains of the ancient city have survived the ravages of the Greek, Punic, Roman, servile, Arabian, and Norman conquests.

**En'neagon** [from the Gr. *έννέα*, "nine," and *γωνία*, an "angle"], a plane rectilinear figure having nine sides and angles. The area of a regular or equilateral enneagon is approximately 6.18182 times that of the square of one of its sides.

**Ennean'dria** [from the Gr. *έννέα*, "nine," and *άνθρ*, *άνθρ*, a "man" or "male"], the ninth class of plants in the artificial system of Linnæus, so called because each flower has nine stems. The term *enneandrous* is applied to these plants or flowers, which are not numerous, and the

distinction itself is unimportant; accordingly, the name is now seldom used.

**En'nel**, a picturesque lake of Ireland, in the county of Westmeath. From it flows the river Brosna. It contains some wooded islands, and its shores are adorned with fine residences. It is near Mullingar, the county-seat.

**En'nemo'ser** (JOSEPH), M. D., a German writer on physiology and animal magnetism, was born in the Tyrol Nov. 15, 1787. He fought against Napoleon in 1813 and 1814, and graduated as M. D. at Berlin in 1816. He became in 1820 professor of medicine at Bonn, and removed in 1841 to Munich, where he practised with success. Among his works are "Magnetism in its Relations to Nature and Religion" (1842) and "History of Magnetism" (1844), the first volume of which (the "History of Magic") was translated into English by William Howitt (1854). D. in 1854.

**En'nerdale Lake**, a picturesque sheet of water in the mountain-region of Cumberland, England, 7 miles N. E. of Egremont. It is an expansion of the river Eken,  $\frac{1}{2}$  miles long and less than 1 mile wide.

**En'nis**, a market-town of Ireland, the capital of the county of Clare, on the river Fergus, 20 miles W. N. W. of Limerick. It has a town-hall, a classical school called Ennis College, and the ruins of an abbey founded in 1240. It returns one member to Parliament. Here is a valuable limestone quarry. Ennis has a lunatic asylum, a jail, an infirmary, a hospital, a public library, a fine court-house, three banks, and two newspapers, a brisk trade and some manufactures, and a colossal statue of O'Connell by Cahill. Four bridges cross the Fergus, and railways extend to Limerick and Athenry. Ennis is one of the see-towns of the diocese of Killaloe (Roman Catholic). P. 6503.

**Ennis**, Tex. See APPENDIX.

**En'niscorthy**, a market-town of Ireland, in the county of Wexford, on the river Slaney, 14 miles N. N. W. of Wexford. It has a splendid Roman Catholic church, and a stately Norman castle many centuries old, but still entire. It has a large trade in grain, is at the head of barge navigation, is connected by railway with Dublin and Wexford, has a convent, five churches and chapels, two banks, and a lunatic asylum. The Irish rebels took it by storm and burned it down in 1798. Pop. 5594.

**En'niskillen**, a parliamentary borough of Ireland, the capital of the county of Fermanagh, is finely situated on the river Erne, which connects the Upper and Lower Lough Erne, about 75 miles W. S. W. of Belfast. It has a town-hall, two barracks, six churches and chapels, three newspapers, a court-house, a prison, an infirmary, tanneries, straw-hat works, a flax-market, a market for corn, pork, and butter, two forts, a linen hall, and manufactures of cutlery. There are handsome mansions and beautiful scenery in the vicinity. The people of Enniskillen warmly supported the Protestant cause in 1689. Here the troops of William III. defeated those of James II. in that year. It is connected by railway with Dundalk, Londonderry, and Bundoran, and steamers ply on the Erne. P. 5836.

**Enniskillen, Earls of** (1789), Viscounts Enniskillen, 1776; Barons Mountflorenc (Ireland, 1760), have seats in Parliament as Barons Grinstead (United Kingdom, 1815).—WILLIAM WILLOUGHBY Cole, third earl, D. C. L., LL.D., F. R. S., was born Jan. 25, 1807, and succeeded to his father's title in 1840. He was educated at Oxford, and before 1840 was distinguished in the House of Commons as Lord Cole, and acted in the Conservative interest.

**En'nisus** (QUINTUS), a celebrated Roman epic poet, was born of a Greek family at Rudiz, in Calabria, 239 B. C. He acquired the rights and privileges of a Roman citizen, and enjoyed the friendship and patronage of Cato and Scipio Africanus. It is said that he supported himself by teaching the Greek language. He contributed greatly to the formation of the national literature of Rome, and was the first great Latin poet. His most important work was an historical epic poem entitled "The Annals," which was for many years the most popular poem in the language. His works, which included tragedies and comedies, are all lost except some fragments. His poetry was admired by Lucretius and by Cicero, who often quotes him. He died in 169 B. C. Among the best editions of his works are those by Spangenberg (1825) and Vahlen (1869). (See SELLAR, "Roman Poets of the Republic," chap. iv.; VOSSIUS, "De Poetis Latinis.")

**Enns**, or **Ens** (anc. *An'isus* or *An'esus*), a river of Austria, rises in the crown-land of Salzburg, 11 miles S. of Radstadt. It flows through Styria, forms the boundary between Upper and Lower Austria, and enters the Danube 11 miles below Lintz. Length, about 120 miles.

**Enns**, a town of Austria, on the Danube, at or near the mouth of the Enns, about 96 miles W. of Vienna. It has manufactures of iron, steel, and cotton. It was the headquarters of Napoleon in 1809. Pop. 4438.

**E'noch**, or **He'noch** [Heb., "initiated" or "teacher"], the name of five persons mentioned in the sacred books (canonical and apocryphal) of the Hebrews. The second in the order of time, and the most important, was "the seventh from Adam," who "propheesied," and was translated at the age of 365. (Gen. v. 23.)

**Enoch, Book of**, quoted by the apostle Jude (vv. 14, 15), an apocryphal book of 108 chapters, of unknown authorship and of uncertain date, critical conjecture ranging from 144 B. C. to 132 A. D. It was probably written in Hebrew by a Palestinian. The early Christian Fathers used it, but for some centuries only fragments of it were known to European scholars, till in 1773 James Bruce brought home with him from Africa three copies of an Ethiopic version of it, made apparently from the Greek about 350 or 400 A. D. It was published in 1838 by Archbishop Laurence, who had previously (in 1821) published an English translation of it, and by Prof. Dillmann (1851). The book contains many curious passages, but its leading idea is that of Divine justice dealing sternly with sinners. Special works on the book of Enoch have been written by Ewald (1854), Philippi (1868), and others. (See especially "The Book of Enoch," by Rev. GEORGE H. SCHODDE, 1882.) R. D. HITCHCOCK.

**Enomoto**. See APPENDIX.

**Enos** (anc. *Enos* or *Enus*), a seaport-town of European Turkey, in Room-Elee, on the *Ægean* Sea, at the mouth of the river Maritza (*Hebrus*), about 75 miles S. by W. from Adrianople, of which it is the port. Its harbor admits only small vessels. Pop. about 6500. Here is a small bay called the Gulf of Enos. *Enos* is mentioned by Homer in the "Iliad," book iv.

**E'nos** (ROGER), GENERAL, born in 1736, was a lieutenant-colonel in Arnold's Quebec expedition (1775), but by a council of war held on the Dead River in Maine was sent back to Cambridge with a part of the troops, on account of the lack of provisions. He commanded at Castleton, Vt., in 1781, and became afterwards a major-general of Vermont militia, and one of the first men of the State. Died at Colchester, Vt., Oct. 6, 1808.

**Enrol'ment** signifies in law the registering or entering of a document or lawful act in the rolls of the chancery or superior courts of common law or in the records of the quarter sessions. Such enrolment was rendered necessary in different cases by statute. In the reign of Henry VIII. of England a statute was enacted that no transfer of land should be effected by bargain and sale unless the deed were enrolled within six months after its date. A decree in chancery does not take full effect until it has been enrolled. Before the enrolment the cause may be removed to the court of appeal, which may reverse the decision, but after the enrolment it can only be heard in the House of Lords.

**Enschede**, *En'skâ'deh*, a frontier town of the Netherlands, province of Overysse, about 90 miles E. by S. from Amsterdam. It has manufactures of cotton goods. P. 5455.

**Ensemble**, *ên'sômb'l'*, a French word signifying "together" or "the whole," is used to express the general effect produced by a picture or by the various parts of a musical performance; also the masses and details of a painting considered with relation to each other.

**En'siform Car'tilage** [Lat. *cartilago ensiformis*, from *ensis*, a "sword," and *forma*, "shape"], called also the **Xiphoid Cartilage** or **Ensisiform Appendix**, in human anatomy, is the third and lowest piece of the sternum or breast-bone. It is smaller than either the first piece (*manubrium*) or the second (*gladiolus*). It is of various form, usually more or less dagger-shaped, sometimes perforated, sometimes 2-pointed, and is usually cartilaginous until the seventeenth or eighteenth year, when a centre of ossification appears in its upper part, and the whole takes on, very slowly, a somewhat bony character. It appears to represent the united hæmal spines of those vertebrae to which the floating (eleventh and twelfth) ribs are attached.

**En'sign** [Lat. *insigne*, neut. of *insignis*, "remarkable," "striking" (from *in*, "in" or "for," and *signum*, a "sign"); Fr. *enseigne* or *drapeau*], the national flag or banner carried by a ship of war, and usually hoisted at the peak or on a flagstaff at the stern. Its chief purpose is to indicate the nationality of a ship when it meets another vessel at sea. In the navy of the U. S. the ensign is the national flag. All British men of war since 1864 carry the St. George's ensign—viz., a white ensign with a red cross, and a union-jack in the left-hand upper quarter. The English ensign is a red, white, or blue flag, having the union in the upper corner next the mast.

**ENSIGN** in the U. S. navy is the eighth grade of commissioned officers, ranking below that of master and above that of midshipman. In the armies and navies of continental Europe there is nothing which exactly corresponds to the English ensign.

**En'silage**, a method of preserving crops in a green state for fodder which has been practised in the Eastern and Middle Atlantic States since 1875. The most approved method is as follows: A green crop, which may be field or sweet corn or the large white Southern corn, millet, Hungarian grass, Egyptian rice corn, sorghum, alfalfa, lucerne, or red clover, must be sowed at such time as to be in blossom or even with the grain in the milk late in August or early in September (before frost). A *silo* must be prepared to receive it. The silo is a pit or cellar built or dug near the barn or stables. It may be of any convenient size, but perhaps 40 feet in length, 13 in width, and 20 in depth will be as good as a larger one. This will hold about 200 tons. It must have solid walls, and floor or stone grouted with cement on the inside or of cement throughout (which is not quite so good). A cover is to be provided for this of 2-inch plank, tongued and grooved, and which may be made in sections of 4 feet battened together, with the battens of each section projecting and fitting into those of the next one. The cover is to be an inch shorter than the width of the silo. On one side of the silo a doorway is to be left, and filled up with brick, but not grouted. The corn or other green fodder is to be cut and brought in directly from the field, and subjected to the action of a provender-cutter, which will reduce it to half-inch or inch lengths. It is then thrown into the silo, and each successive layer thoroughly trampled down. It is well to add a small quantity of salt to each layer, say a bushel to 12 tons. When the silo is filled, heaped, and beaten down, from 3 to 6 inches of straw are to be spread over it and the battened cover laid on, the battens fastened, and pressed down by a weight of from 75 to 250 pounds to the square foot. This pressure may be made with broken stone, barrels of sand, bags of grain, or any sufficient weight. It is well to have a light but substantial roof over the silo. It should not be opened till late in November or December, and then from the door on the side, and the fodder cut out with a hay-knife. It should be very slightly fermented and acid, and will be greatly relished by cattle.

L. P. BROCKETT.

**Ens Martis** [Lat.], (i. e. the "essence of Mars" (iron)), an old alchemical name for the ammonio-chloride of iron, formerly used in medicine. It is an uncertain aperient and chalybeate tonic.

**Entab'lature** [Mod. Lat. *intabulamentum*, from *in*, "upon," and *tab'ula*, a "board" or "plank," literally, "placing boards upon," applied originally to the roofing of a house, and especially to the horizontal covering which rested upon the upright supports of a building], in architecture, the portion of a building between the columns and the roof, running round the edifice. It consists of architrave, frieze, and cornice. In ordinary building the term is applied to the course of masonry on a wall immediately below the roof.

**Entail'**. By this term is meant an estate in fee limited to certain classes of descendants. Thus, a fee simple would be regularly created by the word "heirs," as, for example, to "A and his heirs," and would descend to any heirs, however remote. An estate given to "A" and "the heirs of his body" would be confined to descendants. This is an example of the proper words to create an estate tail. The descent might be still more strictly confined, as to male issue or the issue born of some specified mother. The peculiar features of an entail depend upon a well-known English statute termed *De donis*, the regular effect of which was to confine the property to the specified mode of descent. The result was that the tenant in tail had the general characteristics of owner, except that he could not sell, and that the land could not be seized for his debt. The courts permitted the entail to be destroyed by a fictitious legal proceeding called a "fine," and more completely by another like proceeding called a "common recovery," instituted in behalf of the tenant. He could thus, if he saw fit, become absolute owner. The "common recovery" is now abolished by statute in England, and under certain limitations the tenant may resort to a conveyance called a "disentailing deed," and thus acquire a fee simple. In the United States words constituting an estate tail according to English law will usually be construed to create a fee simple, unless the property is given over to some other person on default of issue surviving the first taker; in which case the secondary gift would be upheld, and would take effect should no issue survive. This last point will be more fully noticed under the titles PERPETUITIES and REMOTENESS.

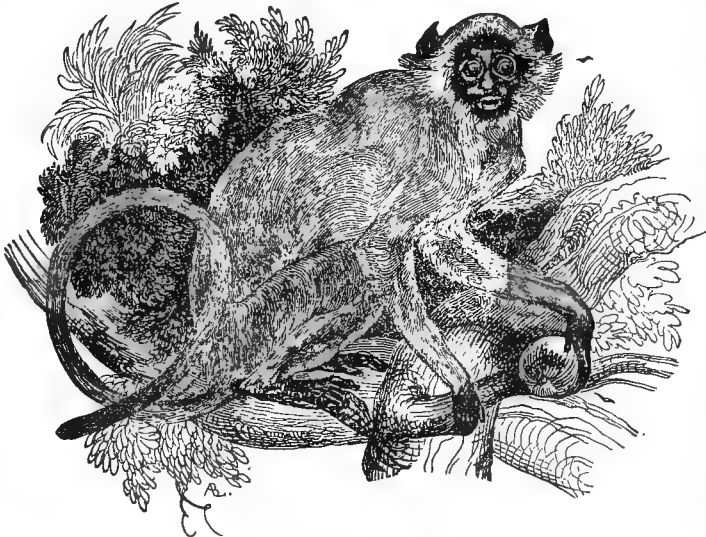


**Ent'asis** [Gr.], a delicate and almost imperceptible swelling of the shaft of a column, is found in nearly all ancient Greek examples. It was adopted to prevent the shafts being strictly frusta of cones, in which case there would, by a simple optical law, be an incorrect impression made upon the eye as to the proportions of the column. The curve of the entasis was usually either part of a hyperbola or of a conchoid. It was one of the most delicate yet important of the refinements of Greek architecture, and has not been accurately attained in modern imitations. In the columns of the Parthenon the entasis amounts to  $\frac{1}{16}$  of the whole height of the column.

**Entel'echy** [from *ἐντελής*, "perfect," and *ἔχειν*, to "have"] is a metaphysical term from the Aristotelian philosophy, denoting the fundamental idea of the whole system. Cicero defined this idea as *energy*, but the Greek philosophers who, in the fifteenth century, moved from Constantinople to Italy—and among them especially Argypopolis—ridiculed him for the definition, and gave *perfection* as the constituent element of the idea. Melancthon, however, and Leibnitz, and all modern philosophers almost without exception, follow Cicero; and when the "Entelechy" of Aristotle is compared with the "Idea" of Plato or the "Absolute Negativität" of Hegel, or other fundamental ideas of other philosophical systems, it is evident that *energy* covers a much larger part of the Aristotelian idea than *perfection*. The abstract repose of the Platonic "Idea" is supplanted by the energy of reality in the Aristotelian "Entelechy;" its potentiality becomes actuality. Aristotle calls truth an idea, but the soul he defines as an *ἐντελέχεια*; and when Dr. Reid tells his readers that he can make no sense of this definition, he seems to forget that there are confessions which it is utterly unnecessary to make. The best explanations of the entelechy, and its relations to the whole system of Aristotelian philosophy, are given by Brandis in his "Aristoteles und seine Akademischen Zeitgenossen," Berlin, 1857, and by Thurot in his "Études sur Aristote," Paris, 1860.

**Entel'lus**, one of the mythical companions of Æneas. He was an aged hero of Troy or Sicily, who at the games in honor of Anchises defeated in a boxing contest the youthful champion Dares, who was almost killed in the struggle.

**Entel'lus Monkey, or Houman** (*Semnopithecus Entellus*), a species of East Indian monkey, having long limbs and a very long and powerful but not prehensile tail.



Entellus Monkey.

It is regarded as sacred by the Hindoos, who dedicate temples to it, and erect hospitals for it when sick or wounded. It exhibits a familiarity bordering on impudence, and often plunders gardens with impunity, as the Hindoos consider it an honor to be robbed by it. They believe that it is a metamorphosed prince, and to kill it is considered a deadly sin; and hence these monkeys absolutely swarm in many places, especially in the vicinity of the temples.

**Enteral'gia** [from the Gr. *ἐντερον*, the "intestine," and *ἄλγος*, "pain"], a name given in some medical works to colic, especially of the form attended by spasmodic contractions in the muscular coat of the intestine. This intensely painful form of disease is often chronic in character,

though the individual attacks are usually short—a character in which it differs from spasms of the stomach, which are often long continued. The disease is best relieved by hot applications and by the cautious use of chloroform. The tendency of late writers is to limit the use of the term *enteralgia* to cases of NEURALGIA (which see) of the intestines.

**Enter'itis** [from the Gr. *ἐντερον*, "bowel," "intestine," and the termination *-itis*, denoting, in modern medical nomenclature, "inflammation"], an inflammation of the small intestines. The term is somewhat vaguely used by medical writers. Active inflammation of the bowels, in adults at least, is very frequently confined, for the most part, to the peritoneal coat, and the disease is hence called peritonitis. When the mucous coat of the bowels alone is actively involved, it is frequently a fatal disease in children, but in adults, with care, the majority of cases recover. Catarrhal enteritis is benefited, and generally cured, by gentle purgation. But in active disease of this kind cathartics will often greatly aggravate the evil. Such cases are best treated by rest, opiates, poultices to the abdomen, and bland nourishment. "Typhlo-enteritis" or inflammation of the cæcum, when caused by abscess or perforation of the appendix cæci, is not unfrequently fatal; when otherwise caused, recovery is to be looked for.

**Ent'erprise**, capital of Volusia co., Fla. (see map of Florida, ref. 3-F, for location of county), 12 miles below the head of steamboat navigation on St. John's River (although steamers have ascended sixty miles higher), 80 miles S. of St. Augustine. It is a place of winter resort, and the head-quarters of sportsmen (both for fishing and gunning) in this part of Florida. Here is the "Green Spring," a remarkable sulphur spring 80 feet in diameter and 100 feet deep. Pop. in 1880, 224.

**Enthu'siasm** [Gr. *ἐνθουσιασμός*, "inspiration," from *ἐν*, "within," and *θεός*, "a god"] refers to the emotions; inspiration to the imagination; revelation to the intellect. An idea may burst upon a man as a revelation; he throws it upon the world as an inspiration; it belongs to the world to receive it with enthusiasm. Enthusiasm is merely passive, a merely receptive state of mind; and it is important, both in religion and aesthetics, to be fully aware of this being its true character, for in religion it causes pitiful misery when every upheaval of our feelings is mistaken for a divine revelation—the more so as enthusiasm, in accordance with its merely passive nature, is as ready to run after a foolish whim as it is to follow the exalted wisdom. And in aesthetics nine-tenths of that disagreeable stuff with which modern literatures are loaded under the names of poems, novels, tales, etc. would never have been read, perhaps even not written, if people had understood thoroughly that art depends for its production wholly on inspiration, whilst enthusiasm only makes us fit for the enjoyment of its gifts.

ENTHUSIASM has, however, also a technical sense, in which it is almost synonymous with FANATICISM. Thus, "enthusiasts" are spoken of in the Elizabethan period by Jewel, Rogers, and others in exactly the same terms as Anabaptists, one of the wildest sects of Christendom, and afterward the name was often applied to the Puritans.

**Enthy'meme** [from the Gr. *ἐν*, "in," and *θυμός*, "mind"], in logic, a syllogism of which one of the three parts (generally the major premise) is suppressed or held in mind—e. g. "The freedmen ought not to vote, because they cannot read." According to De Quincey (*Historical Essays*, vol. ii., p. 215 seq.), the

Aristotelian enthymeme is an argument in respect to matters probable rather than demonstrable. (So also THOMSON, "Laws of Thought," p. 284.) Aristotle's own definition for the rhetorical enthymeme is, "a syllogism from probable propositions or from signs." By *probable propositions* he means those which are general, but not at all universal, as "Injured men seek revenge." By *signs* he designates facts or marks, such as attend upon other facts or conceptions, so that from the presence of the sign we suspect or know that the thing signified is also present. The rhetorical enthymeme, when based on signs, is always affirmative, taking no account of negative indications. Its results are universal, and may amount to practical or even formal demonstration.

**Entomology** is the department of zoology which treats of Insects. It includes the study of their form, structure, development, habits, names, classification, and geographical distribution; and also the examination of the relations which Insects sustain to other animals and to Man. The name of the science is derived from two Greek words—*έντομον*, *entomon*, an "insect," and *λόγος*, *logos*, a "discourse."

In general terms it may be stated that the science of Entomology dates from the time of Aristotle; for this accurate observer and learned scholar, whose writings on Natural History are the more admired the more they are studied, considered insects also, as well as other animals, scientifically, pointing out the limits of this interesting group of animals, and subdividing them into minor groups, with a considerable degree of accuracy. From the time of Aristotle for a period of about 1800 years, little or nothing was done, so far as we know, in the science of Entomology. After this long period of inactivity in this science, Conrad Gesner, a poor Swiss, born in 1516, became a physician at Zurich, and, in addition to his other duties, gave much time to natural history subjects, collecting all that was then known of the natural history of animals in general, and writing special papers on Insects, which were published after his death, by Thomas Mouffet, an English physician and naturalist, who died about the year 1600, and whose entomological writings were published in one folio volume, illustrated with 500 wood-cuts, in London, in 1634.

From the times of Gesner and Mouffet the science of Entomology has always had many votaries—so many that the whole space allotted to this article would not contain even a list of their names and the titles of the books and papers which they have published on this interesting and important subject. Nay, it requires two octavo volumes to enumerate the writers on Entomology and to give the full titles, and dates, and places of their publications, as may be seen by examining Dr. Hagen's valuable work, "*Bibliotheca Entomologica*," 2 vols. 8vo, Leipsic, 1862-63. And it should be added here, that since the publication of that work new writers have come forward, so that several scores of writers and hundreds of papers must be added to the lists enumerated in Dr. Hagen's volumes of ten years ago.

But while no complete list even of the names of the writers on Entomology can here be given, we must not fail to mention a few such names as Redi, Goedart, Malpighi, Swammerdam, Lyster, Madame Merian, Leuwenhoeck, Valisnieri, Ray, Réaumur, Linnaeus, Charles de Geer, Roesel de Rosenhof, Bonnet, Clerck, Lyonnet, Sepp, Geoffroy, Schaeffer, Brunnich, Pallas, Drury, Cramer, Fabricius, Esper, Stoll, Moses Harris, Schrank, Schieffermüller, Villiers, Thunburg, Rossi, Olivier, Smith and Abbot, Pierre André Latreille the "Prince of Entomologists," Panzer, Herbst, Sturm, Illiger, Marsham, Kirby and Spence, Palisot de Beauvois, Paykul, Meigen, Jurine, Savigny, the Hubers (father and son), Schoenherr, Treviranus, Wiedman, Ramdohr, Gyllenhal, Ochsenheimer, Hubner, Fallen, Herold, Klug, Gravenhorst, Meckel, Marcel de Serres, Leach, Suckow, Walckenaer, Macleay, Carl Ernst von Baer, Straus-Durckheim, Lepelletier de St. Fargeau, Dalman, Waldheim, Dumeril, Dufour, Duponchel, Curtis, Stephens, Stainton, Swainson, Wood, Horsfield, Gebler, Germar, Étienne Geoffroy Saint-Hilaire, Eschscholtz, Godart, Bonelli, Carus, Mannerheim, Guérin-Méneville, Rathke, Macquart, Audouin, Zetterstedt, Milne-Edwards, Boisduval, Rennie, Spinola, Kolliker, Leuckart, Brullé, Gené, Guénée, Pictet, Rambur, Kollar, Dahlbom, Say, Van der Hoeven, Zaddach, Lucas, Dejean, Wagner, De Castelnau, Griffith, Lacordaire, Audinet-Serville, G. R. Gray, White, Walker, Dallas, Smith, Doubleday, Cuvier, Burmeister, Shuckard, Westwood, Erichson, Dujardin, Herrich-Schaeffer, Newport, Blanchard, Longchamps, Bowerbank, Le Conte, Haldeman, Harris, Siebold, Gegenbaur, Rondani, Murray, Lucaze-Duthiers, Agassiz, Hagen, Melsheimer, Giebel, Berendt, Uhler, Fitch, Loew, Duval and Migneaux, Wollaston, Osten-Sacken, Langstroth, Huxley, Wallace, Leidy, Packard, Scudder, Grote, Norton, Edwards, Trimble, Claparède, Gerstaecker, Lubbock, MacLachlan, Walsh, Thorell, etc., etc.

The vast numbers of insects, their varied forms, beautiful and in many cases splendid colors, wonderful transformations, and their not less wonderful instincts and habits, and the intimate and important relations which they sustain to other animals and to Man, combine to render the science of Entomology exceedingly fascinating and highly important, and worthy the attention it has received and is still receiving from the ablest minds.

The science of Entomology is of the highest importance, when considered merely from the so-called practical point of view; for it teaches what kinds of insects are beneficial to man, and what kinds are injurious, and thus it shows him which to preserve and which to destroy. It makes him acquainted with the habits of insects, and thus enables

him the better to preserve those that are beneficial, and to meet and resist the ravages of those that are injurious to the crops of the field, orchard, and garden, and of those which are injurious to the food and clothing in the store-rooms and closets.

The important relations, however, which insects hold to Man, and the corresponding importance of Entomology, are but little understood except by those who have given some attention to these animals and to this fascinating and exceedingly important science. The masses of men little realize the fact that some kinds of insects destroy millions of dollars' worth of property annually in every country, and that other kinds furnish the world with many of the comforts and even with the luxuries of civilized life—with silks, satins, and velvets, and with dyes whose fame is as old as history and as wide as the civilized world, and even with every drop of black ink which flows from the pen of the schoolboy, accountant, philosopher, and poet.

The position which Insects hold in the Animal Kingdom may be readily seen by the following classification:

Vertebrates.....	Mammals,
	Birds,
	Reptiles,
	Batrachians,
Articulates.....	Fishes.
	Insects,
	Crustaceans,
	Worms.
Mollusks.....	Cephalopods,
	Gasteropods,
	Acephals,
	Brachiopods,
Radiates.....	Tunicates,
	Polyzoons or Bryozoans.
	Echinoderms,
	Aculephs,
Protozoans.....	Polyps.
	Infusoria,
	Porifera,
	Rhizopoda.

It is thus seen that Insects are the highest class of the Articulates; and it is this class with which the science of Entomology exclusively deals. And this class is now to be defined and classified, so far as our limits permit.

Insects are animals whose bodies are divided transversely into rings or joints more or less movable upon one another, and whose hard parts are upon the outside, and whose respiratory apparatus consists of air-holes, called stigmata, placed along the side of the body, and which open into a system of air-tubes which branch throughout the interior of the body, and thus carry air into every part. These air-tubes each consist of two membranes enclosing between them a spirally coiled fibre, thereby having great strength and flexibility. As in all other articulated animals, their alimentary canal occupies the central line of the body, and above it is the dorsal vessel or so-called heart; and their nervous system consists of a sort of brain lying above the œsophagus, from which two threads, passing around and below the œsophagus, extend beneath the alimentary canal along the floor of the general cavity of the body, and connect at certain distances small nervous centres or ganglia, whence arise the nerves of the body and limbs.

The class of Insects is by far the largest in the Animal Kingdom. It is regarded as much larger than all other classes combined. About 200,000 species of insects are already known, and the whole number may be safely estimated as high as 500,000 species. The species are mostly small—many are microscopic in size—but some kinds in the warm regions are several inches, even a foot, in length. The average length, however, is probably much less than one inch. This vast class may be divided into three groups, which Leuckart and many others regard as orders:

INSECTA, OR INSECTS.	I. HEXAPODA, or Insects proper, as Bees, Butterflies, Flies, Beetles, Bugs, Grasshoppers and Dragon-flies.
	II. ARACHNIDA, as Spiders and Scorpions.
	III. MYRIAPODA, as "Galley-worms," Centipedes, etc.

Dr. A. S. Packard, Jr., in his valuable work entitled "*A Guide to the Study of Insects*," gives the following tabular view of the Classification of Insects, which we gladly insert here, as valuable both to the entomological student and to the general reader:

#### THE CLASS OF INSECTS.

Order I.—Segments grouped into three distinct regions; eyes compound and simple; two pairs of wings (some kinds are wingless, and some, as the Diptera, have only one pair); six thoracic legs; one pair of jointed abdominal appendages. A more or less complete metamorphosis.	HEXAPODA, or SIX-FOOTED INSECTS.
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**Order II.**—Segments grouped into two regions, a false cephalothorax (the so-called cephalothorax of Spiders is not like that region in Crabs, the head being much freer from the thorax), and an abdomen; no antennæ; eyes simple; wingless; four pairs of thoracic legs; three pairs of jointed abdominal appendages (spinnerets) often present. No metamorphosis.

ARACHNIDA,  
or  
SPIDERS.

**Order III.**—Body cylindrical and worm-like. Segments not grouped into regions (except in the recently hatched young). Head free; eyes simple; antennæ present; wingless; yolk-sac present for a short period after hatching. No metamorphosis.

MYRIAPODA,  
or  
CENTIPEDES.

These three groups or orders may now be briefly noticed.

**HEXAPODA.**—The first order, Insects proper, is composed of insects which have their body divided into three plainly marked regions—the head, thorax, and hind-body or abdomen. The head is furnished with mouth, eyes and antennæ; to the thorax are appended the legs and wings; and the abdomen contains the principal organs of digestion, and other viscera, and to it also belong the piercer and sting with which many kinds of insects are provided. The Insects proper have only six legs—and hence are often called Hexapod Insects—and these are attached to the under side of the thorax, one pair to each of the three rings of which the thorax is composed. The leg consists of the hip-joint, by which it is fastened to the body, the thigh, the shank, and the foot, the last consisting generally of five pieces placed end to end and called tarsi, and generally armed at the end with one or two claws. The wings are normally four, but in some, as in Flies, etc., there are only two, and in others, as in Fleas, etc., these organs are wholly wanting. The wings of insects are at first little, soft, sac-like bodies containing tracheæ. They grow from the side of the thorax of the pupa at points above the insertion of the legs. During the pupa stage they are pad-like, but when the pupa-skin is shed, they rapidly expand with air and become broad and delicate wings. The wings of insects are thus simple expansions of the general covering of the body spread over a network of horn-like tubes. These tubes, it may be remarked here, are found to be double, consisting of a central air-tube enclosed within a larger tube filled with blood; and hence the aëration of the blood is also carried on in the wings, and thus these organs serve both the purpose of lungs and of flight. And it may be further remarked here that the number and position of these veins are of very great importance to the entomologist in classifying the genera and species of insects. The typical number of primary veins is five. They diverge from the base of the wing, and divide into veinlets, from which cross-veins arise, all together forming a network of veins and veinlets. The five main veins are, beginning at the front edge, the costal, the sub-costal, the median, the sub-median, and internal. Sometimes the median divides into four. The front or costal vein is undivided; the sub-costal and median are divided into several branches; the submedian and internal are generally simple. The piercer mentioned above is properly an ovipositor, and is in some cases a jointed tube, and is used for conducting eggs into holes where they are to be left to be hatched; in other cases it is a scabbard containing a central borer, or saws in some cases, which are used in making holes in which eggs are to be deposited. The sting with which many insects, as bees and wasps, are provided, is merely a modified ovipositor, and consists of a sheath covering a sharp instrument for inflicting wounds, and connecting with it inside of the body is a sac of poison.

The digestive system of insects is quite complicated, and its parts are variously modified in the different groups

parts called mandibles are organs situated on each side of the mouth-opening, and they vary greatly in form and size. They usually consist of a single joint; and this joint or part is often subdivided into three parts, each ending in a sort of tooth for the purpose of cutting food. The cutting edges are opposed to each other, or overlap, and their motion is horizontal or side-wise, instead of vertical as in the motion of the jaws of vertebrated animals.

The parts called maxillæ are much more complicated organs than the mandibles, and are inserted on the under side of the head, and just behind the mouth. Their function is to seize food and retain it within the mouth, and to aid the mandibles in comminuting it. Each maxilla consists of a basal joint, beyond which it is divided into three lobes—namely, the footstalk, the palpus-bearer, and the blade. The maxillary palpi are slender-jointed organs, very flexible and sensitive. Insects have a pharynx, a gullet, a first stomach or crop, a second stomach or gizzard, a small intestine, a cæcum, etc.

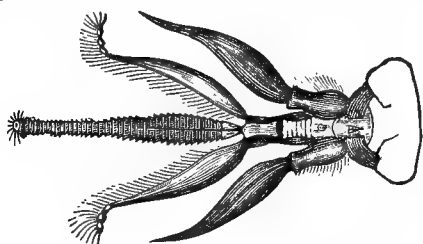
The circulatory system is imperfect, as it exists only in a rudimentary form. Just under the covering of the back there is a long tube which is called the heart, and this organ performs regular alternate movements of contraction and dilatation. The blood enters this tubular organ by openings along its sides, the openings being furnished with valves which prevent its return, and the blood escapes at the foremost end as the organ contracts, and thus the blood is kept in motion throughout the interior of the animal, and thus the waste of the body is supplied and growth secured. The blood of Insects is colorless, and, as already indicated, is not contained in arteries and veins as in the higher animals, but it fills all the interior of the animal not occupied by internal organs, and it permeates the tissues of the organs themselves.

As already indicated, the respiratory system is very different from that of the higher animals. On the sides of the body are generally breathing-holes or stigmata, nine on each side, and these open into air-tubes called tracheæ, which branch throughout the body, carrying air into every part, and thus aërating the blood in the most perfect manner, and thereby fitting these animals for rapid and long-continued motion.

The muscular system of Insects is beneath but continuous with the integument, and it corresponds to the jointed structure of these animals. It consists of straight fibres, more or less isolated, and not gathered into bundles as in the vertebrates, although they are in many cases striated, as in the latter branch. The muscles are colorless, or transparent, or yellowish-white, and very soft. The muscular system is found to be the simplest in the lowest insects, and in the larvæ of all forms; and it is more complex in the head than elsewhere, and more complex in the thorax than in the abdomen. The muscles in Insects are exceedingly numerous. Lyonnet found 3993 muscles in a single larva (*Cossus ligniperda*), 228 of these being in the head. The muscular power of Insects is perfectly enormous. It is stated on good authority that the flea can leap 200 times its own height, that beetles have been known to gnaw through lead pipes, and that the European Stag-beetle (*Lucanus cervus*) has gnawed a hole an inch in diameter through the side of an iron canister in which it was confined!

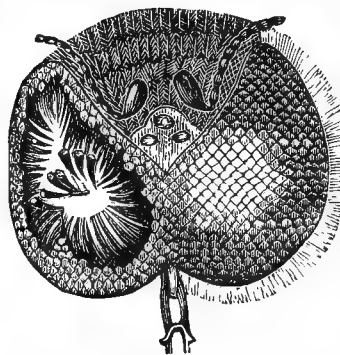
The organs of sight in Insects consist of ocelli and eyes. Theoretically, the ocelli are the most anterior organs of the head, but in the process of development they are carried backward, so that in the adult insect they appear on top of the head. The ocellus is the simplest form of the eye. The ocellus consists of a "very convex, smooth, single cornea, beneath which is a spherical crystalline lens, resting upon

the plano-convex surface of the expanded vitreous humor, the analogue of the transparent cones of the compound eyes." The ocelli constitute the only visual organs of most of the Myriapod, of all of the Arachnid, and of the larvæ of many of the Hexapod Insects. The number of ocelli in adult insects is generally three. These organs are generally present



Mouth and Tongue of the Bee, magnified.

of these animals. In some kinds the mouth parts are modified for biting and chewing purposes; in others they are so modified as to be adapted for sucking organs. The



Head and Eyes of the Bee, magnified.

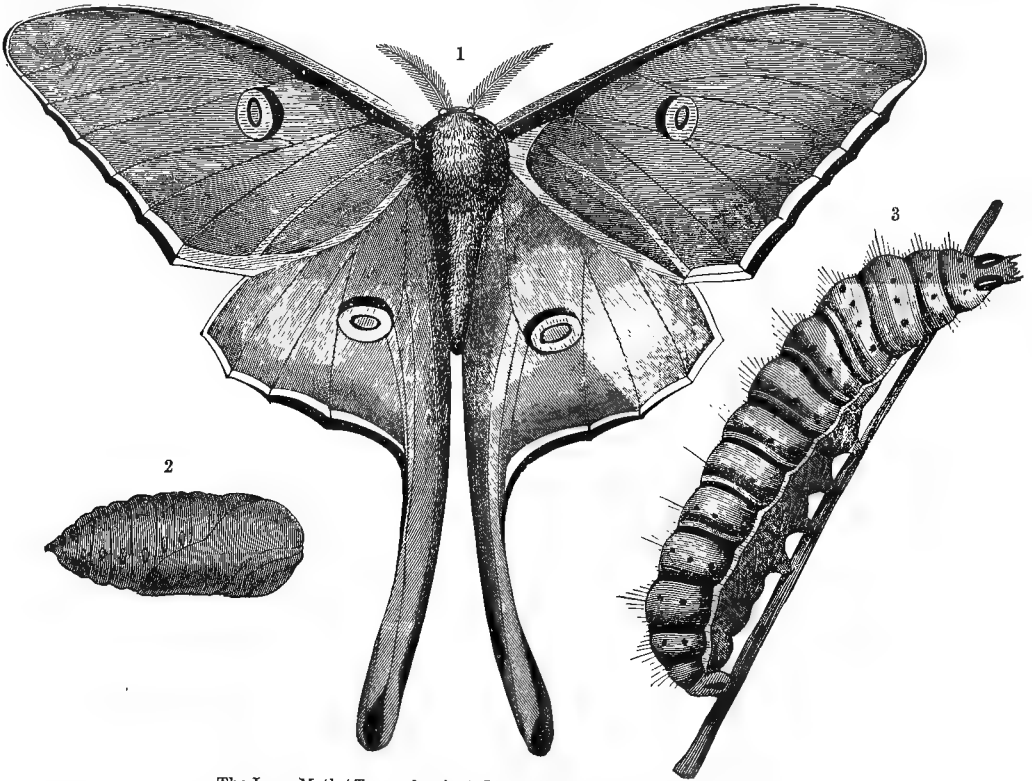
except in the large majority of Beetles. The real eyes of Insects are compound, and are made up of a congeries of simple eyes. During the development or growth of the

insect the simple eyes of the larvæ increase in number, and at length coalesce to form the compound eye. The number of facets or corneæ in the compound eye is very great in some kinds of insects, 3650 having been counted in the eye of a butterfly. The form of the facets is generally hexagonal, but in some species it is quadrangular.

As to the organs of hearing, smell, taste, and touch, but little is positively known. The antennæ seem to serve the purpose of feelers, and it is believed that they are also connected with the sense of hearing. But it should be remarked here that Siebold found an auditory apparatus in the fore legs of some species of grasshoppers.

Their nervous system, as already stated, consists of a double series of nervous ganglions or knots of nervous matter connected by a double cord of nervous threads; and these are situated along the ventral side of the animal, connected, however, with a nervous centre in the head. From these ganglia arise the nerves of the body and limbs.

It is hardly necessary to say that insects are never spontaneously generated, as some persons suppose, but they are produced from eggs, which are hatched after they are laid in some favorable place; or, in some cases, they are hatched in the body of the parent insect, and then brought forth as moving forms.



The Luna Moth (*Tropæa luna*): 1, Imago; 2, Pupa or Chrysalis; 3, Larva.

In passing from the egg state to the adult state, Insects undergo great changes of form and habit. These changes are called transformations or metamorphoses, and they are so great in most cases that the same insect at different ages may easily be mistaken, by one not an entomologist, for as many different animals. There are at least three more or less distinctly marked stages in the life of every insect after it leaves the egg—viz., the larva, the pupa or chrysalis, and the imago state.

In the larva state Insects are more or less worm-like, and consist of thirteen or fourteen apparent segments, besides the head; and they pass most of their time in eating, and as a consequence of this they grow very rapidly. When the larva of an insect has attained its full growth as a larva, it retires to some suitable place, and in many cases it spins a silken covering called a cocoon, then sheds its skin, and appears as a much shortened, oblong, oval, or conical body, apparently lifeless; in this form it is called a pupa or chrysalis. In a majority of species, however, no silken covering or cocoon is made, but the pupa itself is essentially of the same form as those found enclosed in a cocoon. At the end of the pupa state, which varies greatly in duration in the different species, the insect sheds its pupa-skin and comes forth fully grown, and in most species provided with wings; and in this state it is called a perfect insect or imago. After insects enter upon the adult or imago state they do not increase in size. They now provide for a continuation of their species, and then, in most cases, soon perish. All insects which pass through the changes described above are said to undergo a complete transformation. This word "transformation" does not, however, convey the exact idea of the changes, for the changes are those resulting merely from growth and development, and not from true transformations. In a word, the animal is one and the same during all its various forms.

But there are some kinds of insects which do not apparently pass through all the changes enumerated above, but whose larvæ pass by insensible gradations to the pupa state, and from the latter to the perfect insects, all the while remaining in a state of activity. These are said to undergo only a partial transformation. The grasshopper, for example, is hatched from the egg as a wingless insect. It eats voraciously, grows rapidly, hops about without the use of wings, sheds its skin more or less regularly, and appears after each shedding with longer wings and more completely developed limbs, until at length it ceases to grow, and then, shedding the skin for the last time, comes forth an imago or adult grasshopper. The larvæ of those insects which undergo only a partial transformation have only six legs, the same as adult insects. But of the larvæ which undergo a complete transformation, some kinds, as maggots, have no legs; others have a pair of legs to each of the three first segments; others have a pair to each of the three first segments, and, besides these, several fleshy legs, ten or more, placed beneath the abdominal segments, and known as prop-legs.

Insects proper have been variously classified, and different ranks have been assigned to the groups into which they have been divided. According to Packard and others, Insects proper may be divided into seven groups (first proposed by Linnæus) or sub-orders, thus:

1. *Hymenoptera*, as Bees, Wasps, Ichneumons, Ants, Saw-flies, etc.
2. *Lepidoptera*, as Butterflies and Moths.
3. *Diptera*, as Flies, Mosquitoes, etc.
4. *Coleoptera*, as Beetles.
5. *Hemiptera*, as Bugs, Cicadas, Plant-lice, etc.
6. *Orthoptera*, as Grasshoppers, Crickets, etc.
7. *Neuroptera*, as Dragon-flies, May-flies, Ant-lions, etc.

Dr. A. S. Packard, Jr., recognizes two series in these seven sub-orders—a higher and a lower—and arranges them thus:

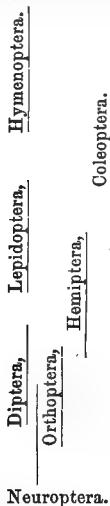
*First and Higher Series.*—Body usually cylindrical; prothorax small; mouth-parts more generally haustellate (formed for sucking); metamorphosis complete; pupa inactive; larva usually cylindrical, very unlike the adult.

*Second and Lower Series.*—Body usually flattened; prothorax large and squarish; mouth-parts usually adapted for biting; metamorphosis incomplete; pupa often inactive; larva flattened, often resembling the adult.

1. HYMENOPTERA.
2. LEPIDOPTERA.
3. DIPTERA.

4. COLEOPTERA.
5. HEMIPTERA.
6. ORTHOPTERA.
7. NEUROPTERA.

In order to show, in a general way, the relative rank of the seven sub-orders and of two series of Six-footed Insects, Dr. A. S. Packard gives the following diagram:



It must be here stated that many naturalists regard these groups as real orders instead of sub-orders; and they stand as orders in many books which the student and reader may have occasion to consult on this subject.

A brief notice of each of these groups may now be given, with such illustrations as will give the general reader a clear idea of some of the characteristic forms in each group.

**HYMENOPTERA.**—The Hymenoptera (*ὑμῆν, hymen*, a "membrane;" *πτερόν, pteron*, a "wing") have four membranous wings, the hind pair the smaller, and all traversed by a comparatively few veins. These insects have four jaws, the upper pair fitted for biting, and the lower pair the longer and softer, and with the lower lip in many cases adapted for collecting honey. The females are provided with stings, but the males have no weapons excepting their jaws. In passing from the egg state to the imago state they undergo a complete transformation. All of the Hymenoptera are diurnal in their habits, and they fly swiftly. They are regarded by Dana as exhibiting the normal size of the Insect type. Of all the Hymenoptera, the Bees are of the greatest popular interest, even if we may not say that they are of the greatest scientific interest; and a volume might well be devoted to their intensely interesting and fascinating history. Thanks to Réaumur, the Hubers, and others, we have volumes of interesting and reliable information in regard to the Hive-Bee (*Apis*), the most wonderful representative of this group.

In general, Bees are eminently social in their habits, and the species are composed of three sorts of individuals—*females or queens, males or drones, and imperfectly developed females or workers*; the last are smaller than the others, and are often improperly called *neuters*. In a single community of the Hive-bee (*Apis mellifica*) there are sometimes 50,000 workers, 2000 males, but only one adult queen. This species has now been introduced in all countries of the civilized world. The celebrated Italian bee is regarded as one of its varieties. The Hive-bee has engaged the attention of the best observers for more than one hundred and fifty years, and many interesting and wonderful things have been found out regarding its structure and habits; but much still remains to be studied in connection with this wonderful insect.

As regards the workers, they are believed to be of two kinds—the nurses, whose function is to build the cells, collect honey, and feed the larvæ; and the wax-makers, which, from the food they eat, secrete wax beneath their

ventral segments, from which it is taken in thin scales. The bee cells are theoretically hexagons with pyramidal bases, and the greater angles are given as  $109^{\circ} 28'$ , and the lesser as  $70^{\circ} 34'$ . I say that the cells are hexagons, theoretically, because it has been shown by Prof. Jeffries Wyman (*Proc. Am. Acad. of Arts and Sci.*, vol. vii., 1866) that the cells are all more or less imperfect when considered mathematically. And it may be added here that it is still an open question as to the exact way in which the form of the cell is secured or brought out. Some naturalists regard the cell as the result of the labor of the bee directed by mere instinct; others believe the bee to be directed in the work by a sort of reason; and others, still, believe that the form of the cell is a necessary result of the labor of bees working together.

The cells are of sizes in accordance with the three sizes—queens, drones, and workers—of bees to be produced. The ordinary cells are arranged horizontally—that is, the comb is made to assume a vertical position; but the queen cells, where the queens are reared, are in a vertical position, mouth downward, and are somewhat pear-shaped, and vastly larger than ordinary cells. The bottoms of the cells of the two tiers do not come directly opposite each other, cell to cell, but the bottom of each cell forms a portion of the bottom of each of three opposite cells, and thus the strength of the cells is greatly increased. The diameter of the cells for the larvæ of the workers is two and two-fifths lines; for the larvæ of the males, three and one-third lines; and the male cells are generally in the middle of the combs.

The bee-larvæ are fed with bee-bread, after it has been worked over in the stomach of the bee; this bread is composed of the pollen of flowers. When bees lose a queen they select an ordinary larva, and by giving it more room and better food they cause it to develop into a queen bee. When the larvæ are ready to go into the pupa state the foster-parents close up the cells with a lid of wax, convex on the drone-cells, and nearly flat on the worker-cells; then the larvæ spin their cocoon. The queen is about sixteen days in coming to maturity; workers twenty days, and drones twenty-four days. The queen sometimes lays 2000 to 3000 eggs in a day, and during her lifetime—perhaps five years—she lays more than a million of eggs. The laying of worker eggs begins in January and February; after this, in the spring, male eggs are laid.

Bees gather the nectar or honey of flowers, pollen, and resinous wax or propolis. When covered with pollen they collect every particle and knead it into little masses, one of which is placed on each hind leg, and in this way it is carried home to the hive. They get the resinous wax or propolis from resinous leaf-buds and leaves, and they use it in finishing the combs and in stopping crevices, etc.

But our space will not allow us to describe these insects at length, and so we may take our leave of them by enumerating here a few of their instincts and habits mentioned above, together with a few others not less wonderful than these. We may here say, then, that when about to swarm Hive-bees send out scouts; they follow their queen; they carefully cleanse their selected abode; they stop all crevices with propolis; they ventilate the hive by the rapid movements of their wings; they guard the entrance; they keep equal spaces between their combs in the hive; they solder the angles of cells and polish the interior; they produce a yellow tinge to the comb, as is believed, by a sort of varnishing; they extract honey from flowers; they collect pollen, and, as is believed, only from one species of flower on a given excursion; they hasten home on the approach of rain; they find their way back after the most extended wanderings; they feed their companions on their return to the hive; they store away the surplus pollen; they swallow pollen and change it into fit food for the larvæ; they feed the larvæ with the right sort of food; they cover the grub-cells with a waxen lid, convex or concave according as the grub is a drone or a worker; they cleanse the cells after the young bees leave them; they retain the young queens in the cells till they are wanted, and they feed them while thus kept confined; they release the queens in the order of their age, the oldest being released first; they cause the queens to fight, and they devotedly follow the survivors, and if they lose their queen they immediately go to work to raise another by giving extra food and room to an ordinary larva or grub; they kill the drones, and drag them from the hive when they are not wanted; and finally, they all have their appropriate parts to perform, and they perform these parts with unerring regularity and in the most perfect manner.

The Humble-Bees (*Bombus*) are in general of large size, and have exceedingly hirsute bodies. They build their nests in or on the ground, and their cells are large, oval, and more or less separate, and their communities are much smaller than those of the hive-bee, but there are in some



cases several hundreds of humble-bees in a single community, and each community arises from a single female which has survived the storms of winter; for the community, as a community, does not survive the winter.

The Wasps (Vespidæ) are other representatives of the Hymenoptera, and like the Bees many species live in colonies composed of females, males, and workers. They construct complex nests under ground or attached to overhanging rocks, to trees, fences, or buildings. These nests consist of tiers of hexagonal cells with their mouths downward, and supported by pedicels; and the cells in a single nest, in some cases, number 16,000. These representatives of the Hymenoptera are especially interesting as being the first paper-makers. Their nests are made of a paper-like substance, which is merely wood reduced to a paste by the action of the jaws of these insects, and this, put into the required form, is left to dry—essentially the same thing that our paper-manufacturers are doing by other processes and on a large scale in their mills to-day. The Wasp communities, like those of the Humble-Bees, are dissolved on the approach of winter; and each female that survives the winter founds a new colony the ensuing spring. Some kinds of wasps, however, are solitary in their habits.

The Ants (Formicidæ) are other members of the Hymenoptera which live in communities composed of females, males, and workers; the two former are furnished with loosely attached wings, and the last are destitute of wings. The workers have the care of the nest and of the rearing of the young; they go in search of food, feed the larvæ, take them into the sunshine in fine weather, and back again into the nest at night or when bad weather comes, and they watch over them with a wonderful fidelity. Most ant-hill communities are composed of individuals of one and the same species; but in some cases the workers procure auxiliaries by visiting the ant-hills of other species, and forcibly taking the larvæ and pupæ and bringing them to their own nest, and there having them reared and trained to work for the community in which they are reared!

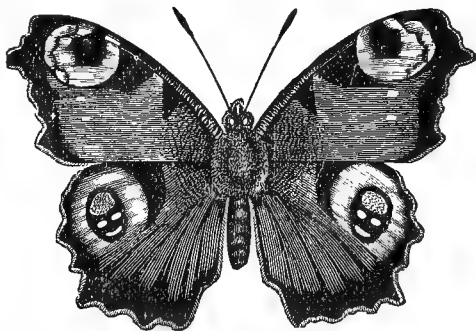
The Ichneumons (Ichneumonidæ) are members of the Hymenoptera which are interesting not only on account of their structure, but because of the fact that they are very destructive to other insects, especially to those, as the Lepidoptera, which in the larva state are injurious to vegetation. They are therefore very useful insects. Ichneumons deposit their eggs on the eggs, larvæ, and pupæ of other insects, and upon these the larva-ichneumon feeds when hatched. These insects have the body long and narrow, the antennæ long, the ovipositor generally long and protected by two thread-like organs of the same length as

punctures cause galls; and the form and nature of the gall depends both upon the kind of gall-fly and upon the kind and part of the plant punctured.

Among the largest of the Hymenoptera are those Boring Saw-flies known as "Horn-tails," which have the body long, nearly cylindrical, and the blunt abdomen ending in a horny point. Beneath this abdomen they have a long saw-like and powerful borer, with which they bore holes into trees, in which they deposit their eggs; and it may be added that their larvæ are among the great host of tree-borers.

There are other saw-flies belonging to the Hymenoptera, but they belong to a separate family—namely, to the Tenthredinidæ. These Saw-flies are of various species, some of which attack the Rose, others the Vine, others the Elm, etc. All have an ovipositor consisting of double saws, lodged under the body and covered by two pieces as a sheath. They are sluggish in their habits. Their larvæ have from eighteen to twenty-two legs, and are found in communities on the leaves of birch and alder, holding fast by their true legs, while the rest of the body is curved upward. Other species, however, appear like slugs on the leaves of the rose and of fruit trees. The larva of the Elm Saw-fly is large, and covered with a thick skin with numerous transverse wrinkles, and when at rest it is coiled so as to somewhat resemble a snail-shell.

LEPIDOPTERA.—The second group of Insects proper—namely, the Lepidoptera (*Aenis*, *lepia*, a "scale;" *πτερόν*, *pteron*, a "wing")—is composed of insects which have



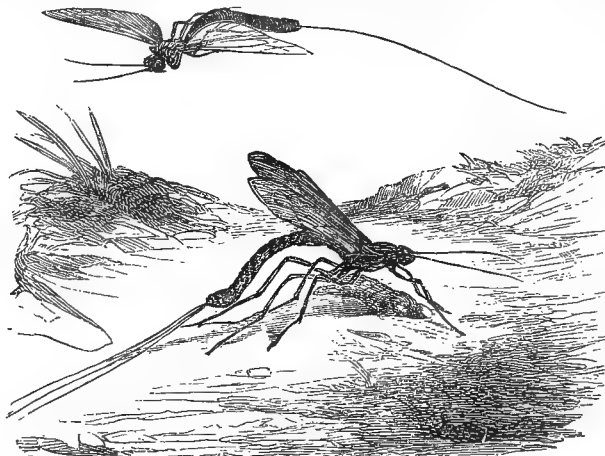
The Peacock Butterfly, *Vanessa Io*.

four wings covered with scales that are easily removed. The Lepidoptera have a tongue consisting of two grooved threads placed side by side, so that the grooved sides come together and form a channel by their junction, and thus the tongue is adapted for sucking purposes; and accordingly these insects drink the dew and feed upon the honey of flowers. When not in use this tongue is rolled up like a watch-spring beneath the head, and more or less concealed on each side by an organ called a palpus. The legs of the Lepidoptera are six in number, but the forward pair is short, and sometimes rudimentary, or wanting. In the larva state these insects are called caterpillars, and they have from ten to sixteen legs. Most kinds of caterpillars feed upon plants. Some kinds eat the leaves, others the blossoms, others the seeds, others the stems, and others the roots. Other kinds, however, eat fabrics, furs, feathers, leather, meat, lard, and even wax. In coming to their full growth as larvæ they usually change their skins four times.

The Lepidoptera include the Butterflies and the Moths. The former are readily distinguished by their knobbed antennæ, and by the fact that they hold their wings erect when they alight. The Moths have variously formed, but never knobbed, antennæ, and their wings are sloping when they alight. All of the Lepidoptera pass through a complete transformation in coming to maturity. Many of the caterpillars of the Moths spin cocoons; many, however, do not, and none of the caterpillars of the Butterflies spin cocoons.

The Butterflies of North America are numerous, and many of them are exceedingly beautiful, as any one may see by examining them, or the splendidly illustrated works of Edwards, and those of Scudder, as well as the illustrations of our butterflies in foreign works.

Of the Moths we have room only to mention the Sphinges or Hawk Moths, and a few of the broad-winged moths. The Hawk Moths (Sphingidæ) are mostly very large lepidoptera, and the wings are long and comparatively narrow. These moths fly with great rapidity, and with few excep-



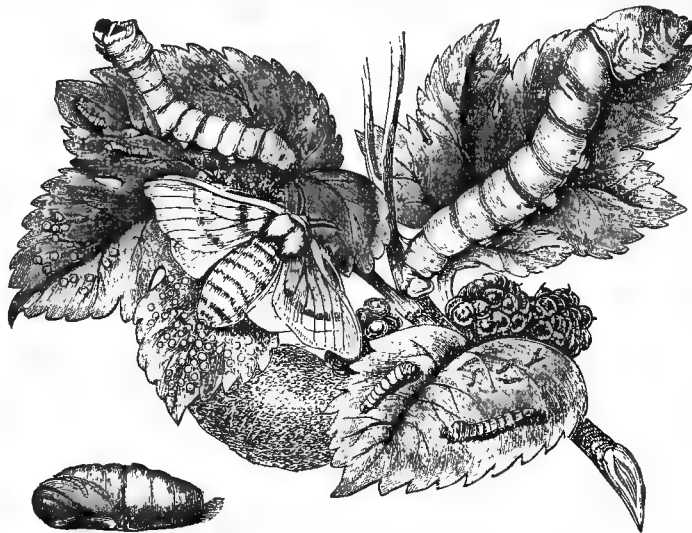
Ichneumon.

the ovipositor itself. The color of the Ichneumon is generally black, varied with red, yellow, or white. Some species, however, are wholly reddish.

Of all the Hymenoptera none are more interesting, considered from one point of view, than the Gall-flies (Cynipidæ), since these small insects, by puncturing a species of oak growing in Western Asia, produce the nut-galls of commerce, and these supply the world with ink. The Gall-flies have the head short and broad, the thorax thick and oval, and the abdomen much compressed and attached to the thorax by a very short peduncle. They are very numerous, and the different kinds attack different kinds of plants. Some species attack the Oak, others the Rose, etc. The females have a long ovipositor, with which they insert their eggs into leaves and other parts of plants, and these

tions they visit the flowers to secure honey in the morning and evening twilight; and as they balance themselves before the petunias and other flowers, by the rapid movements of their wings, they may easily be mistaken for humming-birds. Their tongue is exceedingly long—in some cases five or six inches. The caterpillars of these moths are very large, and they assume curious attitudes. Supporting themselves on their hind legs, they elevate the forward part of the body, and remain for hours in this sphinx-like position.

Some of the broad-winged or Silkworm Moths (Bombycidae), as *Cecropia*, *Polyphemus*, *Luna*, etc., are remarkable for their large size; others, as the beautiful *Deiopeia* and the Wood-Nymphs (*Eudryas*), are remarkable for their beauty; and all in the larva state spin silken cocoons, in



Silkworm, Moth, Larva, and Chrysalis.

which they pass into the pupa state. One of the most common of the small broad-winged moths, is the Tent-caterpillar Moth, which in the larva state lives upon neglected apple trees, and upon wild-cherry trees, and spins the well-known tent-like nests.

DIPTERA. — The Diptera (*dis*, *dis*, "double;" *πτερόν*, *pteron*, a "wing") are so named from the fact that they have only two real wings, the place of the hind wings being occupied by two knobbed threads called poisers or balancers. Their mouth is modified for either sucking or lapping. The sucker or proboscis is composed of two to six bristle-like organs, in some cases as sharp as are the sharpest needles, and either enclosed in the grove of a sheath terminated by two lips, or covered by one or two laminae which serve the purpose of a sheath. They undergo a complete transformation in coming to maturity. Their larvæ are without feet, and are called maggots. The pupæ are in most cases enclosed in the dried skin of the larvæ. Some kinds of dipters, as Mosquitoes, lay their eggs in the water, and their larvæ may be seen in summer in all stagnant pools, where they are popularly known as "wrigglers." They rest with their head downward, and the hind extremity, which contains the respiratory organs, is at such times at the surface of the water. They are very active, and move with a wriggling motion through the water, but come to the surface from time to time to secure air through their respiratory organs. At the end of their larval state they shed their skin, but still remain in the water, and move by means of their hind-body; but now they assume a different attitude, and the respiration is carried on through two tubes situated on the thorax. At the end of the pupa state, which lasts only a few days, the skin splits upon the back, between the breathing-tubes, and the winged insect or imago appears, and after resting a while on its empty pupa-case as it floats upon the water, it flies away in search of a victim whom it may pierce for blood. These kinds of dipters discharge a poisonous fluid into the wounds which they inflict, and this is the cause of the irritation which follows their attacks.

Some species of the Diptera, as the Hessian Fly (*Cecidomyia destructor*, Say) and the Wheat-fly (*Cecidomyia tritici*, Kirby), are very injurious to the farmer, sometimes destroying whole wheat-fields. The Hessian Fly received its name from the popular belief that it was brought to this country, in straw, by the Hessian troops. It is very small,

only about one-tenth of an inch in length. The females lay their eggs on the young blades of wheat, and the eggs hatch in about four days, producing pale red maggots. The larvæ crawl down the leaf, and get between the latter and the main stalk near the joint, and here they injure and often destroy the plant by sucking the sap. The Wheat-fly, on the contrary, lays its eggs in the opening flowers of the wheat, also in those of rye, barley, and oats. In about eight days the eggs hatch, producing little yellow larvæ or maggots, which are found within the chaffy scales of the grain.

Several species of the Diptera are very injurious, or at least annoying, to cattle and horses. One of these is known as the Black Horse-fly (*Tabanus atratus*, Fabricius), another as the Orange-belted Horse-fly (*T. cinctus*, Fabr.), and another the Lined Horse-fly (*T. lineola*, Fabr.). All of these have the eyes very large, covering nearly the whole head, and they have a proboscis enclosing six sharp lancets in the female, and four in the male.

Other members of the Diptera, as the Asilus Flies (*Asilici*), are very long-bodied, and very destructive in their larva state to the roots of plants, and in the adult state they are very rapacious, seizing and destroying other insects.

Other dipters still are the Bot-flies (*Estridæ*), which in the larva state inhabit various parts of the body of herbivorous animals, as horses, cattle, sheep, etc. These flies have very short antennæ, large head, and the wings cover the balancers; and the hind-body of the females has a conical tube bent under the body, and with it they lay their eggs when flying. One species lays her eggs upon the fore legs of the horse, another upon the lips, and another on the throat. By biting the parts where the eggs are laid, the horse gets them into his mouth, and swallows them. The larvæ, by means of hooks, cling to the walls of the stomach till they come to the end of their larval life. Another species (*Estrus bovis*, Fabr.) lays her eggs on the backs of the cattle, and the larvæ penetrate the skin and live there in open sores. Another species (*Cephalomyia ovis*, Linn.) lays her eggs in the nostrils of sheep, and the larvæ crawl into the cavities of the head, and in many cases produce death.

But by far the largest group of all the Diptera is that



Flies.

which Latreille called the Muscidae, which includes about one-third of all the members of this sub-order, and which are known under the popular names of House-flies, Flesh-flies, Blow-flies, Cheese-flies, etc. Meigen has already, a long time ago, described 1700 species of these flies as belonging to Europe, and there is probably even a greater number in this country. These flies have a wonderful power of reproduction. Some species, as the Flesh-flies, are viviparous. Réaumur found 2000 larvæ in a single specimen of this sort.

Among the Diptera there are, as in other groups, some apparently anomalous forms. One of these is seen in the Fleas (Pulicidae), which are wingless flies with hard, com-

pressed bodies, with two simple eyes instead of compound eyes, a sucker-like arrangement of mouth-parts, and hind legs specially adapted for leaping. By many writers the Fleas are regarded as constituting a distinct order—"Aphaniptera" (ἀφανίπτω, *aphanizō*, "to hide;" πτερόν, *pteron*, a "wing"). Other anomalous forms of the Diptera are seen in the Horse-ticks (*Hippoboscæ*), Sheep-ticks (*Melophaga*), Bird-ticks (*Ornithomyia*), etc. These have a horny flattened body, flat head, large eyes, rudimentary antennæ, and a proboscis formed by the labrum and maxillæ. They are parasites, and differ from all other insects in their mode of development. Each female produces only one or two larvæ, and when first hatched the larva is not divided into rings, but is smooth and egg-like, the whole covering being a puparium-like case in which the larva becomes a pupa immediately after it is born. The spider-shaped Bat-ticks (*Nycteribidæ*), which are parasites on the Bat, and the Bee-lice (*Braulina*), minute, wingless, blind insects, parasites on Bees, are other anomalous forms of the Diptera.

**COLEOPTERA.**—The Coleoptera (κολεός, *coleos*, a "sheath;" πτερόν, *pteron*, a "wing") or Beetles are insects whose upper or anterior wings, called elytra, are more or less horny, and they meet in a straight line upon the top of the back; and in general there is a small triangular piece, called scutellum, between their bases. Their hind or under wings are thin, and when not in use are folded longitudinally and transversely. The Coleoptera have two pairs of jaws, which move sidewise, and the larvæ, which are called grubs, undergo a complete transformation in coming to maturity. There are probably more than 100,000 species of these insects, and they present a great diversity of form, size, color, structure, and habits.

Some kinds, as the Tiger Beetles (*Cicindelidæ*), have a large head, globose eyes, long antennæ, and toothed mandibles, and are very rapacious in their habits, devouring other insects, which constitute their principal food. Their larvæ are provided with powerful jaws, and, like the adults, are rapacious in their habits. These larvæ dig vertical holes in the ground, in which they remain, the head just fitting the entrance, and when any insect passes near enough they seize it and devour it.

The Predaceous Ground Beetles (*Carabidæ*) are also rapacious, and several species are known as Caterpillar Hunters, on account of the warfare which they wage against various kinds of lepidopterous larvæ.

Other kinds of beetles, as the Dytiscidæ, are fitted for a residence in the water, and these have their hind legs specially fitted for swimming. They are also exceedingly rapacious, both in the larva and in the adult state, devouring all kinds of small aquatic animals, even fishes.

Other kinds of beetles, as the Gyrinidæ, are found moving in all sorts of curves and gyrations on the smooth surface of standing waters; and these too swim by means of the fringed hind legs.

Some kinds, as the Carrion Beetles (*Silphidæ*), are true scavengers. Living together in great numbers, they perform a most useful service in removing noxious substances. Some species of this family have the habit of burying all the small dead animals which they find. They dig beneath the animal till they sink it out of sight, then deposit their eggs in it; and as soon as the young hatch, the latter begin to devour it, and thus the noxious substance is soon converted into living tissues.

The Dermestidæ are small beetles which in the larva state attack skins and bodies and all parts of dried animals. They often commit great havoc in zoological collections.

The Horn-bugs (*Lucanidæ*) are beetles whose head is very large and broad, and whose upper jaws are very large, curved, and often branched. They fly only in the night. In the grub state they live in the roots and trunks of trees, and some of the species are six years in coming to maturity.

But of all the groups of the Coleoptera, the Scarabæans (*Scarabæidæ*) are one of the most extensive. Here belong the May-Beetle, Rose-Chafers, Goldsmith Beetles, and a host of others. They differ from one another in many important respects, but agree in having a rather short convex form, the antennæ ending in a knob composed of three or more leaf-like pieces, a visor-like piece which extends forward over the face, and their legs are fitted for digging.

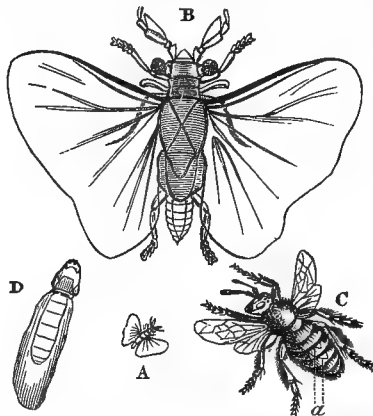
The Buprestians (*Buprestidæ*) are beetles which have the head apparently sunk into the thorax nearly up to their eyes, and the whole form somewhat flattened and very solid.

The lustre is metallic, more or less bronze-like. They are found on trees, and feign death when disturbed. In the larva state they bore the peach, plum, pine, oak, hickory, etc.

The Elaters (*Elatridæ*) are also beetles which have a hard body, and their head sunk to the eyes in the thorax, and the latter is as broad as any part of the body. In the larva state they are called wire-worms, and in this state they devour roots and wood. In the adult state they have attracted much attention from their habit of springing upward with a jerk after they have been placed upon the back.

Some of the representatives of the Coleoptera are very important in their relations to pharmacy. This is true of the Cantharides (*Meloidæ*), extensively used for blistering purposes. They have a broad head, long antennæ, and soft wing-covers, which are more or less bent downward.

The Stylopidæ are minute beetles, so apparently abnormal in their appearance and structure that they have by some naturalists been referred to a distinct order called



*Stylops Dalii*: A, male, natural size; B, the same magnified; C, a bee, with the head of a stylops (a) projecting from between the abdominal rings; D, female, magnified.

"Strepsiptera" (from στρέψω, *strepsis*, a "twisting," and πτερόν, a "wing"). In the larva state these beetles live as parasites in the body of the bee.

Of the small members of the Coleoptera, none are more destructive than the Weevils (*Curculionidæ*). Some kinds of weevils attack the pea, others the plum, others grain, others rice, others stored grain, and others the pine, etc. All of the Curculios are hard-shelled, and the fore part of the head is generally prolonged into a slender snout, at the extremity of which is the mouth armed with small horny jaws. In the larva state they are white grubs.

The Long-horn Beetles (*Cerambycidæ*) are those which have exceedingly long antennæ. When caught they generally make a squeaking noise. The larvæ are wood-borers, and they are the most destructive of all wood-eating insects. In some species they are three or more years in coming to maturity as larvæ; they then go into the pupa state in their burrows, and at length appear as adult beetles. To the Long-horns belong the Oak-Pruner (*Stenocorus villosus*, Fabr.), the Beautiful Clytus (*Clytus speciosus*, Say), the Painted Clytus (*Clytus flexuosus*, Fabr.), the Apple-tree Borer (*Saperda bivitata*, Say), etc.

A large number of beautiful, golden, green, and blue beetles are included under the name of Chrysomelidæ. Their form is hemispherical or oval, the head is sunken, and the antennæ are wide apart. All of these are gayly colored.

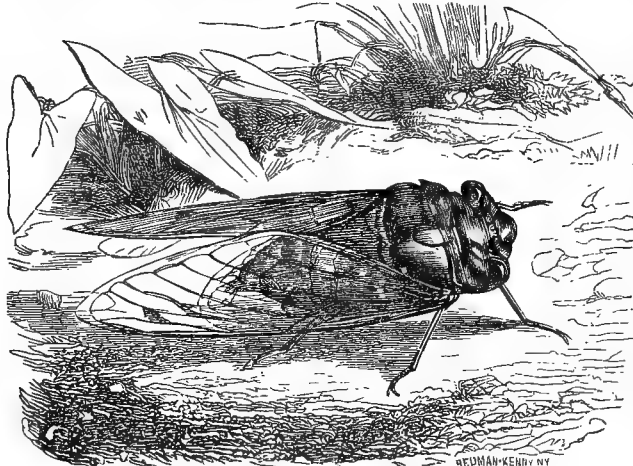
And lastly we may notice the Lady-birds (*Coccinellidæ*) as representatives of the Coleoptera. These are small beetles, more or less hemispherical in form, and of a black, red, or yellow color, ornamented with spots. They are rapacious in their habits, both in the larva and in their adult state, devouring plant-lice.

**HEMIPTERA.**—The Hemiptera (ἡμι, *hemi*, "half;" πτερόν, *pteron*, a "wing") are insects which have the mouth-parts in the form of a slender horny beak, consisting of a horny sheath enclosing three sharp bristle-like organs, the whole being fitted for a sucking apparatus. When not in use this beak is bent under the body, and lies upon the breast. Bugs, Cicadas, Plant-lice, etc. are familiar examples of this group of insects. The Bugs may be regarded as the typical members of the group, as their wings are thick in their basal portion and thin towards their tips; that is, in general terms, half of the wing is of one degree of thickness, and the other half of another degree, and hence the name Hemiptera. As the wings of Bugs thus differ in the two regions, basal and terminal, these insects are often called Hemiptera heteroptera.

On the contrary, other hemiptera, as Cicadas, Plant-

lice, etc., have the wings of uniform thickness throughout, and they do not lie flat upon the back, as in the Hemiptera heteroptera; and having wings of uniform thickness throughout, they are called Hemiptera homoptera. Of the Hemiptera homoptera, few if any are more interesting than the Cicadas or Harvest-flies (Cicadidæ). These insects have a broad head, large eyes, and three eyelets on the crown. Both pairs of wings are transparent and distinctly veined. The males are furnished with an apparatus by which they produce a loud buzzing sound. This apparatus consists of a pair of organs which have been aptly compared to a pair of kettle-drums—one situated in each side of the abdomen, and each formed of convex pieces of a parchment-like membrane, finely plaited, and played upon by means of muscular fibres fastened to the inside; and thus, by the rapid contraction and relaxation of these fibres, the drum-heads are alternately tightened and loosened, and the sounds above named produced. And it may be added here that the intensity of the sounds is greatly increased by other cavities within the body, formed, or at least separated, by thin transparent membranes. The female cicadas are provided with a piercer for perforating the limbs of trees, in which they lay their eggs. This piercer consists of three pieces—two outer ones, which are grooved on the inside, and toothed on the outside like a saw, and a central piece, which is a sort of spear-pointed borer, which moves freely between the other two.

The Cicadas have attracted much attention from very early times. The Greeks, we are told, were charmed with their "singing;" and they often kept these insects in cages that they might enjoy their "music." And the Greeks also used them as food, eating both the pupæ and the perfect cicadas. Our common species are the Dog-day Cicada or Harvest-fly (*Cicada canicularis*, Harris) and the Seventeen-year Cicada (*Cicada septendecim*, Linn.), often incor-



European Cicada.

rectly called the Seventeen-year Locust. It is believed that the latter insect appears in the same locality only at intervals of seventeen years, and hence its specific name. The Seventeen-year Cicadas come in swarms in the early part of summer, and the forests then resound with their singing from morning till night. After pairing, the females lay their eggs. Selecting small branches, they clasp them with their legs, and then they repeatedly thrust their piercers obliquely into the bark and wood in the direction of the fibres, and at the same time they detach little splinters of wood at one end, and these serve as a fibrous cover to the perforations. After thus forming a fissure, they deposit therein from ten to twenty eggs, which are conveyed to their places by means of the grooved side-pieces of the piercers. When one fissure is filled, another is made and filled, and so on, till each female has deposited her whole stock of four or five hundred eggs. When the eggs hatch, the young fall to the ground and immediately burrow to the roots of the tree, upon whose juices they subsist. They live in this way till the time of their transformation approaches, when they gradually ascend towards the surface, and at length they leave the ground, generally or always in the night, and crawl up the trunks of trees, where they fix their feet firmly to the bark. Their covering is now dry and hard. After some effort they open a longitudinal fissure in the skin of the back, and through this opening the perfect Cicada comes forth, leaving its dry and empty pupa skin attached to the tree.

Other examples of the Hemiptera homoptera are seen in the little Tree-hoppers (Cercopidæ) which are found upon

grass, herbs, and trees, upon the sap of which they subsist, imbibing such quantities that it oozes out of their bodies in the form of little bubbles, thus soon covering the insect in a mass of frothy foam. Of all the Hemiptera, none are more remarkable than these for their curious, and, in many cases, grotesque forms.

Of the very small and minute Hemiptera homoptera, none perhaps are more remarkable than the Plant-lice (Aphidæ) and the Bark-lice (Coccidæ). The former have on the hind part of their short body two minute tubes or pores, from which exude minute drops of a sweet fluid. And this fact explains the reason why ants collect in great numbers wherever plant-lice abound, for the ants delight to feed upon this honey-like fluid, and the most friendly relations exist between these two kinds of insects. The ants even caress the plant-lice with their antennæ, apparently soliciting them to give out the sweet fluid; and it is stated, on what seems to be good authority, that an aphid or plant-louse has been seen to give a drop of fluid to each of a number of ants waiting to receive it! The Aphidæ multiply with astonishing rapidity, and in this multiplication they admirably illustrate what has been called Parthenogenesis.

It is well understood among physiologists that it is the contact of the male sperm-cell with the yolk, which fertilizes the egg, and that from the moment of this contact the life of the embryo, which is to be the future animal, begins. This fertilization of the female germ by means of the male element through the pairing of the sexes, is the general rule among bisexual animals. But among insects there are exceptions, so that in some species an embryo may, and does, begin its life without the interposition of the male; and this mode of reproduction has been called by Owen, Parthenogenesis.

The young aphides are hatched in the spring from impregnated eggs laid the previous autumn, and soon they come to maturity, and the whole brood consists of wingless females. These females bring forth living young, each female producing in some cases twenty in a day. These young are also wingless females, and soon they bring forth living young, which are also wingless females, and in their turn bring forth living young. And in this way brood after brood is brought forth, even to the fourteenth generation, in a single season; and this, too, without the appearance of a single male. But the latest brood in autumn is composed of both males and females, which have wings; these pair, stock the plants with eggs, and then perish. We get some idea of the rapidity of the multiplication of these animals when we remember that Réaumur has proved that a single plant-louse may become, in five generations, the progenitor of 6,000,000,000 descendants!

The Bark-lice (Coccidæ) are Hemiptera in which the males alone are winged; the females always remaining in a sort of scale-like form, such as may be found at all times on the apple tree. Coccidæ are famous for the dyes which they have furnished the world for hundreds and even thousands of years. They furnished the *Kokkos* of the Greeks, the *Coccus* of the Romans, the *Kermes* of the Arabs, the *Alkermes* of the Persians; and the *Scarlet Grain* of Poland and the *Cochineal* of Mexico are insects of this family of the Hemiptera.

Some kinds of the Hemiptera, as the Boat-flies (Notonectidæ), live in the water, and are noted for their habit of swimming on their backs; others, as the Scorpion-bugs (Nepidæ), live in the water, and are adapted for seizing prey by their fore legs, which flex upon themselves, and thus act as pincers; others, as the Water-measurers (Hydrometridæ), are found on the water, over the surface of which they move with a gliding motion.

To the Hemiptera also belong the Squash-bugs (Coreidæ), the minute insects included in the Thripsidæ, the Bed-bugs (Cimicidæ), and the Lice (Pediculidæ).

ORTHOPTERA.—The Orthoptera (*ὀρθός*, *orthos*, "straight," *πτερόν*, *pteron*, a "wing"), named from the nature of their wings, which lie straight along the back, have their upper wings rather thick, the under ones the larger and thinner, and folded in plaits like a fan. As already shown in our general remarks, they do not undergo a complete transformation, but they pass by insensible gradations from the larval to the adult stage, all the while remaining active.

Some kinds, as the so-called Earwigs (Forficulidæ), have the body flattened and armed at the hind extremity with a pair of pointed nippers. Others, as the Cockroaches (Blattidæ), have the body broader, flattened, and the hind extremity furnished with conical articulated appendages.

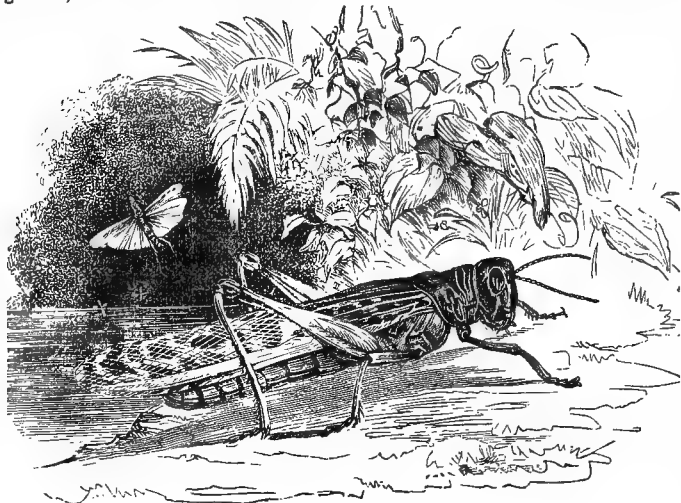
Others, as the Walking-sticks and Walking-leaves (Phasmidæ), closely resemble twigs and leaves. Others, as the Mantids (Mantidæ), are much elongated, and have the fore legs formed for seizing and holding prey; and they sit for hours holding up their fore legs, ready to seize any insect within their reach. Still others, as the Crickets (Gryllidæ), have an oblong flattened body, long stylets at the hind extremity of the body, and the females are provided with a very long ovipositor for introducing their eggs into the ground; and the males have the membranes and nervures

jointed antennæ, and the abdomen has two long-jointed appendages. In the larva and pupa state they are found under stones in the water. Some families, as the May-flies (Ephemeriidæ), are very short-lived, living in the imago state scarcely more than a few hours or a day, although their larva and pupa state extends through several years, all of which they pass in the water.

The Dragon-flies (Odonata) are among the best representatives of the Neuroptera, and have a long body, exceedingly large eyes, powerful jaws, and large and lustrous wings. They fly with great velocity and remain long upon the wing. In the larva and pupa state they live in the water; and when the time comes for them to complete their transformation, they crawl up the stems of plants, and, having withdrawn from the pupa-skin, which remains fixed to the plant, and having become dry, they fly swiftly away. At all periods of their life they are exceedingly rapacious, feeding upon all insects which they can capture.

To the Neuroptera also belong the Horned Corydalis and its allies (Sialidæ), the Ant-lions and other Lacewings (Hemerobini), and the Caddice-flies (Phryganidæ). The Ant-lions are famous for the pitfalls which, while in the larva state, they make in the sands, and at the bottom of which they lie concealed, all but the jaws, and there await insects which fall into their pit; these they at once seize and devour.

Some of the Neuroptera are wingless, and are called degradational forms, and closely resemble the Myriapoda. Such are the Spring-tails (Thysanoura or Podaridæ), which have a cylindrical scaly or hairy body, short and four- to six-jointed antennæ, four to eight simple eyes on each side, and whose anal bristles are united and bent under the body, forming a sort of spring by means of which these insects leap. They are seen in gardens, and also on the surface of pools of water. Such also are the Bristle-tails (Lepismatidæ), which have a long body covered with silvery-like scales, and the abdomen furnished with three long bristles. They are found among old books and woollens, and also under stones and rubbish in damp situations. The species of both these families are small, the largest rarely having bodies over an inch in length.



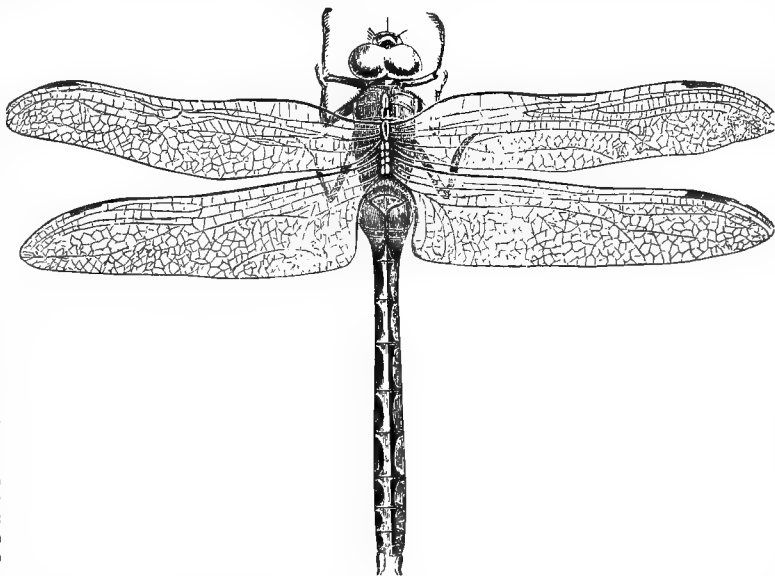
The Crested Locust (*Locusta cristata*).

at the base of the wings so specialized that, by the rubbing the wings upon each other, they can produce a sound known as a chirrup. Others, as the Locusts (Locustidæ), are grasshopper-like, and have very long antennæ and four jointed tarsi, and the females have a long ovipositor. Some kinds of the Locustidæ, as *Ceuthophilus*, are wingless and live under stones; others, as the Katydid (*Cyrtophyllus concavus*, Scudder), have the wings broad in the middle, and concave; others, as the Oblong Leaf-winged Grasshoppers (Phylloptera), have the wing-covers shorter than the under wings; others (*Phaneroptera*) have the ovipositor curved sharply upward; others (*Conocephalus*) have the head ending in a conical projection; and others (*Orchelimum*) have the ovipositor sabre-like in form.

The Migratory Locusts and their allies (*Acriddia* of Latreille) are orthoptera which have a large head, short antennæ, three-jointed tarsi, instead of four-jointed, as in the Locustidæ, and they have no projecting ovipositor. Such are the Red-legged Locusts (*Caloptenus*), the Coral-winged, and the Carolina Locusts (*Eidippoda*), etc.

NEUROPTERA.—The Neuroptera (*νεῦρον*, *neuron*, a "nerve;" *πτερόν*, *pteron*, a "wing") have a long body, and four long, thin, membranous, and finely-netted veined wings, the anterior pair generally, or at least sometimes, being the smaller; in some genera, however, the hind pair is the smaller, or even obsolete. These insects have large eyes and large mandibles. They are destitute of weapons, except their jaws, being without a sting or piercer. Most of the Neuropters are aquatic in the larva and pupa state. Many species do not undergo a complete metamorphosis.

Some of the representatives of the Neuropters, as the White Ants or Termites (Termitidæ), inhabit only warm countries, and in the larva state feed upon wood, devouring all kinds of wooden furniture, and even whole houses, as they have done in the Isle of France. Those called Stone-flies (Perlidæ) are oblong, depressed, and have many-



Dragon fly (*Eschna*).

ARACHNIDA.—The Arachnida are insects which have the body divided into only two well-marked regions, the head and the hind-body, the head and thorax being closely united into one piece, thereby resembling in this respect the head and thorax of the Crustaceans. The Arachnids have simple eyes, four pairs of legs, attached to the thorax, and they are without antennæ, compound eyes, and wings; and they do not change in general form in coming to maturity, which they reach after moulting the



skin six times. The Arachnids are divided into three sub-orders:

1. *Araneina*, or Spiders proper.
2. *Pedipalpi*, or Scorpions.
3. *Acarina*, or Mites.

**ARANEINA.**—The Araneina (*aranea*, a "spider"), or Spiders proper, have mandibles formed exclusively for biting, a more or less spherical abdomen, which is not divided into segments, and this abdomen is attached to the cephalothorax by a slender pedicel. They perform their respiration by means both of lungs and tracheæ, and they undergo no metamorphosis in coming to maturity. The mandibles end in a powerful hook, in the end of which there is an opening to a duct which connects with a poison-gland situated in the head. The palpi resemble shorter legs; they are in fact the maxillæ. In the female they are simple, but in the male the terminal joint is modified so as to be a sexual organ. Most species of Spiders have eight ocelli, but some have only six, some have only two, and certain cave species are said to be blind.

One of the most curious things about Spiders is their silk-spinning apparatus. On the abdominal extremity there are from four to six protuberances, each of which is perforated with a great number of minute holes—in some species as many as a thousand in each protuberance. From these minute holes passes the adhesive fluid or liquid silk, which has its origin in internal reservoirs; and as soon as the fine streams of this material come to the air they harden into silk. It is said that the Spider has the power of uniting all the minute fibres into one or into several threads, according to the use it would make of the silk. The Spiders' webs are very curiously constructed, and well repay the most careful observation and study.

The eggs of Spiders are enclosed in cocoons spun from the same kind of material of which they construct their webs, and the form of the egg-cases or cocoons varies according to the species. The young remain in the cocoon for a long time, and grow to double the size which they have when hatched, apparently without food.

The Tetraneumonæ are large hairy spiders which have four lung-sacs and four stigmata, and two pairs of spinnerets. They live in cylindrical holes which they make in the earth. They are found mainly in warm climates. Here belong the Trap-door Spiders, described by some writers under the name of *Territelariæ*, or "Under-ground Weavers," and by others under the name of *Mygale*. These spiders are named from the fact that they close the entrance of their burrows with a sort of trap-door. This door is made of earth lined beneath with silk, or in some species it is wholly of silk.

The Dipneumonæ, including all true spiders except the preceding family, have two lung-sacs, two or four stigmata, and three pairs of spinnerets. Some of the species of this family are known as the "Wanderers," others as the "Sedentary" spiders. The latter spin webs, and watch them that they may secure prey. Some kinds (*Clubione*) construct tubes of silk under the bark of trees and under stones. Others, as the Water Spider (*Argyroneta aquatica*, Linn.) of Europe, live under the surface of the water, there making their nest, which is filled with air. Others (*Tegenaria*) make a horizontal web, connected with which is a tubular retreat, where the spider remains till some fly or other insect becomes entangled in the web. Those belonging to the genus *Theridion* have the four inner ocelli larger than the four outer ones, and the first and last pair of legs longest; and they make webs of threads crossing in all directions. The genus *Epeira* includes those which have a large globular abdomen. They are sedentary species, constructing a web formed of spiral threads, and other threads radiating from a centre. *Nephila* is a genus of large spiders characterized by a long, cylindrical abdomen. *Nephila plumipes* of the Southern States has become celebrated from the interesting experiments made with it by Dr. B. G. Wilder, in the production of silk. The genus *Thomisus* includes "wanderers" which have very small cheliceres. *Dolomedes* includes wanderers which hide under stones, and not unfrequently dive under water, and which

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make an orbicular cocoon which is carried by the mother. *Lycosa* is a genus of large hairy spiders, with large cheliceres, with the fourth pair of feet the longest, and the third pair shortest. The species make no silk. They



The Tarantula of Europe, *Lycosa tarantula*.

hide under stones. The Tarantula belongs to this genus. The genus *Salticus* includes the leaping Spiders; they have a large square cephalothorax, and the hind-body is of an oval cylindrical form.

**PEDIPALPI.**—Here belong the Scorpions and allied forms. They have the maxillary palpi greatly enlarged, and in most cases ending in forceps, and their abdomen is distinctly jointed; and in the true scorpions the hind-body is very long, and ends in a curved point or sting which discharges a poisonous fluid contained in an internal reservoir.

The True Scorpions (Scorpionidæ) have enormous forceps-like maxillæ. The False Scorpions (Pseudo-scorpiones) are minute forms which have maxillary palpi resembling the claws of the true Scorpions. They are often found in old books and in neglected drawers. The Harvestmen, or Daddy Long-legs (Phalangidæ), have a cephalothorax which is not jointed, the abdomen is short and thick, and the maxillary palpi end in a single claw, and the mandibles end in forceps, and their legs are excessively elongated.

**ACARINA.**—The Acarina or Mites are arachnids which have oval or rounded bodies which exhibit no articulation or divisions into segments, the cephalothorax and abdomen being merged together. Most of the species are very minute in size; a few, however, as the Ticks—which are the largest of all—attain the length of half an inch. The Red Mites (Trombididæ) are common in hot-houses and in hot-beds, and in the dry warm beds of the garden. The Water-mites (Hydrachnidæ) are found in both fresh and salt water. The Ticks (Ixodidæ) are large mites with leather-like bodies, and they attach themselves to man and animals, especially in warm countries. Some species, however, are found in temperate regions. Of the true Mites (Acaridæ), we may mention the Sugar-mite (*Tyroglyphus sacchari*), common in unrefined sugar; the Cheese-mite (*Tyroglyphus siro*), the Flour-mite (*Tyroglyphus farinæ*), the Itch-mite (*Sarcoptes scabiei*); the last being the insect which, by burrowing and breeding under the skin, causes the loathsome disease which bears its name; and to the true Mites belong various species inhabiting domestic animals, and which entomologists refer to the genus *Dermatodectes*; and here also belongs the curious animal known as the Nose-mite, which buries itself in the follicles of the human nose.

**MYRIAPODA.**—The insects which belong to this order are more or less worm-like, and are composed of ten to two hundred or more segments. The head is free from the body, and is similar to that of typical insects. They may be divided into two sub-orders:

1. *Chilopoda*.
2. *Chilognatha*.

**CHILOPODA.**—The sub-order of Chilopoda (*χείλος, cheilos*, a "lip," and *πούς, ποός, pous, podos*, a "foot"), or the highest group, includes those myriapods which have each segment or ring simple, and bearing but a single pair of feet, and which have the head divided into two regions, one before and the other behind the mouth. To this sub-order belong the so-called "Earwigs" (Lithobiidæ), which have a broad and flat head and forty-jointed antennæ, and which feed mainly upon earth-worms; the Centipedes (Scolopendridæ), which have from twenty-one to twenty-three feet-bearing segments, and which in some species, as those of the tropics, are six to nine inches long; and the Geophilidæ, which are characterized by their slender form, and by their great number of segments, varying in the different species from thirty to two hundred, each formed of two complete sub-segments, and bearing only a single pair of feet.

**CHILOGNATHA.**—The Chilognaths (*χείλος, cheilos*, a "lip,"

*γνάθος*, *gnathos*, a "jaw") have very short and few-jointed antennae, very numerous segments, and each segment has two pairs of feet. Here belong the Millipedes, also known as "Thousand Legs" (*Julidae*), which have the body long, nearly cylindrical, and made up of numerous nearly equal segments. And here also belong the Polydesmidae, which have the body broad and flattened and the head large; and the Glomeridae, which have the form of the body half cylindrical, and composed of twelve or thirteen segments, the head large and free, the first thoracic ring small, and the last ring of the body shield-shaped.

And now, having given a brief outline of the nature and of the history of the science of Entomology, and having described and illustrated a few of the more important typical forms of which it treats, we leave the subject with our readers, commending it as one worthy of the attention of the ablest minds. SANBORN TENNEY.

**Entomost'raça** [from the Gr. *ἐντομον*, an "insect," and *στράκα*, a "shell"], one of the orders of crustaceans, including those species having normally five or six cephalic segments in the form of a shell, and five or more rings of the foot series, the hinder ones being generally obsolete. The abdomen has no appendages. The species of this division are very numerous, and most existing species are of small size, except the king-crab (*Limulus*), which some recent theorists place in a new order by itself. Many of them are found in fresh and salt water, and some are parasitic. They differ greatly in general form, and in the number of their organs of locomotion, which in some species are more than 100, and in others are entirely absent. The order includes the carcinoids, ostracoids (with the cirripeds), limuloids (doubtful), and rotifers. Entomost'racean shells are peculiarly abundant in certain palaeozoic rocks. They first appear in the Silurian strata.

**Entozo'a** [from the Gr. *ἐντός*, "in" or "within," and *ζῶον*, an "animal"], a name applied to those animals which dwell within the bodies of other animals. They belong to the Vermes (true worms), the lowest form of articulate animals. They are divided into (1) cestoid worms, or tape-worms, which are all more or less jointed, of a ribbon-like form, each joint of hermaphrodite conformation, and dwelling in the intestines. The embryonic worms penetrate the tissues, become surrounded by a cyst, and are known as "cystic" worms. They have no alimentary canal. (2) The flukes or trematode worms, of flat oval form, smooth, soft, and not jointed. They have an hermaphrodite development, the sexual organs pervading a great part of the body of the adult. They afford many wonderful examples of the so-called alternate generation and of parthenogenesis in some of the generations. The disease called "rot" in sheep is caused by their presence in the biliary passages. In man they cause the hematuria prevailing at the Cape of Good Hope and the endemic dysentery of Egypt. They inhabit the liver, kidneys, lungs, etc. Among the genera are *Distoma*, *Bilharzia*, and many others. When perfect, they have an alimentary canal without vent. (3) The Nematelmia or round worms, having long, cylindrical forms, and in the more perfect forms an intestinal canal with mouth and vent, and distinct sexes. This class includes pinworms, *Ascarides*, the *Trichina*, the Guinea worm, and many others.

**Entre Douro e Minho** ("between the Douro and the Minho," rivers which bound it on the S. and N. respectively), a province of Portugal, is bounded on the N. by Spain, on the E. by Traz os Montes and Beira, on the S. by Estremadura, and on the W. by the Atlantic. Area, 2808 square miles. It is the most populous, the richest, and the best cultivated province of the kingdom. Everywhere are fertile valleys, rich meadows, fields, and vineyards. The products are fruit, wine, oil, figs, oranges, barley, rye, and wheat. Chief town, Oporto. Pop. 982,735.

**Entre Rios**, *ên'trà ree'òs* (i. e. "between the rivers"), a province of the Argentine Republic, is bounded on the N. by the province of Corrientes, on the E. by the river Uruguay, and on the S. and W. by the Paraná. Area, 52,110 square miles. The surface is level, and partly occupied by swamps and prairies or grassy plains. Many cattle and horses feed on these plains. The chief exports are hides, horns, and tallow. Pop. in 1881, 134,235. Capital, Concepcion.

**Entry**, the act of entering. In criminal law, in addition to breaking, entry is necessary to constitute the crime of burglary, but this need not be with the whole body. If the hand or any part of the body goes into the building with intent to commit a felony, it is sufficient; and if only the instrument intended to be used in the commission of the crime enters, it is enough to constitute the offence.

In the law of real estate, entry is the taking actual possession of land. A writ of entry was a common-law action,

now disused, to recover the possession of land from one who wrongfully withheld it. Any going upon the land of another is often termed an entry, and unless done with the permission of the owner, is in most instances unlawful and a trespass.

**En'velope** [from the Fr. *enveloppe*, to "wrap up," to "cover," "enclose"], in geometry, a curve or surface generated by the repeated intersections of given curves or surfaces, whose position, form, and magnitude are allowed to vary according to some invariable law. A tubular surface is the envelope generated by a moving sphere of constant radius; the plane curve is the envelope of its tangent, etc.

**Envelopes**, for letters, are a comparatively recent development of civilization, the demand for them having been created by cheap postal service. They were at first cut, folded, and gummed by hand, but the great call for them stimulated the production of machines for doing the work. These machines are of various kinds; and, not to specify the names of the somewhat numerous rival inventors, it may be remarked that in latter years these machines turn out surprising numbers of envelopes, and that the quality of the work is absolutely perfect—very far ahead of what could be done by hand. Stamped envelopes for letters and newspapers are issued and sold by nearly all civilized governments, but the products of private enterprise are more generally used.

**En'voy** [from the Fr. *envoyer*, to "send" (that is, to "put or start on the way"), from *en*, "in" or "on," and *voie*, "way"], a person sent on any mission, but particularly one sent on business to a foreign court; a diplomatic minister of the second order; one who is inferior in rank to an ambassador, and who cannot demand a private audience of the sovereign to whom he is accredited, but must negotiate with the minister of foreign affairs. Besides the ordinary envoy, there is a class of diplomatists styled envoys extraordinary and ministers plenipotentiary.

**Envoy Extraordinary and Minister Plenipotentiary**, the title of the principal representatives of the U. S. government at the capitals of the following nations: Great Britain, France, Russia, Germany, Austria, Italy, Spain, China, Brazil, Mexico, Peru, and Chili. They rank next below ambassadors and next above ministers resident. They are appointed by the President and confirmed by the Senate. Their salaries are as follows: ministers to Great Britain, France, Russia, and Germany, each \$17,500 annually; to Peru and Chili, \$10,000; to the other countries mentioned, \$12,000.

**Eny'o** [Gr. *Ἔνυ*], the goddess of war in the Greek mythology. (See BELLONA.)

**Enz'ina** (or *Encina*), *de la* (JUAN), a popular Spanish poet, born in Old Castile in 1468. He was patronized by King Ferdinand V. In 1496 he published a volume containing several comedies and odes and a poem called a "Vision of the Temple of Fame." He is considered the founder of the Spanish theatre. Among his dramas, which are remarkable for purity of style and natural imagery, is "Placida y Victoriano." He performed a pilgrimage to Palestine in 1519. Died in 1534.

**Enzio**, or *Enzo*, a natural son of the emperor Frederick II. of Germany, was born about 1224. He fought for his father against the pope and the Guelphs, and assumed the title of king of Sardinia. Having obtained command of the imperial fleet, he gained a great naval victory over the Genoese in 1241. In 1249 he was taken prisoner by the Guelphs, who confined him until his death in 1272.

**E'ocene** [from the Gr. *ἠώς*, "dawn," and *καινός*, "recent," that is, belonging to the dawn of the cenozoic period], in geology, a term applied to the lower tertiary strata, and originally suggested by the occurrence in those strata of a few faint dawnings of living species of fossils. The term was originally limited by the percentage (34) of recent or living to extinct species found in a collection of older tertiary shells of the Paris basin, but it is now known that all the eocene species are extinct. The eocene beds rest on the chalk, and occupy small areas compared with the older formations. They are generally well developed in the vicinity of the three great capitals of Western Europe, London, Paris, and Brussels, each of which is built on a special tertiary basin of this period. They contain many interesting fossils of vertebrates, mollusks, radiata, etc. The eocene strata are divided into upper, middle, and lower eocene. The London clay belongs to the lower division.

In America the eocene strata form a belt of outcrop extending from New Jersey around, parallel with the Atlantic and Gulf coasts, to the Mississippi, and are represented in the interior of the continent by certain estuary and freshwater deposits of Wyoming Territory, etc. On the west coast the eocene has not been distinctly recognized. In

Eastern America the eocene strata are divided into the Claiborne, Jackson, and Vicksburg beds, of which the last are most recent. They contain numerous fossils, mostly marine mollusks, but also include some gigantic vertebrates, as *Zeuglodon cetoides*, a carnivorous cetacean seventy feet in length, and *Carcharodon megalodon*, a shark of which the teeth are sometimes six inches in length. Leaves and fruits occur in the eocene at Brandon, Vt., and in Mississippi. Like the flora of the European eocene, they indicate a tropical or sub-tropical climate. The eocene beds of Wyoming have furnished the remains of a remarkable group of mammals, which are thought by Prof. Marsh to form a new order, which he has named "Dinocera." The largest of these (*Dinoceras mirabilis*) had the bulk of an elephant, and was provided with three pairs of horns and a pair of great sabre-like canine teeth. Many other vertebrate remains from these deposits have been described.

**Eohippus.** See APPENDIX.

**Eolian Harp.** See AELIAN HARP.

**Eon de Beaumont, d'** (CHARLES GENEVIÈVE LOUIS AUGUSTE ANDRÉ TIMOTHÉE), called **Chevalier d'Eon**, a French diplomatist and writer, born at Tonnere Oct. 5, 1728. He was employed in an important mission to Russia in 1755, and served as captain in the French army in 1759. About 1761 he became minister plenipotentiary in London, but he was soon deprived of that office by secret intrigues of his enemies in Paris. He remained as an exile in England for many years, during which much sensation was excited by a report that he was a female. He returned to France in 1777, after which he wore the female dress, in compliance, it is said, with the order of the king. He died poor in London May 21, 1810.

**Eon (or Eudo) de Stella**, a fanatic of the twelfth century, an ignorant (and perhaps insane) nobleman of Bretagne, who, having heard, during the act of exorcism, the words "through Him" (*per Eum*, etc., in Latin) "who will come to judge the quick and dead," concluded, from the resemblance between his own name *Eon* and the Latin *Eum*, that he was the one appointed as the final judge of mankind. He taught a reformed doctrine, and gained many disciples. He was captured in 1143, and many of his followers (called Eonians) were burned, but Eon himself was pronounced insane, and seems to have been spared.

**E'os** (Gr. ἠώς, the "dawn"), in the Greek mythology, a daughter of Hyperion, a sister of Helios (the sun), and the wife of Tithonus. (See AURORA.)

**Eosine.** See PHTHALIC-ACID COLORS.

**Eötvös, or Eoetvös** (JOSEPH), FREIHERR VON, an eminent Hungarian author and statesman, born at Buda Sept. 3, 1813, was educated at the University of Pesth. About the age of twenty he produced "Revenge," a tragedy, and two successful comedies entitled "The Critics" and "The Wedding." His "Carthusian" (1838-41), a novel, was generally admired. He also gained distinction as a political writer and orator of the popular party. Among his works are a political novel entitled "The Village Notary" (1844-46), which was translated into English, a work on the "Equal Rights of Nationalities" (1851), and another on "The Influence of the Ideas of the Nineteenth Century" (2 vols., 1851-54). He was minister of public instruction in 1848, but he resigned the same year. In 1865 he began to edit a political paper. In 1867, after the reconciliation between the Magyars and the emperor of Austria had been effected, he was again appointed minister of public instruction, which place he retained until his death. Died Feb. 2, 1871.

**Eozo'on** [from the Gr. ἠώς, the "dawn," and ζῷον, an "animal," implying an animal existing at the dawn of creation], one of the oldest geological representatives of animal life, a gigantic marine animal whose remains have been found in the Laurentian rocks of Canada. The *Eozo'on Canadense* belonged to the Foraminifera, animals of very low organization, even lower in the scale than sponges. It had no proper organs, but consisted probably of a jelly-like mass, having the power of secreting a calcareous shell. It was doubtless sessile, adding as it grew crust after crust of chalky matter, probably living on from age to age until it constituted whole beds of limestone. What are supposed to be other species of *Eozo'on* have been found in the oldest rocks of Europe. The organic character of *Eozo'on* is denied by many palæontologists.

**Epacrida'ceæ** [from *Epa'cris*, one of the genera], a natural order of exogenous plants (shrubs and small trees), mostly natives of Australia, Polynesia, and the Indian Archipelago. They resemble Ericaceæ in many respects, but differ from them in the structure of the anther, which is 1-celled and destitute of appendages. The leaves are parallel-veined and have no midrib. The corolla is generally tubular; the fruit is in many cases an edible berry, in others a capsule or drupe. The *Lissan'the sap'ida* bears an edible

fruit, which is called the Australian cranberry. Several species of *Epacris* are cultivated in greenhouses for their very beautiful flowers. This order also comprises the *Sphe-notoma*, *Lyginema*, *Styphelia*, and many other genera.

**E'pact** [Gr. ἐπακτός, "added," from ἐπάγω, to "bring to"], the excess of the mean solar month (the twelfth part of a tropical year) over the mean lunar synodical month, or mean lunation; that is, inasmuch as the mean lunation is less than the mean solar month, the epact is properly the amount to be added to the former to bring it up, or make it equal, to the latter. Practically, in the Church calendar, however, the epact is the number of days which intervene between the end of the ecclesiastical year in December and the first day of January succeeding; or, as it is commonly expressed, the epact is the age of the moon, estimated in entire days, at the beginning of the civil year. According to the definition given first above, it is manifest that the epact must increase from month to month, but for the purposes of the ecclesiastical calendar this monthly increase is not considered; the entire increase for each year being supposed to take place at the end of the year. This calendar is extremely artificial, the calendar moon being a sort of fiction of which the periods only approximately correspond with those of the moon in the heavens; so that the calendar months and the true or mean astronomical lunar months rarely begin or end exactly together. In the reckoning of the epact the following arbitrary assumptions are made:

1. The mean synodical month is 29½ days long (it is, in fact, 44 minutes 2.84 seconds longer).
2. The lunar year consists of 12 lunar months, or 354 days.
3. The solar year is always 365 days (it is really 5 hours 48 minutes 46.05444 seconds longer).
4. The calendar months are alternately 30 days and 29 days long. Thus, the first day of the second ecclesiastical month is the 31st of January; the first day of the third ecclesiastical month is the 1st of March; of the fourth, March 31st; of the fifth, April 29th, and so on. Thus, the last day of the lunar year is December 20th; so that if new moon occurs at the beginning of the civil year exactly, the epact at the beginning of the next civil year is 11. In another year this epact will be doubled, and become 22; and at the end of a third it will be 33 days, or more than a month; so that on the 1st of January the moon will be somewhat advanced in a second lunation. The completed lunation is counted 30 days, and the epact is thus reduced to three days at the beginning of the fourth year. The month thus passed over, or dropped, is called an *embolismic* month. As the epacts accumulate, six such embolismic months of 30 days each are dropped; and finally we reach a point where the epact is 29, which we consider to be a complete embolismic month also, and drop it; so that the next following year begins with the epact 0, like the first. This occurs at the end of the nineteenth year, so that in every cycle of nineteen years the epacts recur in the same order.

All the foregoing assumptions are separately inexact, but in combination their inaccuracies nearly balance each other; and accordingly it happens that, at the end of the nineteen-year cycle, the calendar moon, the true moon, and the sun occupy almost exactly the same relative places as at the beginning. That is, supposing the sun and the true moon to leave some determinate point—say the equinox—together at the beginning of the cycle, then at the end of the nineteenth year or the beginning of the twentieth the sun will be truly in the equinox again, and the moon very nearly so, but not quite, being behind by about two hours and four and a half minutes. In something less than twelve cycles (about 220 years), therefore, the true moon will have lost a day on her epact. If the calendar moon lost nothing, its epact would consequently be too great. But the calendar moon loses more than the true moon, as will appear from the following comparison, made for a period of four cycles, or 76 true astronomical (tropical) years and 940 lunations:

940 calendar lunations, of 29½ days each, give.....	27,730 days.
24 embolismic months too long, and 4 too short, add .....	10 "
19 intercalary days, ignored in the lunar calendar.....	19 "
Total days in 4 calendar cycles.....	27,759.000
" " 940 true lunations.....	27,758.753
" " 76 true years.....	27,758.407

It thus appears that the calendar moon falls behind the true moon 0.247 of a day, or nearly 6 hours, in 76 years; and its epact not only absolutely diminishes, but diminishes relatively to that of the true moon also. The effect of this is to cause the successive calendar new moons to occur too late by an amount slowly but constantly increasing; the increase amounting to one entire day in something more than 4 times 76, or 304 years—more exactly 308 years. No account of this circumstance was taken, however, for nearly sixteen centuries after the commencement of our era. At the time of the reformation of the calendar by Pope Gregory XIII., in 1582, the epact had become too small by nearly five days.

It was not this discrepancy, however, which led to the reformation, though occasion was taken at that time to cor-

rect it. The real cause which prompted the action of Pope Gregory was the observation that, through the error of the Julian intercalation (of one day in every four years—every leap-year, as it is called), the adjustment of the months to the seasons was becoming slowly displaced, the equinox going backward towards the first of March. At the time of the Council of Nicæa (A. D. 325) the equinox fell, or was supposed to fall, on the 21st of March; in 1575 it fell upon the 11th. A retrogradation of ten days had occurred in 1250 years. Pope Gregory thought it expedient to put back the equinox again to the 21st, which he could do in no other way than by adding *ten* to the count of every day in the year; and this he accordingly did. It did not matter at what place in the year the change of count began. He actually commenced by calling the fourth day of October, 1582, the fourteenth day of that month. This change has had no other practical effect but to perplex systematic chronology. The displacement of the seasons had not become so great as to occasion any inconvenience. It was, however, desirable to provide against any further displacement for the future; and this part of Pope Gregory's reform is only to be spoken of in terms of admiration. The Julian intercalation of one day in every fourth year produces an error of excess in the calendar year, which by accumulation amounts to about three-quarters of a day in a century, or three days in every four centuries. The intercalary day is, therefore, in the Gregorian system, omitted in the centennial years which are not multiples of 400, and retained in those which are. The dropping of an intercalary day has the effect to make the succeeding year begin a day sooner than it otherwise would, and it therefore diminishes the moon's epact by the same amount. The Gregorian correction of the civil year accordingly requires a reduction of the epact by three days in every four hundred years. If the epact, as it had been previously reckoned, had been truly adjusted to the astronomical year, this correction would be all that would be necessary to keep it permanently right. But in point of fact the Julian intercalation made the mean year too long, in reference to the moon, by about six hours in 76 years, or one day in 304 years (if the more exact numbers are taken, one day in 308 years), making the epact correspondingly too great. The principal mathematician employed on the calendar by Pope Gregory, Christopher Clavius, made the period  $312\frac{1}{2}$  years, which would give eight days in 2500 years. To correct the epact to the Julian year, therefore, it is necessary to add to it eight days in every twenty-five centuries; and to correct it from the Julian to the true year, it is necessary to subtract three days in every four centuries. In 100 centuries the epact is accordingly increased by 32 days, and diminished by 75 days, the diminution amounting on the whole to 43 days. The larger of these corrections, called the solar, which is subtractive, is applied of course in each non-bisextile centennial year. The smaller has to be applied at periods regulated by arbitrary rule. As 25 is not divisible by 8 without a remainder, the intervals between the corrections cannot be entirely uniform. There are seven intervals of three centuries each, and an eighth of four centuries. The first application of this correction after the promulgation of the Gregorian reformation was made in 1800, which century was assumed to end one of the periods of twenty-five. The correction is to be made at the end of every third century after 1800, until 3900, after which it will be deferred till the year 4300. In the Church Prayer-Book, at the end of the introductory matter relating to the calendar, there are three tables called General; of which the second embraces the resultant effect of these corrections of the epact up to the end of the eighty-fifth century, when the correction amounts to one entire embolismic month of thirty days.

The use of the epact of the year in the calendar of Pope Gregory was to lead to the determination of paschal full moon, and so, by consequence, of Easter. (See EASTER.) The epact being the age of the moon in entire days at the beginning of the (lunar) month, the place of new moon in March would be found by counting backward from the 30th of March (which we have seen to be the last day of the third lunar month), including this 30th day itself in the count, a number of days equal to the epact. The date in March thus found is the *first* day of the moon, and thirteen days more added bring us to the fourteenth; the day of March thus found will be the date of paschal full moon, unless it happens to be less than the 21st. In this latter case we must go to the month of April, and count backward from the end of the fourth lunar month, which is April 29th. To facilitate this counting backward, or to make actual counting unnecessary, Clavius introduced a row of numeral letters into the calendar page opposite the days of the month, in reversed order, I. being opposite March 30, and XXX., or 0, standing opposite March 1. This is extended through all the months in the year, as in the following illustration, which presents the months of March and April only:

Day of Month.	MARCH. Epact.	Letter.	Day of Month.	APRIL. Epact.	Letter.
1	0, or XXX.	D	1	XXIX.	G
2	XXIX.	E	2	XXVIII.	A
3	XXVIII.	F	3	XXVII.	B
4	XXVII.	G	4	XXVI., 25	C
5	XXVI., 25	A	5	XXV., XXV.	D
6	XXV.	B	6	XXIV.	E
7	XXIV.	C	7	XXIII.	F
8	XXIII.	D	8	XXI.	G
9	XXII.	E	9	XX.	A
10	XXI.	F	10	XIX.	B
11	XX.	G	11	XVIII.	C
12	XIX.	A	12	XVII.	D
13	XVIII.	B	13	XVI.	E
14	XVII.	C	14	XV.	F
15	XVI.	D	15	XIV.	G
16	XV.	E	16	XIII.	A
17	XIV.	F	17	XII.	B
18	XIII.	G	18	XI.	C
19	XII.	A	19	X.	D
20	XI.	B	20	IX.	E
21	X.	C	21	VIII.	F
22	IX.	D	22	VII.	G
23	VIII.	E	23	VI.	A
24	VII.	F	24	V.	B
25	VI.	G	25	IV.	C
26	V.	A	26	III.	D
27	IV.	B	27	II.	E
28	III.	C	28	I.	F
29	II.	D	29	0, or XXX.	G
30	I.	E	30	XXIX.	A
31	0, or XXX.	F			

In this little table one peculiarity will attract attention. Though the third lunar month has thirty days, and the fourth only twenty-nine, yet each has thirty epact numbers. There seemed to be a necessity for this; otherwise, when the epact is XXIX. it would be equivalent to zero in the short months (the hollow months as they were called), but not so in the full months. The epacts XXIV. and XXV. are therefore placed opposite the same day. During the same cycle three consecutive numbers like XXIV., XXV., and XXVI. will never all be found among the epacts. When XXIV. and XXV. are both present, XXVI. will be absent; and in that case XXV. is transferred to the place of XXVI., as indicated by the Arabic numeral 25 opposite that epact. Thus, notwithstanding this duplication, two epacts will never fall on the same day of the month. (For a more full explanation of this matter, see the little treatise by the writer of this article, entitled "How to Find the Church Festivals.")

The use of epacts for finding paschal full moon and Easter is not very convenient. The simple rules given in the article on EASTER in this volume will be found much more so. But this is a suitable place to explain how to find the value of the numerical term proper to be used in calculating the date of paschal full moon in the article referred to. The General Table II. of the Prayer-Book, above spoken of, contains the resultant corrections of the epact for all the centuries from 1600 to 8500. From 1600 to 1700 this correction was zero. From 1700 to 1800, and further from 1800 to 1900, it is 1; and in subsequent centuries it goes on, somewhat irregularly, to increase. Now, the numerical term in the formula given in the article EASTER for computing the date of paschal full moon (when the golden number is odd) is at present 10, from 1600 to 1700 was 9, and after 1900 will be 11. It is, in short, always 9, increased by the correction of the epact found in the General Table II. just mentioned; which for convenience we may call the secular correction of the epact. And an extremely simple rule for finding this numerical term is the following: *From the number of the centuries in the given year of our Lord take its fourth part and its third part (disregarding fractions), and increase the result by two.* This is true up to 4200. But in that year and the centuries following, up to 6700, the number of the century must be diminished by one before taking the third part. In other respects the rule remains unaltered. In 6700 and the centuries following, up to 9200, the number of the century must be diminished by two before taking the third part. In 9200, and up to 11,700, the rule is the same as given at first, except that the result is to be increased by three instead of two. The Gregorian calendar will, however, itself require correction before the year 4000. As an example, let it be required to find the numerical term for the computation of paschal full moon during the century beginning with 4100 and ending with 4200. Putting *S* for this term, we have  $S = 41 - \frac{1}{4}(41) - \frac{1}{3}(41) + 2 = 41 - 10 - 13 + 2 = 20$ . In General Table II. of the Prayer-Book we find opposite to 4100 the number 11. And  $11 + 9 = 20$ , thus verifying the statement made above.

F. A. P. BARNARD.

**Epaminondas** [Gr. Ἐπαμεινώνδας or Ἐπαμινώνας], an illustrious Greek statesman and general, born at Thebes about 418 B. C. He was a pupil of Lysis, a Pythagorean

**philosopher.** His youth was passed in retirement and study. He was temperate and virtuous, and is said to have despised riches. He formed an intimate friendship with Pelopidas. In 385 he served with distinction at the battle of Mantinea, after which he passed many years in private life. He was one of the deputies sent by Thebes in 371 B. C. to a congress of the Grecian states, in which he opposed the policy of Sparta and defended the interest and rights of Thebes in an eloquent speech. War speedily ensued between Sparta and Thebes, and Epaminondas was chosen commander of the Theban army, which amounted to only 6500 men. He defeated the Spartans at the battle of Leuctra, July 6, 371 B. C., which was fatal to the supremacy of Sparta. In this action he displayed great military genius, and owed his success partly to his novel manoeuvres and combinations. He invaded Peloponnesus in 369, and marched against Sparta, which was defended with success by Agesilaus. He commanded the Theban army which defeated the Spartans at the battle of Mantinea, July 3, 362 B. C., but was killed in this action. He left a pure and exalted reputation as a patriot, a statesman, and a sage, and is universally admitted to have been one of the greatest captains of antiquity. Cicero expressed the opinion that Epaminondas was the greatest man that Greece has produced. (See CORNELIUS NEPOS, "Epaminondas"; GROTE, "History of Greece," chaps. lxviii., lxix., and lxxx.; E. BAUCH, "Epaminondas und Theben's Kampf um die Hegemonie," 1834.)

**Epamoné'ria**, a town at the N. W. point of the island of Santorini (*Thera*) in the Grecian Archipelago. The houses are partly excavated in the face of a cliff of pozzuolana which is nearly perpendicular and is close to the sea. The lowest of fifteen tiers of houses is about 400 feet above the sea.

**Ep'arch** [Gr. *ἐπαρχος*, from *ἐπὶ*, "upon" or "over," and *ἀρχή*, "government"], in ancient Greece the title of the governor of a province, a ship's master, a satrap, or the prefect of a region under the Roman rule. The province itself was called an eparchy. In modern Greece the primary subdivision of a nomarchy is called an eparchy. In Russia an eparchy is the diocese or archdiocese of a bishop or archbishop of the Greek Church.

**Epaulement** [Fr. from *épaule*, "shoulder"], a military term which, from its derivation, would signify, as defined by Webster, a *side* work, a work to cover *side-wise*—*e. g.* a *traverse*, or a short parapet made at the flank of a battery or end of a parallel; but practically its meaning is extended to any covering made of earth, stone, wood, or iron, when intended simply as a screen—*e. g.* to cover cavalry waiting to be brought into action. (See MAHAN, "Military Engineering.")

**Epaulette**, an ornamental article of uniform of military and naval officers, worn on the shoulders, as the name indicates; a plate or strap extending along the shoulder from near the collar, and terminating with a fringe of gold or silver bullion, which falls over the shoulder. Rank is indicated by the size of the bullion and by devices on the strap, such as stars, anchors, crowns, etc. In the American army the epaulette, hitherto worn by officers of all grades (as still in the navy), is now confined to general officers, its place being supplied, for the lower grades, by the "shoulder-knot" of gilt cord. The practice varies in the different services of Europe.

**E'pe**, a town of the Netherlands, province of Guelderland. Pop. 7705.

**Épée, de l'** (CHARLES MICHEL), ABBÉ, a French teacher of the deaf and dumb, was born at Versailles Nov. 25, 1712. He was a Jansenist preacher, and for some time canon at Troyes. About 1755 he began to devote himself to the gratuitous instruction of the deaf and dumb. He is said to have been the first who used gestures or the language of signs in their education, on which subject he wrote several treatises. He founded in Paris an institution which was successful. Died Dec. 23, 1789.

**Epeirus.** See **EPÍRUS**.

**Epei'ra** [from the Gr. *ἐπὶ*, "on," "together" and *εἶπω*, "to fasten"], a genus of spiders belonging to the Epeiridae, are distinguished for the brilliancy of their colors and the geometric regularity of their webs, which are formed by concentric circles and straight radii. *Epeira diadema* is a large species found in Great Britain. These spiders are very numerous in tropical countries, where they grow to great size. Several species occur in the U. S.

**Eperies**, *á'pér-yèsh* or *á'pá-re-èsh*, or **Heperjes** [Lat. *Eperie* or *Fragopolis*], an old town of Hungary, the capital of the county of Saros, is on the river Tarcza, about 148 miles N. E. of Pesth. It is surrounded by walls, and is one of the most beautiful towns of Upper Hungary. It is a bishop's see, has five churches, a college, and manufac-

tures of linens, woollen goods, and earthenware. A royal salt-mine is worked in the vicinity. Pop. in 1881, 10,931.

**Épernay**, *á'pér'ná'* [Lat. *Aquæ Perennæ*], a town of France, in the department of Marne, on the river Marne, about 80 miles E. by N. from Paris. It is on the railway from Paris to Chalons, 20 miles W. N. W. of the latter. It is well built, clean and well paved, and has a town-hall and a public library. Here are manufactures of hosiery, earthenware, and refined sugar; also many elegant villas, with wine-vaults. Épernay is a great entrepôt or market for champagne wine, which is produced in the vicinity. Pop. 16,388.

**Eper'ua**, a genus of trees of the order Leguminosæ, one species of which (*Eperua falcata*), called wallaba, is abundant in Guiana. Its hard, durable, heavy, resinous timber, which is of a bright red-brown color, with white veins, is much used for shingles. The tree has pinnate leaves and a regular monopetalous flower.

**E'phah**, a Hebrew measure of capacity containing 27.83 pints, or three English pecks and three pints.

**Ephem'era** [from the Gr. *ἐφήμερος*, "lasting for a day" (from *ἐπὶ*, "on" or "for," and *ἡμέρα*, a "day")], a genus of neuropterous insects, commonly called day-fly or may-fly, are allied to the dragon-flies or Libellulidæ. In the larva and pupa states they live a year or more in the water, but their existence in the perfect state is very brief. They are used by anglers as bait. They give name to the family Ephemeridæ, of which many species occur in the U. S.

**Ephem'eris** [Gr. *ἐφήμερίς*, a "diary," from *ἐπὶ*, "on" or "for," and *ἡμέρα*, a "day"], **Astronomical Ephemeris**, **Nautical Almanac**. Ephemeris and almanac are chiefly applied to two distinct classes of publications. An almanac is usually an annual which gives a calendar of the civil and ecclesiastical divisions of the year, with the dates of festivals and fasts and other days of special commemoration, and for each day or some longer interval the times of passing the meridian and of the rising and setting of the sun, moon, and principal planets, and their places in the zodiac, together with the phases of the moon and the times of eclipses and other important astronomical phenomena. With these is combined a variety of other matter, according to the special object of the publication. The astronomical tables which almanacs contain are ordinarily given with little precision, and are for the most part adapted only to a particular latitude. Such tables are said to have been constructed even in the time of Ptolemy. They were indispensable to the astrologers of later days, who doubtless had them for finding the positions of the planets at some future or past date, compiled with sufficient accuracy to make their prognostications.

Since the invention of printing, almanacs have appeared in large numbers in every part of the civilized world. They supplied an extensive popular demand, but added to the real information which they contained astrological and meteorological predictions, and other matter much more objectionable.

The "British Almanac," published by the Society for the Diffusion of Useful Knowledge, for the year 1828, introduced a decided reform in this class of works. And now there are many, and in all civilized countries, which contain valuable statistics of various kinds and essays on various subjects, such as are adapted to the classes of readers for which each may be specially designed. Some of them have a permanent value as works of reference. The "Tidal Almanac" of the U. S. Coast Survey is an example of a special class.

An ephemeris of a fixed star is a table of its apparent right ascension and declination at equal intervals of time. An ephemeris of a primary body of the solar system gives for each day, or for some regular longer or shorter interval, its direction and distance from the earth or sun, or both. The apparent semi-diameter, horizontal parallax, phases, and degree of brilliancy may also be given at stated intervals. The ephemerides of satellites give their positions with reference to their primaries, with their occultations, eclipses, and transits.

Observations furnish the data for computing the elements of a planet's orbit, and the ephemeris is prepared either directly from these elements or from tables derived from them, constructed to facilitate computations, and in which the attractions of other bodies are taken into account. The places of the planet tabulated in the ephemeris, whether for past or future times, may readily be compared with those derived from observations; and thus, as observations accumulate, the astronomer may determine more accurately the planet's orbit, and by a new and more trustworthy ephemeris again subject the theory of its motion to the test of observations. The history of astronomy furnishes an instructive example of the alternate improvement in the means and methods of observation, and the advance of



theory and scientific knowledge. At one time observations are more precise than theory; at another, the theory of the motions of a heavenly body may give its position more accurately than any single observation. It has been by such successive advances, alternately in theory and in the precision of observations, that practical astronomy has attained its present approximation to perfect accuracy. Tables of some of the planets are extended to several centuries in the future, with full confidence that an astronomer of those remote times will find them not only within the field of his telescope, but near its centre.

An astronomical ephemeris is a collection of such ephemerides for a particular year or series of years, with the times of eclipses, occultations, and other astronomical phenomena, or the means of determining them. The more complete works of this kind are intended to furnish the astronomical observer, whether at an observatory, in the field of a survey, or at sea, with all the data relating to the sun, moon, planets, and some of the principal fixed stars, which he needs to facilitate the prosecution of his work. From the design of some of them, and the special adaptation of portions to the wants of navigators, they are also called "nautical almanacs."

Although prepared for a particular meridian, they can readily be adapted to any other by interpolating for the difference of longitude or of the local times of the two meridians. Their use, therefore, is general, and not restricted to any part of the earth.

The earliest astronomical ephemeris noticed in astronomical bibliographies is that of Iarchus in 1150; the first printed ephemerides were published in 1475 for the years 1475 to 1506, and in 1499 for the years 1475 to 1531, though doubtless portions were prepared earlier; both were prepared by Regiomontanus. The latter extends through three cycles of nineteen years, and gives the longitudes of the sun and moon, and the phases of the moon and of eclipses occurring from 1483 to 1530, with explanations and useful tables. These have been the precursors of a succession of ephemerides, defective at first, but improving as astronomy advanced.

The "Connaissance des temps ou des mouvements célestes," commenced by Picard for the year 1679, has appeared for each succeeding year, without interruption, to the present time. Additions and improvements were made by La Lande in 1760, who subsequently added lunar distances, with the design of making it more useful at sea. This and almost all the subsequent volumes have been enriched by valuable memoirs by the most eminent French astronomers, thus carrying out the purpose of La Lande to make this annual a journal of astronomy. For many years it has been prepared under the direction of the Bureau des Longitudes of France. Improvements have been made in it from time to time by the use of more precise tables in its preparation. At present it is under the immediate supervision of M. Mathieu, and is among the most valuable of this class of works.

The "Nautical Almanac and Astronomical Ephemeris," published by the British Admiralty, was commenced by Maskelyne for the year 1767. He undertook its preparation, after a plan sketched by La Caille, for the purpose of meeting the wants of navigators, and especially of supplying facilities for using the method of finding the longitude by the distance of the moon from the sun or a star, which Halley had proposed in 1731. Mayer's new tables of the moon for the first time gave the moon's place with sufficient precision to make this method available. The successive annual volumes have been issued, usually three years in advance, to the present time. It was not until 1834 that it came up to the requirements of an astronomical ephemeris. Other improvements and additions have since been made. Under its present superintendent, Mr. J. R. Hind, new tables of the sun, moon, and all but two of the planets have been introduced, so that it has no superior either as an astronomical ephemeris or an almanac for the use of navigators. Many of its volumes contain valuable contributions to practical astronomy by English astronomers.

The "Berliner Astronomisches Jahrbuch" first appeared for the year 1776, and has been continued by Bode, Encke, and its present superintendent, Prof. Foerster, without interruption. It was mainly designed to supply the wants of astronomers, though those of the navigator were not overlooked. As an astronomical ephemeris it was in advance of all others until the later improvements in its British contemporary. Its volumes contain valuable astronomical memoirs from many of the most distinguished German astronomers. Of later years it has contained ephemerides of most of the asteroids.

The preparation of the "American Ephemeris and Nautical Almanac" was begun in 1849, under the superintendence of Lieutenant (afterward Rear-Admiral) Davis, U. S. navy, in accordance with act of Congress of the U. S. The

theoretical portions of the work were placed under the special direction of Prof. Benjamin Pierce of Harvard University. The construction of tables of the moon and of some of the planets, with corrected elements and in a form which would facilitate the computation of their ephemerides, was first undertaken, and so successfully accomplished that from its commencement the "American Ephemeris" has ranked among the highest works of this class in extent, completeness, and adaptation to the wants of astronomers and navigators. The first volume was for 1855. In the preparation of later volumes new and more accurate tables of the sun and planets (except Jupiter and Saturn) have been employed. Several of its volumes contain valuable papers by American astronomers.

It consists of two parts—the first arranged specially for the use of navigators, and computed for the meridian of Greenwich; the other prepared for astronomers, and adapted to the meridian of Washington. The first part is also published separately. Tables of the moon, Mercury, Venus, the standard stars, and four asteroids have also been published. The preparation of ephemerides of twenty-three asteroids discovered by American astronomers has also been undertaken.

Professor Joseph Winlock, U. S. navy, who became director of Harvard Observatory, Cambridge, Mass., succeeded Admiral Davis in the charge of the work; in 1866 it was placed under the direction of the writer of this article. The successive volumes have appeared for each year without interruption. Several of them contain valuable memoirs. The continuance of the work is dependent upon annual appropriations by Congress. J. H. C. COFFIN.

**Eph'esians, The Epistle of Saint Paul to the,** was written probably in the year 61 or 62, during the apostle's first imprisonment at Rome, and about the same time with the Epistle to the Colossians. The words *ἐν Ἐφέσῳ*, "at Ephesus" (i. 1), are wanting in the "Codex Sinaiticus" and some other MSS., but the weight of diplomatic evidence on the whole preponderates in their favor. The absence of personal greetings is not so easily explained. It is one of the richest and most glowing of the Pauline Epistles. The first three chapters are doctrinal; the last three, hortatory and practical. Of the many commentaries which have been written, those of Harless (German), 1834–58, and Eadie (Scotch), 1854, are among the best.

R. D. HITCHCOCK.

**Eph'esus** [Gr. *Ἐφεσος*; Fr. *Éphèse*], one of the twelve cities of the Ionian confederation, stood on the river Cæster, which falls into the Gulf of Scala Nova on the western coast of Asia Minor. Its earliest traditions connect it with the birthplace of the goddess Diana, which was probably in the immediate vicinity of the site selected for the famous temple, one of the Seven Wonders of the ancient world. Amazons are said to have been the earliest priestesses of Artemis (Diana), and Herodotus tells us that Hercules founded a city in the Ephesian territory B. C. 1250. Androclus the Athenian (B. C. 1044) drove out the inhabitants, and with his followers established a Greek colony. Ephesus increased in importance with the culture of the worship of Diana, which attracted multitudes from all parts, who remained to worship at the shrine of the goddess and to benefit themselves by the commerce of the city, which became the chief mart of Asia and the metropolis. Ephesus was in turn ruled by tyrants, oligarchies, and republics. It paid tribute to Persia for two centuries from the time of Cyrus (B. C. 558–529) to Darius III. Ephesus was chiefly remarkable for its magnificent temple dedicated to Diana, which was burnt by Eratosthenes in B. C. 356; the day Alexander the Great was born. The Romans finally possessed themselves of this and other cities in Asia Minor (B. C. 41), and under Cæsar Augustus and the succeeding emperors the city was rebuilt. The city was sacked by the Goths A. D. 262. The temple was then destroyed, and from that time the city declined in importance. For many centuries it was in the hands of various adventurers, and it declined into a mere suburb when the Turks built a considerable town at Ayasalouk towards the end of the thirteenth century. The explorations which were directed by Mr. John T. Wood, an English architect, for the British government from 1863 to 1874, resulted in very important discoveries; 462 Greek and Latin inscriptions were brought to light, and the remains of the famous temple were discovered by him 22 feet below the present surface. Mr. Wood found remains of three temples which were built successively on the same site. N. E. of the city, and at the foot of the hill at Ayasalouk, the foundations and some of the cellar walling of the temple built B. C. 500, and described by Pliny as having been laid on charcoal and fleeces of wool, were found. Four feet above the pavement of this temple was found the pavement of the temple burnt by Eratosthenes, and the pavement of the peristyle of the last

temple was found 7 feet 6 inches above the most ancient of these three temples, which were discovered by Mr. Wood to be of the same size. The last temple was raised upon a platform 9 feet 6 inches high, which was ascended by fourteen steps. The temple itself was 184 feet wide and 343 feet long, with 100 columns in the peristyle 6.0½ in diameter; 36 of these were sculptured with figures life-size, some of the columns having as many as ten figures in their circumference—others had only four or five. Mr. Wood found in the ruins of the city the remains of Saint Luke's tomb. The large theatre was 495 feet in diameter, and seated 24,500 persons. The Odeon was 153 feet in diameter, and seated 2300 persons. Many interesting tombs and other remains were found, and the British Museum has been much enriched by the results of these explorations.

JOHN T. WOOD.

**Ephial'tes**, the name of a famous giant in the Greek mythology, said to have been a son of Neptune.

**Eph'od** [from the Heb. *aphad*, to "put on"], a Jewish robe or tunic worn originally by the high priest; afterwards by all priests. It was made of fine linen. The ephod of the high priest had a breastplate attached to it containing twelve precious stones, on which were engraved the names of the twelve tribes. The relation of these twelve stones to the Urim and Thummim is still an open question.

**Eph'ori**, or **Eph'ors** [Gr. *ἐφοροι* (sing. *ἐφορος*, from *ἐπι*, "on" or "over," and *φάω*, to "see"); Lat. *ephori*], the title of magistrates common to many of the Dorian states of ancient Greece. In the political constitution of Sparta the ephors exercised supreme power. The Spartan ephors were five in number, and were elected from the body of the ruling caste. Their term of office was one year. Besides their judicial authority, they exercised a control over the functions of the kings and the senate, and sometimes recalled the former from their foreign expeditions. They negotiated treaties with foreign states, and possessed nearly all the executive power of the government.

**E'phraem** (or **Ephraim**) **THE SYRIAN** [Lat. *Ephraem'us Syrus*], a celebrated ecclesiastic and writer, born probably about 308 A. D. at Nisibis, in Asia Minor, died between 373 and 378. He was a zealous opponent of Arianism, became a hermit or anchorite in the prime of life, and lived in a cave near Edessa. He was venerated as a saint and a prophet by his contemporaries, and received the offer of the bishopric of Edessa, but he declined it. He wrote in Syriac numerous religious works, among which are hymns and commentaries on Scripture. But of his many works only a small number exist in the original Syrian text, and the rest in Greek, Latin, Armenian, and Slavic translations. It is doubtful whether he himself understood Greek; the Greek versions of his works, however, are certainly translations. A complete list of his writings is given by I. S. Assemani in "Bibl. Orient." i. 59-164, and in the preface to the Roman edition of his Greek works. The principal edition of the Syrian and Greek texts is that which appeared in Rome in 6 vols. fol. (1732-48), under papal authority; 3 vols. Greek text with Latin translation, and 3 vols. Syrian text, also with Latin translation, by the brothers Assemani. A German translation of a selection of his works was published by Zingerle (6 vols., 1830-37).

**E'phraim**, one of the Hebrew patriarchs, was the second son of Joseph, and the head or founder of one of the twelve tribes of Israel. The territory of the tribe of Ephraim extended from the river Jordan to the Mediterranean Sea, and was bounded on the N. by Manasseh and on the S. by Benjamin and Dan; and was about 55 miles from E. to W. by 70 from N. to S.

**Ep'icarp** [from the Gr. *ἐπί*, "upon," and *καρπός*, "fruit"], in botany, the outermost layer of the pericarp or fruit. When the walls are separable into three layers, the outer layer is named either exocarp or epicarp.

**Epicharm'us** [Gr. *Ἐπίχαρμος*], an eminent Greek poet and philosopher, born in the island of Cos about 540 B. C., was a pupil of Pythagoras. He removed about 485 B. C. to Syracuse, where he passed the greater part of his mature life. According to Aristotle, he was the inventor of comedy. Plato assigns him as high a rank among comic writers as that of Homer among epic poets. Epicharmus wrote, besides dramas, treatises on philosophy, mythology, etc. He appears to have been an original genius and elegant writer. His works are not extant. Died about 450 B. C. (See O. MÜLLER, "The Dorians;" HARLESS, "De Epicharmo," 1822.)

**Ep'ic Po'etry**, or **The Ep'os**, is that class of poetry which relates the history of a series of events, taking the series as a whole, apart from what precedes or follows. Epic poetry is chiefly of a narrative nature, and represents the subject of which it treats as a unit, with a definite begin-

ning and an end. In a wider sense, epic poetry comprises the ballad, the romance, and even the fable, but in its more limited use it may simply denote the popular legends and tales of a nation or tribe which have been collected and arranged. Of the Greek epics, two only, the "Iliad" and the "Odyssey," have come down to us, and the study of these has helped us very much to understand the true nature of the epic. Until the close of the last century, Homer was regarded as the original author of these epics. But in 1795 F. A. Wolf, a learned German philologist, broached the theory that the poems of Homer were not the work of one, but of many poets. In fact, they appear to be, to some extent at least, a collection of Greek legends and tales, arranged (as is now generally admitted) by the master-mind of a great poetic genius. A similar origin must be predicated for the Hindoo epics "Rāmāyana" and "Mahābhārata," the "Shah Nameh" of the Persian Firdousee, the Finnish "Kalevala," and the German "Nibelungen."

From the manner in which it originated, the nature of the epic is easily deduced. As the poetical summation of the popular legends of a race or tribe, in which all the thoughts and feelings of the race are depicted, it must embody the peculiarities of the nation, and must be a complete and true picture of the life and doings of a race. Thus it is that in the same nation different epics may exist. While, for instance, the "Iliad" is a collection of the war-legends of the Greeks, the "Odyssey" treats of the family life and travels on land and on sea. But as the epic must be such a complete picture, and must be, in contrast to the former legends, a complete whole, it takes from the primitive history of the nation a prominent fact as a central figure, and groups around this the single legends; and this centre is only the frame which holds together the single, otherwise unconnected, legends.

This form of an epic is only possible in the early youth of a nation, when the legends still circulate among the people and are believed by them. But there have nevertheless been attempts at epics in later times, which have been the work of a single poet. This is the difference between Virgil and Homer. Among the more prominent epic poets of modern times are Dante, Ariosto, Tasso, Camoens, Milton, and Klopstock. But the more practical and prosaic the world becomes, the more this form of poetry will disappear, and it is only a romantic or a comic epic, like Byron's "Don Juan," that will be successful in these days, while the novel takes the place of the epic. (See ZIMMERMANN, "Ueber den Begriff des Epos," 1848.)

**Epictet'us** [Gr. *Ἐπικτήτος*; Fr. *Épictète*; Ger. *Epiktet*; It. *Epitetto*], an eminent Stoic philosopher, born at Hierapolis, in Phrygia, about 60 A. D. He was in his youth a slave of Epaphroditus, a favorite of the emperor Nero, and lived at Rome. He became a freedman, and was banished with other philosophers from Rome by Domitian in 89 A. D., after which he lived at Nicopolis in Epirus. He was a man of excellent moral character, and acquired a high reputation as a teacher of philosophy, but he wrote little if anything. His temper and doctrines were less austere than those of most other Stoics, and were essentially Christian in their nature. It does not appear, however, that he had any connection with the Christian Church, or that he was a believer in the mysteries of that religion. Among his favorite maxims was "Suffer and abstain." His disciple Arrian collected his maxims and doctrines in a work called "Enchiridion," which has been translated into English by Mrs. Carter (1758), and by T. W. Higginson (1865). (See RITTER, "History of Philosophy;" G. BOILEAU, "Vie d'Épictète et sa Philosophie," 1855, in English by J. DAVIES, 1670; FARRAR, "Seekers after God," 1869.)

**Epicure'an Philos'ophy**, a system of philosophical teaching which took its name from Epicurus (357-270 B. C.), its founder. It originated in a reaction against the teachings of Socrates and his followers. Throughout the period of Greek decline and the last ages of republican Rome it exercised a profound influence, which was perpetuated through the days of the Roman empire, in spite of the opposition of Stoicism and of Christianity. It is a remarkable fact that it always remained substantially as Epicurus left it.

The writings of Epicurus are lost, with the exception of fragments chiefly preserved by Cicero, Seneca, and Diogenes Laertius, but the sublime poem of Lucretius, "De Rerum Natura," is an exposition of the teachings of Epicurus.

In theology, Epicureanism was essentially atheism. The gods were eternal, immutable, and entirely unconscious of human affairs. Human responsibility for wrong-doing was consequently reduced to the minimum. The highest positive duty was made to be the pursuit of pleasure—not necessarily sensual enjoyment, for Epicurus himself taught that repose was the highest pleasure. Whatever the virtues of Epicurus may have been, the results of his system of ethics were thoroughly bad. The moral corruption of ancient Greece

and Rome was in part the fruit of this system. The genial temper, the elegant habits of life, and the moral indifference exhibited in the writings of Horace were among the least objectionable of the effects of the widespread Epicurean teachings. It is not too much to assert that Epicureanism produced not one thoroughly admirable character in ancient history.

The physical doctrine taught by Epicurus and Lucretius was not unlike that of certain modern evolutionists. They held that matter is uncreated, indestructible, and that all material things were self-evolved, without a supervising or directing Intelligence. (See *Lucretius*, "De Rerum Natura," GASSENDI, "Syntagma Philosophiæ Epicuri," and HENNE's article "Épicure" in the "Dictionnaire des Sciences Philosophiques.")

**Epicurus** [Gr. Ἐπίκουρος], a celebrated Greek philosopher, the founder of the Epicurean sect, was born in the island of Samos in 337 (or, as some say, 341) B. C. He was a son of Neocles, an Athenian, and is said to have been a pupil of Xenocrates, but he professed to be self-taught. He visited Athens at the age of eighteen, afterwards travelled in Ionia, and opened a school at Mitylene, where he taught new doctrines. About the year 306 he removed to Athens, where he purchased a garden and founded a celebrated school of philosophy. He was very popular as a teacher, and gained a great number of disciples. He recognized pleasure as the chief good, and consequently was calumniated by the Stoics, but it appears that his habits were temperate and virtuous. His physical philosophy was based on the atomic theory of Democritus. He treated ethics as the most important department of philosophy, and studied nature with an ethical rather than a scientific purpose. He opposed the popular superstition, and refused to recognize the gods of the Greek mythology, but taught that the gods live in a state of passionless tranquillity, and give no attention to subliminal affairs, which they consider beneath their notice. Epicurus took no part in political affairs. He wrote numerous works on ethics, natural philosophy, etc., which are not extant, but several of his letters have been preserved by Diogenes Laertius. His opponents admitted that he was personally amiable and virtuous. Our knowledge of his doctrines is derived chiefly from the works of Cicero and Lucretius, who in his poem "De Rerum Natura" amply illustrates his philosophy, and expresses great admiration of Epicurus. Among the eminent men who favored Epicurean principles were Horace, Atticus, Gassendi, Rousseau, and Voltaire. Died in 270 B. C. (See GASSENDI, "De Vita et Moribus Epicuri," 1647; RITTER, "History of Philosophy;" G. H. LEWES, "Biographical History of Philosophy.")

**Epicycle** [from the Gr. ἐπί, "upon," and κύκλος, a "circle"], in ancient astronomy, a circle having its centre moving along the circumference of another circle. It was a favorite opinion of the Greek astronomers that all the celestial motions must be uniform and circular, because the circle is the most perfect of plane figures. The phenomena of the stations and retrogradations of the planets were apparently inconsistent with this notion; and in order to explain them, Apollonius of Perga imagined the theory of *epicycles* and *deferents*. He supposed every planet to move uniformly in the small circle or epicycle, the centre of which is carried uniformly forward along the circumference of the large circle or deferent, of which the earth occupies the centre. Hipparchus, having discovered the eccentricity of the solar orbit, supposed the motions to be performed in eccentric circles. The celebrated astronomer Ptolemy adopted the hypotheses both of Apollonius and Hipparchus; that is, he supposed the earth to be placed at a small distance from the centre of the deferent circle (which consequently was called an *eccentric*), and the planet to move uniformly in the epicycle, the centre of which also moves uniformly in the deferent. By means of these suppositions, and by assigning proper ratios (determined by observation) between the radius of the deferent and the radius of the epicycle, and also between the velocity of the planet in the epicycle and the velocity of the centre of the epicycle on the deferent, he was enabled to represent with considerable accuracy the apparent motions of the planets, and particularly their stations and retrogradations. As a first step towards connecting the sciences of astronomy and geometry the hypothesis of epicycles does great honor to its inventors.

**Epicycloid** [etymology same as for *Epicycle*], a curve traced by a point on the circumference of a circle which rolls on the convex side of a given fixed circle. It belongs to the class of curves called *roulette*s, and is not invariably a transcendental curve. It is always of a finite order when the circumferences of the two circles are commensurable. The normal of the epicycloid is easily constructed; it always coincides with the line which joins the generating point to the corresponding point of contact of the two circles. The

evolute of the epicycloid is a similar epicycloid, the radii of the circles being merely altered in a certain ratio. When the circles are equal the epicycloid is similar, and similarly placed to the pedal of the fixed circle with respect to a point in the circumference. The curve is the cardioid, which is the inverse of a parabola. The epicycloid was invented by Romer, the Danish astronomer, who about 1674 proposed this curve as the best form for the teeth of wheels, in order to prevent friction. Newton gave its rectification in his "Principia."

**Epidamnus.** See *Durazzo*.

**Epidaurus** [Gr. Ἐπίδωρος], an ancient town of Greece, on the E. coast of the Peloponnesus and on the Saronic Gulf, about 45 miles S. W. of Athens. It was an independent state, and possessed a small territory called *Epidauria*. As early as 600 B. C. it was one of the chief commercial cities of the Peloponnesus. It derived much importance from its temple of Æsculapius (situated 5 miles from the town), which was one of the most celebrated sanctuaries in Greece, and was frequented by patients from all of the Hellenic states. They came to be cured of their diseases. Here are the ruins of a magnificent theatre, which Mr. Leake says is in better preservation than any other in Greece. It is 370 feet in diameter. Once in four years a festival was celebrated here in honor of Æsculapius, with musical and gymnastic games. On or near the site of Epidaurus is a small village called *Epidavro*, at which the Greek congress assembled in 1821.

**Epidaurus Lime'ra**, an ancient seaport-town of Greece, on the eastern coast of Laconia. In the Middle Ages it was the most important Greek town in the Morea. The ruins of its temples are visible at *Old Monemvasia*, 3 miles N. of Monemvasia.

**Epidemic** [from the Gr. ἐπί, "upon," and δῆμος, a "people"]. A disease is said to be epidemic when it attacks a considerable number of people, spreading rapidly throughout a community for a time, but not becoming permanent and *endemic* (i. e. not remaining as a disease characteristic of that particular community). Few subjects connected with medicine have given rise to more speculation than the cause and progress of epidemics. It appears certain that there must be either distempered conditions influencing the people who are subject to an epidemic, and predisposing them to the reception of disease-poisons, or else, what is more probable, that some peculiar disease-germs are present in air, water, or food during epidemics. Contagious epidemics, such as smallpox, measles, etc., are demonstrably propagated in this way. Others, like influenza and cholera, will propagate themselves in spite of personal quarantines, *cordons militaires*, and even of intervening oceans, though they may be intensified by near association with the sick. Some observers ascribe certain epidemics to the excess or deficiency of ozone in the air.

The germ-theory, which ascribes disease to microscopic vegetation, is a favorite with many; and some observers believe that they have detected the cause of various epidemics. For example, the cause of measles has been ascribed with confidence to the presence in the air of the spores of an organism identical with the rust of barley straw. Further observations will quickly establish or overthrow all such theories.

Mental epidemics, such as the dancing mania, lycanthropy, witchcraft, and the mania for suicide, are not improbably owing to physical conditions, like other epidemics.

The following laws or general statements with regard to epidemics appear to be established: (1) An "epidemic influence" appears at times to intensify disease, and immensely to stimulate the propagation of endemic diseases, thus converting them into epidemics. Thus, smallpox, typhus, typhoid, and scarlatina, usually endemic, sometimes rage with great violence as epidemics. (2) Sometimes an epidemic influence shows itself in the character of non-epidemic diseases. Thus, in some seasons pneumonia is of an active, sthenic type; at other times it almost uniformly assumes a low or typhoid character. In some seasons nearly all inflammations take on an erysipelatous form. (3) When a decided epidemic prevails, non-epidemic disease is very apt to show some of the features of the prevailing epidemic. Even before the advent of an epidemic these features may be observed. (4) The first onset of an epidemic is usually, not always, its most severe and fatal stage, but many such diseases have periods of exacerbation and of intermission. (5) Epidemics would appear to alternate in successive cycles, smallpox being followed, for example, by measles, scarlatina, or typhoid. (6) Some diseases occur both as epidemics and as sporadic diseases. In the former case the disease usually exhibits a greater tendency to depression and a larger proportionate mortality. (7) The lower animals to some extent share with man in special epidemic influences.

Facts are not wanting which give reason to hope that epidemics will become limited in their ravages. The plague and other destructive epidemics have become localized or endemic; and the introduction of thorough sewerage in cities, underground drainage in the country, habits of personal cleanliness, and other hygienic conditions cannot fail to accomplish much good.

CHARLES W. GREENE.

**Epidendrum** [from the Gr. *ἐπί*, "upon," and *δένδρον*, a "tree"], a large Linnaean genus of epiphytic orchids, which, as originally constituted, included the vanilla and many other species now excluded. It is worthy of mention as affording within the limits of the U. S. two examples of the tree orchids or epiphytes so abundant in the tropics. The *Epidendrum conopseum* grows principally upon magnolia trees, and is found in South Carolina, Georgia, and Florida. *Epidendrum venosum* grows in Florida. The blossoms, although rather pretty, are not conspicuous. Some of the tropical species are showy.

**Epidermis** [from the Gr. *ἐπί*, "on," and *δέρμα*, "skin"], called also **Cuticle** or **Scarf-skin**, in anatomy, is in structure a modification of the epithelium, accurately moulded to the papillary layer of the true skin or derma. When exposed to pressure and friction it becomes hard and thick, as in the palms of the hands; otherwise it is soft. It is composed of agglutinated, flattened cells, but in the deep layers the cells are rounded or columnar, and filled with soft contents. In most races of men these deep cells contain more or less pigmentary matter, which gives the skin its various shades from black to white. The epidermis is penetrated by the ducts of the sweat-glands and oil-glands of the skin. Its cells are developed in the liquor sanguinis, which is poured out on the external surface of the true skin. The hair and nails in man, and also the horns in lower animals, are modifications of the epidermis.

The epidermis in plants is a layer of thick-walled cells, of character varying extremely in different species. It is entirely homologous in structure with animal epidermis. Upon leaves it is penetrated by the stomata, and both transmits exhalations and absorbs carbonic acid, the most important part of the plant's food.

**Epídote** [from the Gr. *ἐπί*, "upon" (implying "addition"), and *δίδωμι*, to "give," so named, it is said, because the series of the secondary forms are an enlargement on the base of the primary], a mineral which consists essentially of silica and alumina, combined with portions of lime, oxide of iron, or peroxide of manganese. A variety containing lime is called *zoisite*, and another containing manganese is termed *pistacite*. It is often found crystallized in prisms, and sometimes occurs massive. The color is generally green, yellow, or red.

**Epidotes** [Gr. *Ἐπιδότης*, the "liberal giver"], a Greek divinity worshipped at Lacedæmon. Of his myths little is known. Also, the god of sleep, worshipped at Sicyon. The name was also a title of Zeus and other beneficent deities.

**Epigæa** [from the Gr. *ἐπί*, "on," and *γῆ*, "earth," "ground"], the name of a genus of plants. (See next article.)

**Epigæa re'pens**, the botanical name of the trailing arbutus or mayflower, an early spring flower of the U. S., well known for its beauty and fragrance. It belongs to the Ericaceæ, and in the Southern States is called ground laurel. It has decided diuretic powers.

**Epi'glot'tis** [from the Gr. *ἐπί*, "upon," and *γλωττίς*, the "glottis," a name suggested by its position], the thin fibro-cartilaginous lid of the glottis. It is attached in front to the thyroid cartilage by two ligaments constituting a narrow neck. During respiration the epiglottis is vertical, and in the act of swallowing it automatically falls backward and closes the larynx, thus preventing the passage of food into that organ.

**Epig'oni** [Gr. *Ἐπίγονοι* (from *ἐπί*, "on" or "after," and *γένω*, to "be born"); Fr. *Épigones*], a term signifying "successors" or "heirs," was a collective appellation of the sons of the seven Greek chiefs who conducted the expedition against Thebes. Their names were Alcmaeon, Thersander, Diomedes, Ægialeus, Promachus, Euryalus, and Sthenelus. They renewed the war and took Thebes. In the history of literature the name is sometimes applied to those writers who confine themselves to the further development of the ideas of the great masters of the classic period.

**Epigram** [Gr. *ἐπίγραμμα*, from *ἐπί*, "on," and *γράφω*, to "write"; Fr. *épigramme*], originally an "inscription" or brief writing; a short poem or piece of verse which has only one subject, and ends with a witty or ingenious turn of thought; an interesting idea expressed happily in a few words. The first of these definitions is nearly correct for a modern epigram, but differs widely from the original sense of the word in Greek. The Greek epigram was at first a short collection of lines inscribed on a monument or statue,

and the word was afterwards transferred to short poems suitable for inscriptions. The general characteristics of Greek epigrams are perfect simplicity and the seemingly studied absence of that *point* which characterizes the modern epigram. But perhaps this seeming pointlessness is due to our ignorance of the circumstances under which they were written and to which they allude. It appears that the first and indispensable requirement of an epigram is not brevity nor sharpness, but *antithesis*. Epigrams are nearly all in one form of metre, the elegiac. Some of the epigrams of Catullus and Martial present the modern epigrammatic character; and Martial has in fact afforded the model on which the modern epigram has been framed. The French writers have been more successful in epigrams than any other modern writers, and they excel especially in those which are intended to be satirical and *piquant*.

**Epigynous** [from the Gr. *ἐπί*, "upon," and *γυνή*, a "female"], a botanical term applied to stamens and petals which grow on the summit of the ovary. These sometimes appear to be inserted on the ovary, in consequence of the coherence of the calyx with the ovary.

**Epilepsy** [Lat. *epilepsia*; Gr. *ἐπιληψία*, from *ἐπί*, "upon," and *λαμβάνω*, to "take," to "seize"], a disease of the nervous system, in which there are occasional seizures or fits of sudden and complete loss of consciousness, usually associated with convulsions, which become clonic, and finally impede respiration. The attack may last from two to twenty minutes, and is followed by exhaustion and sleep. In other cases, called *petit mal* (Fr. for "little sickness"), the loss of consciousness is but momentary, and there is no convulsion or falling down, as in ordinary attacks.

It has been customary to say that this disease is merely functional, because in most cases there is little or no apparent organic change of the brain observable after death; but the present opinion of pathologists appears to be that sufficiently careful observation will detect lesions, however minute, sufficient to account for the symptoms. Dilatation of blood-vessels in the medulla oblongata is frequently observed. The disease itself is of a frightful character, apart from the unhappy effects it may produce upon the mind of the patient.

When occurring in childhood, and especially during the period of dentition, it may after a time be spontaneously cured. It is sometimes hereditary, and often is caused by various excesses, by blows on the head, or by excessive fright.

The treatment during the paroxysm, if it be habitual, is simply to place the patient where he cannot hurt himself, to loosen his clothing, and give him plenty of fresh air. Between the paroxysms the patient should avoid all excesses of eating, of drinking, or of any other kind. Systematic exercise, and even gymnastics, never carried so far as to produce much weariness, are often beneficial. Nutritious food, with avoidance of coffee, tobacco, and stimulants, is usually advisable. A seton in the back of the neck is frequently useful. Of medicines, the bromides of potassium and of ammonium are useful in warding off the attacks, but they have little curative influence. Indeed, in the adult patient there is usually but little prospect of cure, though perfect recovery is not unknown. Tonics, such as iron, arsenic, and quinia, are useful in special cases, but in others are apparently worse than useless.

Notwithstanding the terrible effects of this disease upon the minds of many of its victims, not a few distinguished men have been epileptics, as were Cambyses, Caesar, Mohammed, Petrarch, Henry IV. of England, Napoleon, and Byron. The ancients, it is said, sometimes called this disease *morbus basilicus* ("kings' disease"), from the idea that great men were especially liable to it; and among its numerous names was *morbus sacer* (the "sacred disease"), because the gods were believed to have especial care over its victims.

**Epilobium** [barbarously derived from the Gr. *ἐπί λοβῷ*, a "violet on a pod"], or **Willow Herb**, a genus of herbaceous perennial plants of the natural order Onagraceæ, natives of temperate and cold climates. They have eight stamens and four petals. The fruit is an elongated many-seeded pod or capsule. Some of the species bear beautiful flowers. The *Epilobium angustifolium*, a native of Europe and of the U. S., has showy pink-purple flowers, and is sometimes planted in gardens. Several other species are indigenous in the U. S. The popular name willow herb was given in reference to the leaves, which resemble those of a willow. These leaves have astringent properties, and are reputed to have other active powers.

**Epi'logue** [Gr. *ἐπίλογος*, from *ἐπί*, "upon" or "after," and *λόγος*; Lat. *epilogue*], in dramatic poetry, the closing address to the audience at the end of a play. It was usually spoken by one of the actors, and was cheerful and familiar in tone. The term was sometimes applied to the conclusion of an oration.

**Epim'achus**, a genus of tenuirostral birds inhabiting Australia and Papua, and formerly classed with the birds



Epimachus Magnus, or Grand Plume-Bird.

of paradise. The *Epimachus albus* is of a fine violet-black color, with a broad collar of feathers, margined with green, at the base of the neck. Floating plumes, very long, white and silky, arise from the back and rump. Twelve of the lowest of these end in long thread-like points; hence it has been called the "twelve-threaded bird of paradise." The grand plume-bird (*Epimachus magnus*) is found in Papua. Its body is one foot long, its tail three feet. Its color is black-brown, the side-feathers curled and raised upward, glittering with changeable blue and green tints. The head and belly are of a lustrous blue. It is one of the most beautiful of all known birds.

**Epimen'ides** [Gr. Ἐπιμένειδης; Fr. *Épiménide*], a famous Greek poet and prophet, was a native of Crete, and flourished about 600 B. C. According to tradition, he fell asleep in a cave, and awaked after the lapse of more than fifty years with a large increase of wisdom and inspiration. He wrote a poem on the voyage of the Argonauts. At the request of the Athenians, who were afflicted with the plague, he visited Athens about 596 B. C. and purified that city. Goethe wrote a poem called "Des Epimenides Erwachen."

**Epime'theus** [Gr. Ἐπιμηθεύς; Fr. *Épiméthée*], a personage of the Greek mythology, was said to be a brother of Prometheus and the husband of Pandora. His name (from ἐπί, "on" or "after," and μέσος, "consideration," "thought") signifies "afterthought."

**Épinal**, à'pe'nâl', a handsome town of France, capital of the department of Vosges, is pleasantly situated at the western base of the Vosges Mountains, on both sides of the Moselle, about 200 miles E. S. E. of Paris. It has a ruined castle, a fine Gothic church, a theatre, a hospital, a public library, and a museum of pictures and antiquities. Here are manufactures of cutlery, paper, hosiery, lace, chemicals, pottery, and linen fabrics. Pop. in 1881, 16,445.

**Épinay, d'** (LOUISE FLORENCE PÉTRONILLE DE LA LIVE), MADAME, a French literary lady, born about 1725. She was married at an early age to M. d'Épinay, but they

were soon separated. She was intimate with Rousseau, for whom she built the hermitage at Montmorenci. Her work on education, entitled "Conversations of Emilie" (1783), gained a prize of the French Academy. Died in April, 1783. She left autobiographic memoirs (3 vols., 1818). (See FALLU, "La Marquise d'Épinay," 1866.)

**Epiphania.** See HAMAN.

**Epipha'nus** [Gr. Ἐπιφάνιος; Fr. *Épiphané*], SAINT, a bishop and polemic, born at Eleutheropolis, in Palestine, about 310 A. D. He was educated in Egypt by certain monks, who instilled into his mind ascetic notions, and became afterwards a disciple of Hilarion. In 367 he became bishop of Constantia (formerly Salamis) in the island of Cyprus. He was an adversary of Origen, whom he denounced as a heretic, and he co-operated with those who deposed Chrysostom. He wrote, besides other works in Greek, a treatise against heresies, entitled "Panarium," which is one of the most important sources of information for the history of the ancient Christian Church. Best edition of his works by W. Dindorf (5 vols., 1859-63). (See LIPSIIUS, "Zur Quellenkritik des Epiphanius," 1865.) Died in 402 A. D.

**Epiph'any** [Gr. Ἐπιφάνεια, from ἐπί, "on," "over," "before," and φαίνωμαι, to "appear;" Lat. *Epiphani'a*; Fr. *Épiphanie*], the name of a festival in the Christian Church, celebrated the twelfth day after Christmas (Jan. 6), to commemorate four events: (1) Christ's baptism; (2) his birth; (3) his manifestation to the magi; (4) the manifestation of his divinity in the miracle at Cana. Later, especially in the Western Church, it popularly commemorated the visit of the three wise men to the infant Jesus. The eve of Epiphany, called "Twelfth Night" in England and "Three Kings' Night" in Germany, was anciently a great popular festival. Its celebration is still kept up.

**Epiphe'gus** [from the Gr. ἐπί, "upon," and φηγός, a "beech tree," because it is found growing on the roots of that tree], a genus of herbs of the order Orobanchaceæ. Like all the order, it is a root-parasite, growing apparently from the ground, but really from the roots of trees. This genus is found only under beech trees; the herbs are purplish or yellow-brown, slender branched, with scales in place of leaves, and from six to twelve inches high. The *Epiphegus Virginiana*, common in the U. S., is called "cancer root," from the idea that it is curative of cancer.

**Ep'iphyte** [from the Gr. ἐπί, "upon," and φυτόν, a "plant"], the name applied to those plants which attach themselves to the bark of trees, and derive their nourishment chiefly from the air, whence the popular name of air-plant. These plants are found generally in tropical countries, and prefer moist and shady situations. The orchideous epiphytes have recently been cultivated with great success in green-houses. Many of them are of exquisite beauty, and others are remarkable for their singular and grotesque forms.

**Epi'rus**, or **Epei'rus** [Gr. Ἠπειρος; Fr. *Épire*], a country of ancient Greece, bounded on the E. by the chain of Pindus, on the S. by the Ambracian Gulf, and on the W. by the Ionian Sea. It corresponds to the southern portion of the modern Albania, a wild and mountainous region which in all ages has been occupied by semi-civilized and robber tribes, called *Epirots* or *Épirote*s. It is adapted to pastoral pursuits, and its fine horses, oxen, and Molossian dogs were celebrated in antiquity. The three most important tribes of Epirots were the Chaones, Molossi, and Thesproti. The Molossi eventually became the masters of all Epirus. Among the Molossian kings was Alexander, whose sister Olympias was married to Philip of Macedonia. The most celebrated king of Epirus was Pyrrhus, under whose reign this kingdom attained its greatest power and splendor. He waged war against the Romans in Italy. Died in 272 B. C. Epirus became a Roman province in 168 B. C., and was conquered by the Turks in 1466. The chief towns of Epirus were Ambracia, Buthrotum, and Dodona. This region is still frequently called Epirus or "the Epirus." (See MERLEKER, "Das Land und die Bewohner von Epirus," 1841.)

**Episcopal Church, The Protestant**, the religious body formerly known as "the Church of England in America." The full official title of this communion is "The Protestant Episcopal Church in the United States of America," a name assumed, it has been surmised, to distinguish it from those Christians, on the one hand, who acknowledge the papal supremacy, and from those, on the other, who reject the authority of bishops. Whether this were really intended or not is perhaps doubtful; the name, however, describes with sufficient accuracy the relations of this Church to the other religious bodies in the United States.

The Episcopal Church is the descendant and representative of that branch of the Church of England which was



established in the North American colonies in the seventeenth century. The English adventurers of that and the preceding age, like the Spaniards and Portuguese, carried their national religion with them, and introduced it wherever they gained a footing. The instructions given to Sir Humphrey Gilbert in 1578 gave him authority to settle in any country which was not in the possession of any Christian prince. He was to govern his colonies by laws agreeable to the policy of England, and not against the Christian faith professed in the Church of England. This expedition terminated, indeed, in disaster and in the death of the commander; but similar principles guided the expedition which set sail for the "western parts of America" in 1607, under the command of Captain Newport, of which the Rev. Robert Hunt, a man of energy and ability in civil affairs, as well as a learned and devout divine, was the chaplain. Under his guidance and supervision the foundations of the Church in Virginia were laid; and although it doubtless suffered from his early death, it gradually increased in strength and influence, and became the established religion of that colony. In Maryland, and in what are now called the Middle States, the Church of England was introduced at an early date. In New England, where Puritanism had a predominating influence, churchmen were longer in gaining a footing, which, when gained, they were obliged to make good against determined opposition.

Without tracing the history of the Church through the colonial period, it may be sufficient to say that, notwithstanding many drawbacks, it had in the year 1776 gained a very respectable position. It had been all along, however, obliged to contend not only with open enemies, but with injudicious friends. The violent measures of Andros and others had tended in some places to increase the dislike to the English Church which was felt by the Puritans of New England and New York, and by the numerous sectaries who, attracted by Lord Baltimore's proclamation of a general toleration, had swarmed into Maryland. The attempts which were made from time to time to procure bishops for America had failed, principally from political causes, and the Church, thus deprived of the presence of the highest order of its ministry, was necessarily crippled in the performance of its functions. The want of bishops threw difficulties in the way of raising up a native ministry. Young men who sought holy orders were obliged to make a long and perilous voyage to England to be ordained, and they were fortunate if they returned in safety. The smallpox in the eighteenth century was the peculiar scourge of the colonists who visited England; and this disease, justly dreaded in those days, carried off many of the most promising youths of America. The devotion of colonial churchmen, however, to their religion continued firm and unwavering; and although they encountered further trials at the time of the Revolution, they were able not merely to overcome them, but to place their Church in a position which has enabled it ever since to increase in influence and members.

At the beginning of the Revolutionary war there were in the Middle and Eastern States about eighty parochial clergymen. These gentlemen, with the exception of those in the great cities, were for the most part dependent for their support upon the Society for the Propagation of the Gospel. This society, however, withdrew its gifts after the termination of the war. In other respects, also, the conclusion of peace left the Church in a depressed condition. Many of the clergy and laity had adhered to the Crown during the struggle, and at its close withdrew themselves to England or to the colonies which continued loyal. The peace was soon followed by the confiscation of the landed endowments of the Church in Virginia, and the numerous churchmen in that State were thrown upon their own resources. The Church was poor, and its prospects were not hopeful.

Two important measures were immediately necessary—to obtain an episcopate, and to promote a closer union between the churches in the several States. The first was necessary to the existence, the second to the well-being, of the Church. Under the old Confederation the States regarded themselves as independent sovereignties, and by consequence the churches in them conceived themselves to be so many national churches. This position, if it had continued, would not indeed have affected their faith and doctrine, which are unchangeable, but it might nevertheless have produced many inconveniences. By the principles of the Church of England, every national church, while it is bound to adhere to the common faith of Christendom as a heritage from the apostles, has a wide liberty in regulating its own ceremonial, discipline, and worship. Thus, the Prayer-Book might have been altered in a different way in different States, and divergences in discipline and government might have been developed to such an extent as to make the relations between the churches an

alliance rather than a union. This danger was averted, almost by an accident. A few clergymen from New York, New Jersey, and Pennsylvania met at New Brunswick, in New Jersey, to take measures for reviving an old society (which still exists) for the support of the widows and children of the clergy. They naturally discussed the condition of the Church, and made arrangements for a larger meeting to be held soon afterwards in New York, to which representatives of the laity were to be invited. This meeting, however, did little more than lay down certain general principles—with reference particularly to episcopacy and the Common Prayer-Book, which they rightly conceived would tend to promote a real union between the churches in the several States—and issue a call for a similar meeting to be held the next year in Philadelphia. This was the beginning of the General Convention, which has ever since been regarded as the governing body of the Church in the United States.

The constitution of this body, as it was soon afterwards established, required it to consist of all the bishops, and of four clergymen and as many laymen from each State. By later amendments, when more than one bishop was placed in a State, every diocese or episcopal jurisdiction became entitled to a representation of four clerical and four lay deputies, and the lay deputies were required to be communicants. All the bishops were entitled to seats *ex officio*; and it was arranged that as soon as there should be three or more they should sit in a separate house. Every act was to receive the approbation of both houses. Authority was given to the General Convention to prescribe the qualifications for ordination and to set forth a Book of Common Prayer—the two things that were most necessary for establishing such a union as was desired. It was also directed that there should be a convention in every State, consisting of clergy and laity, the powers of which were not in any way defined. It seems to have been assumed, however, that these conventions were to exercise supervision over the affairs of the Church in every State—or, to use the more recent expression, in every diocese—in all matters which did not come within the immediate jurisdiction of the bishop.

This constitution was adopted in the several States, though not immediately in all. The Convention of 1785 had consisted of delegates from what were afterwards called the Middle States, and from Maryland, Virginia, and South Carolina. Much doubt was felt in the East, particularly in Connecticut, as to the wisdom of some of its provisions. The introduction of the laity especially into what was conceived to be a Church council was regarded as an experiment of questionable expediency, and some of the powers which were given them were thought to be without precedent. These objections, however, were gradually removed or waived; and in 1789, Bishop Seabury, with a deputation from Connecticut, took his seat in the General Convention, and the union of the Episcopal churches in the United States was completed. Although the constitution proposed in 1785, and adopted in an amended and completed form in 1789, all along contemplated the presence of bishops, there really were none in the United States at that time except Bishop Seabury, who took no part in the proceedings of the Convention. This gentleman (the second of a family which for five generations has furnished a line of clergymen, all able and some distinguished) had been sent to England soon after the peace by the clergy of Connecticut to obtain consecration from the English bishops. He had found an obstacle, however, in the oath of allegiance, which forms a part of the English consecration office, and which, of course, could not be taken by any one but a British subject. After some delay, and much negotiation, he succeeded in obtaining consecration from the Scottish bishops, and, returning to America in 1785, was received as bishop of Connecticut and Rhode Island.

The rule of the Church, believed to have come down from the apostles themselves, requires the presence of at least three bishops at every consecration; and it was necessary that there should be at least that number in the United States to maintain an episcopal succession. Application was therefore made in 1786 to the English bishops in behalf of the Rev. William White and the Rev. Samuel Provoost, who had been chosen to the episcopate in Pennsylvania and New York. The obstacle arising from the oath of allegiance was removed by an act of Parliament; but a new difficulty was found in a revised Prayer-Book which had been proposed for use in the United States in 1785, and in which the English bishops thought that they perceived indications of a disposition to depart from the doctrine of the Church of England. After a correspondence between some of the most learned divines in England and the United States, in which the principle was clearly brought out that "this Church does not intend to depart from the Church of England in any essential point of doctrine, discipline, or wor-

ship, or further than local circumstances require," it was agreed to proceed with the consecration of these gentlemen, and they were accordingly consecrated bishops on the 4th of February, 1789, in the archbishop's chapel at Lambeth, by the Most Rev. John Moore, archbishop of Canterbury, assisted by other bishops. Partly because it was desirable that there should be more than the lowest number of bishops necessary to maintain a succession, and partly to keep up the succession in the English line, the Rev. James Madison obtained consecration in 1790 as bishop of Virginia.

The "Proposed Prayer-Book," as it was called, which had never met with much favor, was allowed to fall into oblivion, and it has now become one of the curiosities of ritual literature. A new revision of the Prayer-Book was made upon the principle just indicated. The English Prayer-Book was retained, with such alterations as were necessary to adapt it to the changes in the political condition of the country, and with many other (chiefly verbal) modifications. The promise, however, to adhere to the doctrine, discipline, and worship of the Church of England was, upon the whole, strictly adhered to. The most important changes were the introduction of a communion office closely resembling that of the Scottish Episcopal Church, and more nearly approaching the older liturgies of England, which was done at the request of Bishop Seabury and at the instance of the Scottish bishops; the omission of the Athanasian Creed; and the leaving out the precise directions about confession which occur in the English Office for the Visitation of the Sick. This omission was perhaps balanced, and the mind of the Church sufficiently declared, by the stringent rules about confession which are found in the Office for the Visitation of Prisoners, borrowed from the Irish Prayer-Book. The Prayer-Book, thus revised, was ratified in 1789. It came into immediate and general use, and has ever since been, without material alteration, the "use of the Protestant Episcopal Church in the United States."

The two objects which the Convention had in view in 1785 were thus attained in 1789. There was a sufficient number of bishops, and the union of the Church in the United States was perfected. Since that time one hundred and twenty-eight bishops have been consecrated, of whom sixty-seven are living. There are nearly 3600 priests and deacons, and the number of communicants is computed at 369,000. The Church has extended into every State and Territory, and its missionaries have penetrated into Western Africa, China, and Japan. In the General Convention of 1789 (that in which the union of the Church was perfected) two bishops sat with twenty-nine clerical and lay deputies. That of 1883 consisted of sixty-five bishops and four hundred and six clergymen and laymen. The number of churches and chapels is estimated at about 3000. There is a general theological seminary in the city of New York, and there are divinity schools in Connecticut, Ohio, Pennsylvania, Massachusetts, Wisconsin, and Minnesota. Several colleges are connected with this Church, among which are Trinity College, Hartford, Hobart College, Geneva, Racine College and Burlington College, in the States of Connecticut, New York, Wisconsin, and New Jersey. The University of the South was begun a few years ago with prospects of success, but its usefulness will probably be rather in the future than in the present. Faculties of divinity and grammar-schools are attached to several of the colleges. St. Stephen's College, Annandale, N. Y., receives at an early age youths who are designed for holy orders, and carries them to the point at which they begin their theological training. Trinity School, N. Y., an endowed grammar-school established in 1706, receives seventy-two boys on the foundation.

The doctrine of the Episcopal Church is that of the Church of England, believed to have been the common faith of Christendom while it continued undivided. The relations of this Church to the rest of Christendom were clearly defined by the bishops who met in conference at Lambeth in 1867. More than seventy bishops from England, Scotland, Ireland, the colonies, and the United States met in that year to take into consideration the state and best interests of the churches of the Anglican communion. One of their first acts was to express the deep sorrow with which they viewed "the divided condition of the flock of Christ throughout the world," and to record their conviction that "unity will be most effectually promoted by maintaining the faith in its purity and integrity, as taught in the Holy Scriptures, held by the primitive Church, summed up by the creeds, and affirmed by the undisputed general councils; and by drawing each of us closer to our common Lord, by giving ourselves to much prayer and intercession, by the cultivation of a spirit of charity and a love of the Lord's appearing."

The Episcopal Church, while it receives the Holy Scriptures as the ultimate rule of faith, does not throw them open to the varying interpretations of every man's private

judgment, but explains them by the aid of traditions which it believes to have come down through an unbroken line of teachers from the apostles themselves, by the creeds, and by the definitions of Christian doctrine made by the general councils. Candidates for baptism are required to confess their faith in the words of the Apostles' Creed—adults in person, and infants by their sponsors. Communicants must receive also the Nicene Creed, which contains the same teachings in a more expanded form. Nothing is required from laymen, beyond acceptance of the Prayer-Book and a proper deference to the instructions of the clergy, who are believed to derive their doctrine and their right to teach by a succession from the apostles. The XXXIX. Articles of the Church of England (except the twenty-first, "of the power of Christian princes in relation to general councils") are still commonly bound up with the Prayer-Book, but the practice of signing them has been laid aside since the Revolution. The clergy sign, instead, a general declaration that they "believe the Holy Scriptures of the Old and New Testament to be the Word of God, and to contain all things necessary to salvation;" and they "solemnly engage to conform to the doctrines and worship of the Protestant Episcopal Church in the United States." The mode in which the teachings of Holy Scripture are ascertained has been already pointed out.

Thus, the Episcopal Church would seem to be one of the most liberal and comprehensive of religious bodies. It may contain within itself (it is not, however, asserted that it *does*) those, on the one hand, who apparently differ from Roman Catholics in little more than in denying the pope's jurisdiction in countries which are or have been included in the British empire, and, on the other, those who are to be distinguished from Presbyterians only by their acceptance of episcopacy and the Prayer-Book. Within these possible limits there would appear to be ample scope for religious thought; and the great freedom of religious thought accounts for the schools of teaching which have long existed. As men incline toward authority on the one hand, or individual judgment on the other, they are said to be High Church or Low Church. The lines of thought, however, are not sharply drawn, and the schools melt into each other by imperceptible degrees. The principles laid down by the Fathers at Lambeth (themselves men of every conceivable school of thought) have been long tested, and have been found sufficient to maintain the unity and harmony of the Church.

BEVERLEY R. BETTS.

**Episcopal System**, in the Roman Catholic Church, is that theory according to which the highest clerical power is vested in the whole body of bishops. This theory was most prominently brought forward in the papal elections of the fourteenth century, and its followers declared the Church, as represented in its general assemblies, to be above the pope. In France the University of Paris was the chief supporter of this theory, and the Gallican Church accepted it as one of its fundamental laws. In Germany the coadjutant bishop of Treves, Nikolaus von Hontheim, who was one of its chief supporters, wrote a celebrated book, in which he clearly defined the episcopal system, "*De statu ecclesiæ et legitima potestate Romani Pontificis*" (1763). The Punctations of Ems (see Ems) had the same fundamental idea, and although they failed in their purpose, the system continued to spread in Germany. But the declaration of papal infallibility has put an end to these differences, and made an impossibility of the episcopal system. In the German Protestant churches the episcopal system is that theory according to which the authority of the bishops, which had been suspended in the Protestant countries in consequence of the peace of 1555, was transferred to the ruler of the country.

**Episcopius** (SIMON), a learned Dutch divine whose original name was BISSCHOP, was born in Amsterdam Jan. 1, 1583. He was distinguished for his liberality, moderation, and other virtues, and became the chief pillar and champion of the Arminians or Remonstrants. He was appointed professor of theology in the University of Leyden in 1612, but he was accused of Socinianism by the Calvinists (Gomarists), and was banished in 1618 by the Synod of Dort. He retired to France, returned to Holland in 1626, and became rector of a college in Amsterdam in 1634. His principal works are the "Confession of the Remonstrants" (1621) and "*Institutiones Theologiæ*." Died Apr. 4, 1643.

**Episode** [Gr. ἐπεισόδιον, from ἐπί, "on," "in addition to," "eis," "in" or "into," and δῶς, a "road," a "journey," a "coming;" i. e. something that comes in besides the main plot or poem] was originally one of those parts of an ancient classical drama which were performed between the entrances of the chorus. In modern use it signifies an incidental narrative or digression in a poem, more or less connected with the main plot, but not essential to its development.

**Epis'tates** [Gr. ἐπιστάτης, from ἐπί, "on" or "over," and ἵσταμαι, to "be placed," to "stand"], literally, "one set or placed over," the title of the presidents of the two great councils of the ancient Athenians—viz., the Ecclesia and the senate of Five Hundred. Their term of office was one day.

**Epis'tle** [Lat. *epistola*; Gr. ἐπιστολή, from ἐπιστέλλω, to "send"], literally, a thing sent, hence a letter. The name is now given especially to the twenty-one epistles of the New Testament. The writings ascribed to the so-called Apostolic Fathers (Clement of Rome, Barnabas, Ignatius, Polycarp, and Hermas) are for the most part epistolary in form. Of quite inferior dignity and value are the following undoubtedly spurious epistles: Abgarus of Edessa to Christ, and Christ to Abgarus; Lentulus to the Roman Senate; several of the Virgin Mary; Paul to the Laodiceans; the Third of Paul to the Corinthians, and one of the Corinthians to Paul; Peter to James; eight of Seneca the philosopher to Paul, and six of Paul to Seneca.

**Epis'tolæ Obscuro'rum Viro'rum** [Lat. for "letters of obscure men"], a famous collection of satirical letters directed against the monks and the Roman Catholic Church. They were published in three parts—the first at Hagenau (1515), the second at Bâle (1517), and a third at a later date. They were probably written jointly by Ulrich von Hutten, Crotus Rubianus, and Buschius. They are an admirable imitation of the barbarous Latin of the monks of those days. Certain Dominicans at Cologne, under the lead of one Pfefferkorn, a baptized Jew, advocated the expulsion of all Jews from Germany, the forcible education of their children in Christian doctrine, and the burning of their books. This attempt was opposed by Reuchlin; and pending the decision of the question by the pope the "Epistolæ" appeared. Says Sir William Hamilton: "The 'Epistolæ' are at once the most cruel and most natural of satires, and as such they were the most effective. They converted the tragedy of Reuchlin's persecution into a farce; annihilated, in public estimation, the enemies of intellectual improvement; and even the friends of Luther, in Luther's lifetime, acknowledged that no other writings had contributed so powerfully to the downfall of the papal domination." Many editions of the "Epistolæ" have been published, the best of which is that of Boecking, Leipsic, 1858.

**Ep'itaph** [Lat. *epitaphium*, from the Gr. ἐπί, "upon," and τάφος, a "tomb"] was anciently the name of the monument or tomb over a grave, and was especially applied to the funeral oration delivered at the grave. It is, however, universally applied at present to the inscriptions upon tombstones. The literature of epitaphs is very considerable. Greek epitaphs are preserved in great numbers in the Anthology. Of Latin epitaphs, many exist both in literature and upon the tombs themselves. Numerous interesting examples of early Christian epitaphs have been taken from the Catacombs. Many collections of remarkable epitaphs in modern languages have also been made.

**Epithala'mium** [from the Gr. ἐπί, "on" or "near," and θάλαμος, a "bridal chamber;" also "marriage"], a bridal hymn; a chorus sung, in ancient Greece, near the door of the bridal chamber. It appears to have been a formal part of the marriage ceremony. Among the ancient Romans the rude Fescennine songs, which seem to have been of a phallic character, were often sung at weddings, and are hence called epithalamia. The term is often given to formal poems composed in honor of a particular marriage. Anacreon and Pindar composed poems of this kind. The most perfect example of it now extant is the epithalamium of Pegasus and Thetis, by Catullus.

**Epithelio'ma** [from EPI-THELIUM, which see], a variety of cancer which attacks most frequently the surfaces which are covered with pavement epithelium or with epidermis. Many pathologists class it with "canceroid" disease, because it appears to be less malignant than true cancer. Indeed, if removed early, the patient has a fair prospect of future exemption from the disease, but in neglected cases it assumes the malignancy and other dreadful characters of true cancer. The lips, especially the upper lip, are the most frequent seat of epithelioma, but it may attack even internal organs. Histologically, it appears to be composed of epithelial elements.

**Epithe'lium** [from the Gr. ἐπί, "on," and ἑλνυς, "soft," "delicate," "tender," because used to protect the delicate tissues beneath], in anatomy, is the layer of cells which lines the serous (or closed) and the mucous (or open) cavities of the body, the mucous epithelium being continuous with the epidermis, which is a modification of the epithelium.

Epithelium is of two principal kinds: (1) "Pavement" epithelium, consisting of rounded or polygonal cells. This variety is especially found in the closed cavities, but is not

confined to them. (2) "Columnar" or cylinder epithelium, found chiefly upon mucous membrane. This kind has many varieties of form, one of the most important being "ciliated epithelium," which is provided with fine hair-like processes (cilia), whose length varies from one one-thousandth to one twelve-thousandth of an inch. These cilia have a rapid automatic motion in one direction, moving from 150 to 250 times in a minute. These motions are no doubt highly important in physiology, but their mechanism is little understood. In some instances these motions obviously assist in discharging excretions, etc., but in others their use is quite unknown. The epithelial cells have a very important part in the secretion of many fluids. For example, mucus is formed by the bursting of epithelial cells and the discharge of their soft contents, mingled with the debris of the old cell-walls. This process of destruction is attended by continual renewal of the cells.

**Ep'ithet** [from ἐπί, and τίθημι, to "put upon"], a word or clause which expresses some attribute of an object that is prominent in thought, but is not made the basis of a discrimination or classification; e. g. "Frail man is mortal;" "Earthly pleasures, which are fleeting and unsubstantial, are not the highest for man." Used in opposition to DEFINITIVE (from *de* and *finio*, to "mark out the lines or boundaries"), by which we understand a word or clause which expresses some attribute that is made the basis of a discrimination or classification; e. g. "Good men [*i. e.* only good men] are a blessing to the community;" "Those pleasures that are from the earth are not the highest for man."

Great care should be taken that epithets be not too frequently employed, and that there be something in the thought to which they actually and exactly correspond. The felicitous employment of epithets is one of the attributes of genius which gives to literature its highest charm. See Milton's

"Drew iron tears down Pluto's cheek."

**Epit'ome** [Gr. ἐπιτομή, a "cutting short" (from ἐπιτέμνω, to "cut," to "gash," also to "abridge")], in literature, an abridgment; a work in which the contents of a former work are reduced into a smaller space by curtailment and condensation. In the declining age of the Western Roman empire the practice of epitomizing the works of older writers, especially in history, became very prevalent. In several instances a valuable original work has been lost which perhaps would have been preserved if an epitome had not been substituted for it. Among the best known works of this class are the epitome of Florus, "Epitome Rerum Romanarum," and that of Eutropius, "Breviarum Historiæ Romanæ," both abridgments of the history of Rome.

**Epitro'choid** [from the Gr. ἐπί, "on," and τροχός, a "wheel"] is a curve traced by a point in the plane of a circle which rolls on the convex side of a fixed circle. The curve thus generated is one of the family of roulettes, and becomes an epicycloid when the generating point is in the circumference of the rolling circle. When the two circles are equal the epitrochoid becomes similar to the pedal of the fixed circle with respect to a certain fixed point in its plane. But the pedal being always the inverse of the reciprocal of the primitive curve, the epitrochoid in this case must be the inverse of a conic with respect to one of its foci, which latter is a curve of the fourth order, belonging to the Cartesian ovals, and called the *limaçon*. Epitrochoids are generally transcendental curves; it is only when the circumference of the fixed and rolling circles are commensurable that the epitrochoid returns into itself and becomes an algebraical curve.

**Epizo'a** [a Gr. term, from ἐπί, "on," and ζῶον, an "animal"], a name given to animals living upon the skin and among the hairs of other animals, as fleas, lice, ticks, mites, etc. Some of these, like the itch-mites, are Acarina—spiders of low grade of development—but most are insects of spider-like character, low forms of Diptera and Hemiptera. Most mammals, many birds, and a great many insects are infested by insect parasites. The *Cymus ceti*, or whale-louse, living upon whales and fishes, is a crustacean. Many Cirripedia live in a similar way upon whales and sharks. Most Epizoa live as true parasites upon the blood and secretions of the animal which they infest. Others, especially the Cirripedia, appear to feed upon other food, making the skin of a larger animal merely their place of abode. The very great majority of Epizoa are articulate animals.

**Epizoot'ic** [from the Gr. ἐπί, "upon," and ζῶον, an "animal"], a disease which attacks the lower animals, or any one species of them, as epidemics attack men. The term is objectionable, because, with some limitations, these diseases chiefly attack but one species, instead of all animals; and moreover, as man is an animal, all epidemics are epizootics. The so-called epizootic diseases follow the general laws of epidemics, and they would appear to attack especially the

domesticated animals. Some diseases attack both man and the lower animals. Thus, smallpox affects the horse, cow, and sheep, assuming in each a modified form. Among the more important epizootic diseases are the rinderpest, the contagious pleuro-pneumonia, and the "foot-and-mouth disease" (all attacking neat cattle); the remarkable influenza which attacked horses and mules, arising in Canada Sept. 30, 1872, and rapidly moving southward and westward over the whole of North America; the scab, foot-rot, and other diseases of sheep. The "reds," the *muscardine*, *pébrine*, and other diseases of the silkworm have been the cause of serious calamities to operatives, and at times have almost threatened the existence of the silk manufacture.

The epizootic influenza of 1872-73, above alluded to, destroyed, according to Dr. A. B. Judson of New York, 1500 horses and mules in New York, or 4 per cent. of the total number in the city. The disease reached Chicago Oct. 29, St. Louis Dec. 1, Salt Lake Jan. 11, 1873, and San Francisco April 15. It is thought that the disease spread chiefly by contagion, and not by atmospheric influence.

**E Plu'ribus U'nium** [Lat.], "One composed of many," the motto of the U. S., consisting of many States confederated.—*Webster*. [Lat.], "One of many," the motto of the U. S.; the allusion being to the formation of one federal government out of several independent States.—*Worcester*.

After the Declaration of their independence by the States was announced on the 4th of July, 1776, and before the adjournment of that day's session, it was resolved, "That Dr. Franklin, Mr. J. Adams, and Mr. Jefferson be a committee to prepare a device for a seal for the United States of America." The result of their joint work was the present seal of the U. S., which has not been changed since its first adoption. The six sections, or quarterings, upon the escutcheon or shield were intended to denote the countries (England, Scotland, Ireland, France, Germany, and Holland) from which the States so united had been, respectively, chiefly peopled. The motto adopted on this seal, and which has ever since been retained, was intended to denote the character of the federal government in its formation, as stated by the great American lexicographers, Webster and Worcester, in their above definitions. From the six quarterings on the shield, with the necessary seven attending spaces outside of the sections or quarterings, arose the original thirteen stripes, as they are called, which were transferred to the flag of the Union in 1777. The stars were intended to represent the number of the States, while the origin of the stripes was the quarterings or sections of the shield, as stated. ALEXANDER H. STEPHENS.

**Epping**, a town of England, in Essex, is at the N. end of Epping Forest, 16 miles N. E. of London. It is noted for its cream, butter, and sausages. Epping Royal Forest, formerly Waltham Forest, covers 60,000 acres, but was once much more extensive, covering the whole of Essex almost to the very gates of London. Now only 13,000 acres are in woods and wastes, and the rest is enclosed as private property. The great fair formerly held every year around the Fairlop Oak has now ceased, but the stag is still turned out on Easter Monday for the amusement of the public. In the midst of the forest Queen Elizabeth's hunting lodge is still standing. Pop. 2343.

**Eps'om**, a market-town of England, county of Surrey, 14 miles by railway S. S. W. of London. It has mineral springs containing sulphate of magnesia, which derives from this place the name of Epsom salt. They were first discovered in 1618, but after the Restoration they enjoyed great celebrity. Charles II. and Prince Jörgen of Denmark, the spouse of Queen Anne, often resorted to them. Gradually, however, they were deserted. Here is a royal medical college. Epsom is famous for its horse-races, which are held yearly on the Downs,  $1\frac{1}{2}$  miles S. of the town. The races last four days, one of which is called "Derby Day," and are more numerously attended than any other races in the kingdom. They were permanently established in 1730. Pop. 6916.

**Eps'om Salt** [Lat. *magnesie sulphas* (i. e. "sulphate of magnesia"); Ger. *Schwefelsaure Magnesia*], the magnesium sulphate ( $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ ), a salt, when pure, usually found in colorless acicular crystals derived from the right rhombic prism, and containing 51.22 per cent. of water of crystallization. It is somewhat efflorescent, for at  $32^\circ$  Fahrenheit water will dissolve over one-fourth its weight of the anhydrous salt, and as the temperature is raised the solubility increases. The salt was formerly manufactured from the waters of the mineral spring of Epsom, England. It also exists largely in sea-water, from which it was formerly prepared in large quantities. In Italy it is now prepared from a schistose rock; in England, from dolomite; in Pennsylvania and Maryland, from magnesite. This salt is used in medicine as a cooling and generally safe cathartic. It is nauseous to the taste, but may be easily taken in "soda-

water," with lemon syrup. In the household it is an excellent addition to starch, decidedly increasing its stiffening powers. Mixed with ordinary whitewash, it gives a fine pearly whiteness to walls.

**Equa'tion** [Lat. *equa'tio*, *equa're*, to "make equal"], in algebra and the calculus, an expression denoting that two quantities symbolically expressed are equal. The sign = placed between the two quantities equated denotes this relation. Either quantity may be expressed in a single term, or in more terms than one, connected by the sign + or —. The term or terms on the left of the sign of equality constitutes what is called the first member of the equation; the term or terms on the right, the second member. In analysis there occur equations of two classes, distinguished as *algebraic* and *transcendental*. Algebraic equations are those in which the quantities employed are subjected to no operations but the operations of common algebra, including addition, subtraction, multiplication, division, and involution to powers or evolution of roots, expressed by constant indices. Transcendental equations are those whereinto relations are introduced to which the ordinary operations of algebra are inadequate, as when the exponents of powers are variable, or when the trigonometrical functions of variable angles enter as terms or factors. Such relations are called transcendental (see TRANSCENDENTALS), and give name to the equations in which they occur. The object of algebraic equations is usually to ascertain the value of some unknown quantity through its relations to other quantities which are known. If there is but one unknown quantity, a single equation will suffice for the solution. If there are two or more, there must be as many equations expressing relations independent of each other as there are unknown quantities. If the number of independent equations is smaller than the number of unknown quantities, the problem to which they belong is indeterminate. It can then be made determinate by forming a sufficient number of independent equations with arbitrary conditions. If the number of independent equations is greater than the number of unknown quantities, the problem to which they are supposed to belong is impossible. In this case some of the conditions which these equations express are incompatible with each other; but if, after eliminating all the unknown quantities from them, we treat the constants which remain as if they were unknowns—that is, make them arbitrary constants—the resolution of the group with respect to these will show what relations they must have to each other, or the conditions which must exist, in order to render the original set of equations determinate. They are therefore called *equations of condition*; which term is generally applicable to all equations which express necessary relations between quantities, without any regard to their absolute value.

The equality between the members of an equation is not affected by subjecting both to the same operation. Thus, if both members be multiplied or divided by the same quantity, increased or diminished by the same quantity, raised to the same power, depressed to the same root, made the values of similar trigonometrical functions of the same angle, or taken as the exponents or logarithms of the same assumed constant or variable, under all these transformations the relation of equality between them is preserved. If any term be transposed from one member to the other of an equation, the equality is still maintained, provided the sign of the term transposed be changed from + to —, or from — to +, at the same time. If all the terms of one member be thus transposed to the other, this member is reduced to 0, but the equality is still preserved. In all general discussions of the theory of equations it is common to consider the equation under this form; i. e. with the significant terms on one side and zero on the other.

An *identical* equation is one in which precisely the same terms are found on one side as on the other, or in which this exact similarity is producible by performing operations on one side or the other, which change the form without altering the value. Thus,

$$\frac{cy^2 + cx^2 + 2axy + ay^2 + 2cxy + ax^2}{a+c} = (x+y)^2$$

is an identical equation, because, by properly arranging the terms of the first member, and actually performing the division by  $a+c$ , and by developing the second member at the same time, we have  $x^2 + 2xy + y^2 = x^2 + 2xy + y^2$ . An identical equation is obviously no help towards the solution of a problem.

The *degree* of an algebraic equation is denoted by the highest power of the unknown quantity contained in it, if it has but one, and by the greatest sum that can be found by adding together the exponents of all the unknowns which are factors in any single term, if there are several. An equation of the first degree is called a simple equation. If it has but one unknown, it is resolved by transposing

all the terms into which the unknown enters to the first member, and all those into which it does not enter to the second; then resolving the first member into two factors, of which one shall be the unknown; and, finally, dividing both members by the second factor of the first member—that is, by the coefficient of the unknown quantity. If a simple equation contains more than one unknown, then singly it is indeterminate. To be determinate there must be just as many equations (not transformable into each other) as there are unknowns. In this case, if we find from one of the equations the value of one of the unknown quantities in terms of the others (*i. e.* by treating all the other unknowns as knowns for the time being), and substitute the value so found in all the remaining equations, we shall have eliminated, or got rid of, one of the unknowns, and have made the number of equations one less at the same time. Following up this mode of proceeding, we shall at length have but one equation and one unknown quantity; of which last therefore the value is obtainable in known terms. The values of the rest are then easily deducible by successive substitutions.

Equations of the second degree can always be reduced to the form  $x^2 + 2px = q$ . For if originally there are many terms containing  $x^2$  and  $x$ , and also many known quantities, all the unknowns having been brought to the first member and the knowns to the second, the term or group of terms containing  $x^2$  may be resolved into two factors, of which one shall be  $x^2$  itself, and the whole equation may then be divided by the other factor. Then all the knowns forming the coefficient of  $x$  may be represented by  $2p$ , and the entire second member may be represented by  $q$ . In this case it may happen that the coefficient of  $x$  is negative. If so, the *implicit* value of  $p$  is said to be negative, while its *explicit* sign is positive. This matter must be attended to when the values which  $p$  replaces are restored. The quadratic having the form above, its solution, which presents two values, either of them capable of satisfying the equation, is as follows:

$$x = -p + \sqrt{q + p^2},$$

$$x = -p - \sqrt{q + p^2}.$$

Any equation, whatever its degree, which contains but two powers of the unknown, is reducible precisely like a quadratic, provided that the indexes of the two powers are in the relation of 2 to 1. For, supposing the two powers to be  $m$  and  $n$ , we can always reduce the equation to the form  $x^m + 2px^n = q$ , or  $x^{2m} + 2px^m = q$ . Hence, from what

has just been said it appears that  $x = (-p \pm \sqrt{q + p^2})^{\frac{1}{n}}$ .

For the manner of reducing cubic, biquadratic, and higher equations resort must be had to systematic treatises. The following are a few of the propositions of general interest in regard to the theory of equations which are admissible in an article having the necessarily limited scope of the present.

Every equation of whatever degree (say the  $m^{\text{th}}$ ) is capable of being reduced to the form  $x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \dots + Px + Q = 0$ ; in which the coefficients  $A, B, C$ , etc. are positive or negative, whole or fractional, real or imaginary, as it may happen. If an equation has as many real roots as its degree indicates, the coefficient  $A$  will be the sum of all these roots with signs reversed. If the several roots are  $a, b, c$ , etc., the equation itself is the product of the binomial factors  $x - a, x - b, x - c$ , and so on; so that the constant (or known) term  $Q$  is the product of all the roots  $a, b, c$ , etc., with signs reversed. If there are not so many different real quantities which will satisfy the equation as the number of units in the exponent of the degree, then there will be *imaginary* roots (quantities containing an *even* root of a *negative* quantity), and these, when present, are always present in pairs, each member of a pair containing the same real and imaginary terms, the imaginary term with contrary signs. Such pairs of roots are called conjugate roots. If one of the real roots (as  $a$ ) of an equation is known, the equation is divisible by the binomial  $x - a$ , and may thus be depressed in degree to the next lower order. If the coefficients of all the different powers of the unknown quantity from  $m$  downward are whole numbers, all the commensurable roots are whole numbers. Every equation in which some of the coefficients are fractional can be transformed into another of the same form as given above, in which all the coefficients shall be whole numbers; but in this case  $x$  will have to give place to some other unknown, as  $y$  in the expression  $y = kx$ . After the transformation we shall have  $y^m + A'y^{m-1} + B'y^{m-2} + C'y^{m-3} + \dots + P'y + Q' = 0$ .

Every equation can be transformed into another in which the second term shall be wanting by assuming  $x = y - \frac{A}{m}$ , and substituting this value of  $x$  for  $x$  itself in the given equation. This transformation is always necessary preliminarily to the reduction of cubics, and generally to that

of biquadratics. Every equation in which the signs are all positive must have all its real roots negative. Every *complete* equation (*i. e.* one in which all the powers of  $x$  are present) which has its signs alternately positive and negative must have all its real roots positive; and this will be true of incomplete equations if we replace the missing terms by zeros. When the last (the known) term of an equation is positive, the number of its real positive roots is even; when it is negative, the number of such roots is uneven. Every equation of an even degree, in which the coefficients are real and the last term negative, has at least two real roots—one positive, and the other negative. Every equation of an odd degree, in which the coefficients are real, has at least one root of a sign contrary to that of the last term. When the roots of an equation are all real, the number of positive roots is equal to the number of variations of sign (changes from + to -, or the contrary in proceeding from left to right), and the number of negative roots is equal to the number of permanences of sign.

The number of real roots of any numerical equation in which the roots are all unequal may be found by means of its first derivative (see DERIVATIVE), as follows: Operate on the equation and its derivative as for finding greatest common measure, using only positive multipliers or divisors in preparing the several steps, and change the signs of the successive remainders thus found. Set down then in a row the first terms (only) of the given equation, the derivative, and the several remainders prepared as above (including the last remainder, which will have but one term), with their signs. Suppose the unknown to be positive, and write under each term of this row the sign of that term resulting from this supposition. Then suppose the unknown to be negative, and write under the sign last written the sign resulting from this second supposition. Count the number of variations in the first of these rows of resultant signs, and also the number of variations in the second of the rows. The difference between these numbers is the number of real roots in the original equation.

If, as above supposed, the original equation has no equal roots, no common measure will be found by the first operation above, and the last remainder will be a constant. But if it has equal roots, a common measure will be found. In this case divide the original equation by this common measure, and the quotient will be a new equation having the same roots as the given one, the equal roots of that equation entering it but once. Proceed with it as above. If the given equation contain but one set of equal roots, the greatest common measure found in the operation above described will be a binomial, or a complete power of a binomial; and the common value of the equal roots will be found by extracting the numerical root of the known term which corresponds in degree to this power. If the given equation contained more than one set of equal roots, the greatest common measure found as above will be the product of the same number of binomials or binomial powers; and by putting this equal to zero, and pursuing with it the same treatment as with the original equation, the number of real roots in it will be ultimately found.

If, instead of taking the *first terms* of the quantities above specified—viz. the equation, the derivative, and the remainders (with signs reversed)—those expressions be written out in full, and their resultant signs ascertained and written down for any assumed value of the unknown, as  $p$ , and for other values as  $p_1, p_2, \dots, p_n$ , etc., increasing or diminishing by minute differences; and if at length a value, as  $p_n$ , be found which gives one variation more or one fewer than the value  $p_{n-1}$ , next greater, or next less; then one of the real roots of the equation lies between  $p_{n-1}$  and  $p_n$ . It thus appears that all the real roots of any numerical equation of whatever degree may be found by approximation.

F. A. P. BARNARD.

**Equation of Time** is the difference in mean solar time between the sun's apparent or true right ascension and its mean right ascension; or, in other words, the difference between sun time and clock time. This difference arises—(1st) from the sun's unequal motion in longitude because of the eccentricity of the earth's orbit; (2d) from the obliquity of the ecliptic; and (3d) to some small extent from the perturbations of the moon and planets. Sun time and clock time agree about Dec. 25th, April 16th, June 16th, and Sept. 1st. The equation of time is greatest about Nov. 1st, when the clock is sixteen minutes and sixteen seconds faster than the sun.

**Equation, Personal.** It is found by experience that different persons, in recording the results of astronomical observations, will make various errors, some anticipating the event, but others failing to record it at the proper time. When it is found possible, by examining a long series of records made of the same events by two observers,



to discover the average difference between their records of events, a very important correction of time-intervals may sometimes be introduced into a computation based upon such records. Such a correction is called the relative personal equation of the two astronomers. When it is found that an observer habitually makes, or is likely to make, a certain error in his time-records, such error (or absolute personal equation) can be readily allowed for.

**Equa'tor** [Lat. *æqua'tor*, from *æquo*, *æqua'tum*, to "make equal;" Sp. *ecuador*], literally, "that which makes equal," or which divides equally the surface of the earth, in geography, is a great circle of the terrestrial sphere which is equidistant from the two poles, and divides the earth into northern and southern hemispheres. Latitudes are counted from the equator along the meridian, and longitudes are measured on the equator or on some circle parallel with it.

**EQUATOR**, in astronomy, is the great circle of the celestial sphere, of which the plane is perpendicular to the axis of the earth's diurnal motion. It is called the equator because when the sun is in its plane the days and nights are exactly equal all over the world. The equator divides the sphere into northern and southern hemispheres, and is often styled the *equinoctial*. The apparent diurnal motions of all the celestial bodies are performed in circles which are parallel to it. The right ascensions are measured on it.

**Equatorial Current.** See CURRENTS, MARINE.

**Equato'rial Tel'escope**, a telescope mounted upon a fixed axis parallel to the axis of the earth, and turning also upon a second movable axis parallel to the equator, for the continuous observation of heavenly bodies, and for noting their right ascension and declination. The motion of the telescope round its fixed or "polar" axis is necessarily parallel to the equator, and this gives the instrument its name. In order to maintain the object observed steadily in the field of view, the telescope is made to revolve round the polar axis by an attached clockwork, which admits of being regulated so as to vary the velocity of rotation, according as the object under examination is the sun, the moon, a planet, or a fixed star.

**Eques'trian** [Lat. *eques'tris*, "belonging to a horse or horseman" (from *e'ques*, a "horse"), pertaining to horses; riding on horseback; skilled in horsemanship; representing a person on horseback, as a statue.

**Eques'trian Order** [Lat. *or'do eques'tris* or *equites*, the plu. of *e'ques*, a "horseman"], also called **Knights**, the name of an important division of the citizens of ancient Rome. They were originally a military organization, and formed the cavalry of the Roman army. According to Livy, Romulus constituted three centuries (300) of equites, to whom he gave the several names of Ramnenses, Titenses, and Luceres. Down to the year 123 B. C. the equites formed simply a division of the army, and their centuries were composed of patricians and plebeians, but C. Gracchus in that year procured the passage of the *Lex Sempronia*, which instituted a new class or political order called *ordo equestis*, from whom all the *judices* (judges) must be selected. The reform of Sulla deprived them of the sole right of being chosen as judges, who thenceforth were selected from the senators, equites, and *tribuni æarii*. The equites also enjoyed the privilege of officiating as *publicani* or farmers of the public revenue. According to Cicero, who belonged to this order, these publicani "comprised the flower of the Roman chivalry, the ornament of Rome, the firm support (*firmitas*) of the republic." The badges of the equites were a gold ring and a robe with a narrow purple border.

**Eques'trian Stat'ue**, a complete figure of a person on horseback, executed generally in bronze or stone. In ancient Greece, where plastic art attained its highest perfection, statues of men and of horses were often of the first excellence; but horses were more commonly represented as attached to the chariot. In Rome, equestrian statues of the emperors were common. The finest extant Roman work of the kind is a bronze equestrian statue of M. Aurelius Antoninus. Among the famous modern equestrian works are the noble colossal statue of Peter the Great at St. Petersburg, and that of Frederick the Great at Berlin by Rauch. Recent works of the kind are very numerous.

**Equian'gular**, having equal angles. A figure is equiangular when all its angles are equal, as a square. Two or more figures of the same kind (usually rectilinear) are said to be equiangular when the angles of the one taken consecutively are respectively equal to the angles of the other.

**Equian'gular Spi'ral**, a term applied to the logarithmic spiral, from its having the property of cutting all its polar radii rectores at the same angle.

**Equidæ** [from the Lat. *equus*, a "horse"], the family which is formed by the horse, ass, etc., a section (*Solidungula*) of the order *Ungulata*. The most characteristic feature of the Equidæ is the solid, one-toed foot formed by the

union of the central phalanges and the atrophy of the lateral ones. Single-toed horses began in the pliocene. In the miocene epoch our horses were represented by *Hipparion*, etc., which had two small lateral toes or hoofs, of which some traces may be often found in living horses. In the lower miocene *Anchitherium* represents the Equidæ, and connects the horse with *Palæotherium*, *Philotaphus*, etc. of the eocene and with the tapirs of the present day. The genealogy of the Equidæ is better known and more instructive than that of any other group of mammals. Nearly twenty species of equine quadrupeds have been described from the tertiary and quaternary deposits of America, but it is supposed that no horse existed with the New World at the time of the advent of the Europeans. (See HORSE and HIPPARION.)

**Equilat'eral** [from the Lat. *æ'quus*, "equal," and *la'tus* (gen. *la'teris*), a "side"], having equal sides. In geometry a rectilinear figure is said to be equilateral when all its sides are equal. If, moreover, its angles are all equal, it is called *regular*. Every equilateral figure inscribed in a circle is equiangular, and therefore regular. The converse theorem, however, is only true for polygons with an odd number of sides. An equilateral hyperbola is that of which the axes are equal.

**Equilib'rium** [Lat. *æquilibrium*, from *æ'quus*, "equal," and *li'bra*, a "balance;" Fr. *équilibre*], the state of rest produced by two or more mutually counteracting forces; equipoise. Equilibrium is the foundation of the theory of mechanics; it is, in its generalized meaning, the *physical law of the universe*. **EQUILIBRIUM**, in the fine arts, the just place or balance of a figure or other object, so that it may appear to stand firmly. Also the due equipoise of objects, lights, shadows, etc. against each other.

**Equinoctial.** See EQUINOX.

**Equinoct'ial Points**, the two opposite points of the celestial sphere in which the ecliptic and equator intersect each other, the one being the first point of Aries, and the other the first point of Libra. These points do not retain a fixed position in relation to the stars, but retrograde from E. to W. with a slow motion, requiring 25,000 years to accomplish a complete revolution. This motion is called the "precession of the equinoxes."

**E'quinox** [from the Lat. *æ'quus*, "equal," and *nox*, "night," i. e. the time when the night equals the day in length], in astronomy, the time when the sun passes through the equator in one of the equinoctial points. When the sun is in the equator the days and nights are equal all over the world, hence the derivation of the term. This happens twice every year—viz., about the 21st of March and the 22d of September; the former is called the *vernal*, and the latter the *autumnal* equinox. The equinoxes do not divide the year into portions of equal length, but the interval from the vernal to the autumnal equinox is greater than that from the autumnal to the vernal; in other words, the sun continues longer on the northern than on the southern side of the equator, because it is more distant from the earth in our summer than in winter, and its angular motion in its orbit is consequently slower between March and September than in the other part of the year. In 1800 the difference amounted to seven days sixteen hours and fifty-one minutes.

**Eq'uiage** [from the Fr. *équiper*, to "equip," to "fit out," to "furnish"] in ordinary language signifies the carriage, horses, and liveries which indicate the fortune or rank of a nobleman or gentleman; a carriage of state; a retinue; ornamental furniture. In marine affairs it signifies the crew of a ship, together with all a ship's furniture, masts, sails, ammunition, etc. In military language the term "camp and garrison equipage" is applied to the tents and other furniture of an army.

**Equip'ment**, the act of equipping or fitting for an expedition; furniture, accoutrements, or warlike apparatus. The equipment of a private soldier comprises his clothes, arms, and other necessary articles. In civil engineering the term is applied to the rolling stock of a railroad—i. e. the locomotives and cars.

**Equipment and Recruiting, Bureau of**, in the U. S. navy department, has charge of supplying cables, rigging, anchors, sails, blocks, and fuel for ships in commission. It controls the government ropewalks and other manufactories of that class of goods which it supplies. It also has control of naval enlistments of seamen, landsmen, and boys, and of the recruiting rendezvous and the receiving ships.

**Equiseta'ceæ** [from *Equisetum*, one of the genera], a natural order of cryptogamous plants, growing in ditches, wet ground, and rivers in many parts of the world. They have no decided affinity with any known order, and have no medicinal qualities. They have hollow and jointed

stems. They are found fossil in coal, and were in ancient geologic periods very much larger and more numerous than at present.

**Equisetum** [from *e'quis*, a "horse," and *se'ta*, a "bristle"], a genus of plants of the order Equisetaceæ, comprises numerous species called horsetail. The fructification is in the form of a cone or spike. To the base of each spore are attached four thread-like and club-shaped elastic filaments, which roll up closely around the spore when moist, and uncoil when dry. The *Equisetum hyemale* (scouring rush) is indigenous in the U. S. and also in Europe. The abundant silex in its cuticle renders it useful for polishing furniture and for scouring utensils. The U. S. have also several other species. True *Equiseta* date back to the trias, when they were numerous, and attained the height of twenty feet. In the carboniferous rocks the *Equiseta* are represented by *Calanites*, *Calamodendron*, etc.

**Equitant** [from *eq'uito*, to "ride"], a botanical term signifying "riding astride," is applied to leaves which overlap each other without any involution, as those of the iris.

**Equites.** See EQUESTRIAN ORDER.

**Equity** [Lat. *æquitas*, "equality," "justice," from *æquus*, "just," "even," "equal"]. This word is used to indicate a portion of the mass of English jurisprudence, derived from the decisions of courts and the rules of approved text-writers. It originated in the same general way as that branch of jurisprudence technically called "common law." It is, in a sense, common law itself when considered in contrast with statutes. The relation of equity to common law can be best understood by a brief historical survey. After the Norman conquest of England the king was deemed to be the fountain of justice. Ultimately, certain great courts of general jurisdiction came into active operation, known as "king's courts." These were the common pleas, the king's bench, and the exchequer. At first, their functions were quite distinct, but in course of time, by fictions of law, jurisdiction was assumed, so that in some respects it became concurrent in these tribunals. The regular mode of bringing a question before one of these courts for adjudication was by an action, in which there was a plaintiff and a defendant. A formal statement of the plaintiff's claim and of the defendant's defence was made in written allegations termed pleadings, and the question thus raised was called the issue. A judge and jury disposed of issues of fact. The action must be commenced by a so-called *writ*, purporting to emanate from the king and addressed to the sheriff, who caused the defendant to be brought before the court. There was an office in chancery, from which the writs issued. They were framed in a technical manner. The clerks would only grant a writ when they could find a precise precedent in their office. Actions were real, personal, or mixed. A real action was adapted to the recovery of land; personal actions were used to recover money; and the two were combined in a mixed action. The personal actions were framed on the theory either of contract or wrong (technically called tort). Originally, they were debt, covenant, and detinue in cases of contract; and in case of tort, trespass, trover, and replevin. The object of the action of debt was to recover a specific sum of money due to the plaintiff. The action of covenant was brought upon an instrument under seal. "Detinue" was resorted to in order to recover a specific chattel which the defendant had received as a bailee. (See BAILMENT.) The action of trespass was instituted for an immediate and direct injury to person or property; trover was the appropriate means to recover the value of personal property wrongfully converted by the defendant; while replevin was used to recover the property itself.

It was found at an early day that the personal actions were quite insufficient to give full relief. A statute was enacted in 13 Edw. I. (ch. 24) which led to the introduction of a new form of action, termed "trespass on the case." This was a comprehensive name for all actions for wrongs where the injury was indirect and consequential, as in the case of negligence. It also included many cases now recognized as strictly actions upon contract, and called "assumpsit." If this statute had been wisely interpreted, no court of equity would have been necessary, nor would any probably have arisen. But the judges of the so-called common-law courts adopted very strict and narrow rules of construction, and confined the remedy under the statute to the same kind of relief as had been already recognized. All the relief granted in these courts may be summed up in a single phrase: one can recover money only or specific real or personal property. As society advanced in wealth and civilization, such a system of remedial justice was lamentably imperfect. Out of its imperfection grew the jurisdiction of courts of equity. The residuum of justice not granted to the common-law courts remained in the king. It became a practice to address petitions to him in particular cases

for relief which those courts could not grant. These were referred to the privy council, a powerful body of men selected by the monarch for their wealth or capacity. In process of time the disposal of these petitions devolved upon one of their number, the lord chancellor, who was a great officer, and who had usually the legal training which would fit him to dispose of the important questions submitted to him. Such matters were not presented by writ, as in the common-law courts, but by an application in the nature of a petition; and this commonly closed with the stereotyped phrase that the petitioner, having no sufficient remedy at common law, asked for relief "for the love of God and in the way of charity." At an early day the chancellor devised a writ called a writ of subpoena, whereby a party to a suit could be compelled to disclose upon his oath facts bearing upon the controversy between him and the opposite party. This is called "discovery." No such power inhered in common-law courts. In this way the court of chancery became a regular tribunal for the administration of justice. It followed precedent, and has worked out a scientific system of equity jurisprudence. It has now become so bound down by rules that new principles can only be introduced by legislation. This point is treated in a masterly manner by Mr. Maine in his work on "Ancient Law." It should be remarked that other courts besides the court of chancery acquired equity jurisdiction. Thus, the court of exchequer had until modern times equity powers. There may thus be courts of equity which are not strictly courts of chancery.

When English jurisprudence had assumed a precise and fixed character, there were thus two sets of tribunals, called respectively courts of common law and courts of equity. In some cases the jurisdiction of the two courts was concurrent; in others the equity court had exclusive authority, as in the case of trusts. The courts differed in three principal respects: two of these were in matters of procedure, while the third distinction was radical and substantial. They differed as to the mode of proof and of trial, and in respect to the nature of the relief granted. The first two distinctions have been largely modified in this country in a considerable number of the States. In these law and equity are administered by a single court and under the same system of pleading, so that there is no distinction between an action at law and a suit in equity. Even in these States the difference in relief still continues. When the action is for the recovery of money only, or of specific real or personal property, a writ issues to the sheriff to carry the judgment into effect. In other (or equity) actions, as when a defendant is required to execute or cancel a written instrument, or to refrain from doing an act, the order of the court is directed to him; and if he wilfully disobeys it, he may be punished for contempt of court. This consolidation of law and equity was first attempted in a "code of procedure" adopted in New York in 1848. This has been substantially enacted in a number of other States, and has had much effect upon legal opinion in England. Courts of equity have adopted certain maxims which have had a large influence on the development of the system. They are such as these: (1) Equity follows the law; (2) He who comes into equity must come with clean hands; (3) He who asks equity must do equity; (4) Where the equities are equal, the legal title must prevail; (5) Equality is equity; (6) Equity regards that as done which ought to be done.

A brief exposition of a few of these maxims will show the principles which guide the action of the court. The maxim that "He who comes into equity must come with clean hands," does not refer to general moral delinquency. It only applies to the subject before the court. It then assumes a comprehensive meaning. Under it the court would not protect the copyright of an immoral book, or a trademark which was so used as to deceive the public. The maxim that "He who asks equity must do equity," means that the court will only grant relief to a plaintiff upon the condition that he will render justice to the defendant. For example, a borrower could not succeed in setting aside an instrument on the ground of usury, except upon the condition of paying to the creditor the debt and lawful interest. The maxim that "Where the equities are equal, the legal title must prevail," means that the court will not, on the application of a plaintiff, deprive a defendant, being a purchaser for a valuable consideration, of a title recognized in a court of common law, unless he has acted in bad faith or with notice of the existing rights of the plaintiff. An illustration will show its application. If A has taken an informal mortgage upon land, and accordingly one not valid in law, and yet a good claim in equity, and B, without notice of A's rights, has taken, for a valuable consideration, a subsequent regular or formal mortgage or conveyance, B will have superior legal rights, which will be recognized in a court of equity. If B had acted with notice of the informal mortgage, A's equity would have been superior. The rule that "Equality is equity" is applied

to persons who ought to bear a common burden equally, as in case of the duty of co-sureties to contribute equally to pay the debt for which they are bound, or in cases of general average in the law of shipping. It is the principle which underlies the distribution of assets among creditors in cases of bankruptcy, or in the administration of the estates of intestates. The rule that "Equity regards that as done which ought to be done," is one of great importance. It leads to a doctrine peculiar to this court, known as "equitable conversion." This phrase means that the owner of property, by the mere expression of his will according to legal rules, can change its legal character, and thus give to money the qualities of land, or to land those of money. Thus, if a testator orders his land to be sold and converted into money, the land from the moment of his death is deemed to be personal property. The same result would follow if he had directed money to be laid out in land. So, if an owner of land contracts to sell it, his interest before any conveyance is made is deemed to be money, while that of the purchaser is regarded as land. This doctrine is attended with important practical consequences, to which the limits of this article do not permit a reference.

It is an important rule that the jurisdiction of this court attaches to the person of a litigant, without reference to the situation of the property in controversy. Thus, the court of chancery in England might order a defendant within its jurisdiction to execute a conveyance of land situated in this country. It would proceed upon the theory that he was under a legal duty or obligation to do the act which as a matter of conscience he was bound to perform. The court was at one time termed a "court of conscience," and in the older law digests or abridgments, the equity law is placed under that head. It should be added that mere gratuitous executory promises are not enforceable in this court. Attention is only paid to the claims of purchasers for a valuable consideration.

The topics of equity jurisprudence are usually considered by text-writers in their relations to the jurisdiction of the courts of common law. In this aspect equity jurisdiction may be regarded either as auxiliary to the jurisdiction of those courts, or as concurrent or exclusive. This method is necessarily discarded in those States where law and equity are administered under a uniform system of pleading and practice, as in New York. The principal subjects may be enumerated under the following heads: Cases of accident or mistake (as where a clause is omitted from an instrument by accident); cases of fraud, either actual or constructive; specific performance of contracts (*c. g.* requiring a party who has promised to execute a conveyance to fulfil his contract); cases of interpleader, whereby a mere stakeholder can be relieved from the results of a litigation; cases of accounts, including a variety of instances; cases of trusts, whether created by express words or arising from implication of law. The court also protects all persons under actual or legal disability, such as infants, married women, and persons of unsound mind. Under these and other heads the court may cancel, modify, or reinstate instruments, and in general adjust the rights of the respective parties to the controversy. In some of these cases actions may be brought in a court of law. Thus, in case of fraud, if the injured party desired pecuniary damages, he would bring his action at law; if he desired to set an instrument aside, he would proceed in equity. A person who would have a good defence on the ground of fraud to an action at law, may in some instances become plaintiff in equity, and have the instrument cancelled, as in the case of a negotiable promissory note. The most extensive of all of these topics is the subject of trusts. Strict trusts are solely cognizable in this court.

The remedies in this court are flexible and readily adapted to the exigencies of the case. The most liberal rules prevail as to parties. Every person can be made a party whose presence is necessary to a complete determination of the matter in controversy. The court has power to prevent apprehended injuries to property by means of an injunction, or to place the property itself in the possession of one of its own officers, termed a receiver, until the rights of the parties are finally established.

The tendency of modern times would seem to be to blend the two systems of common law and equity jurisprudence into one, when the common law will prevail as modified by the rules of equity. T. W. DWIGHT.

**Equity of Redemption**, the right which the owner of mortgaged property has to redeem it after the condition of the mortgage has been broken. A mortgage is in form a conveyance of property, with a provision that it shall be void on the performance by the maker, within a given time, of a certain condition, usually the payment of a sum of money; and by the common law, if the condition is not performed the conveyance becomes absolute,

and the maker of the mortgage, called the mortgagor, loses all right to the property. But the English court of chancery, an equity tribunal, as early as the reign of Charles I. asserted its power to remedy this hardship by compelling the mortgagee to give up the land on payment of the debt with interest. This right in equity to redeem the property after the conveyance has become absolute at law has in modern times come to be regarded as an estate in the land, and can be conveyed or mortgaged or devised by its owner. It passes by descent to his heirs; it is liable for the debts of his creditors, and can be sold on execution against him, and is subject to dower and curtesy. This right to redeem lasts till cut off by foreclosure of the mortgage, which is usually effected by an action in a court of equity. The foreclosure may result in giving a complete title to the mortgagee (called a *strict* foreclosure), or it may result in a sale of the premises and the payment of the debt out of the proceeds, the surplus being returned to the mortgagor or to those who claim under him. The right to redeem from the mortgage extends to all who acquire an interest in the land under the mortgagor after the making of the mortgage; and all such persons must be made parties to a proceeding to foreclose the mortgage, otherwise their right to redeem will not be affected. Formerly, unless restrained by some clause in the mortgage, the mortgagee could at once take possession of the premises, although equity compelled him to account for the rents and profits upon redemption. Now, however, the mortgagor has in general the right of possession till the condition is broken, and in some States till foreclosure, except when after default, where the security is inadequate, a receiver is appointed to take charge of the property under the direction of the court. T. W. DWIGHT.

**Equivalents, Chemical.** See CHEMISTRY.

**Equivocal Term**, in logic, a term which has several significations applying respectively and equally to several objects. A word is generally said to be employed equivocally where the middle term is used in different senses in the two premises, or where a proposition is liable to be understood in various senses.

**Equus**, the name of the genus which includes the horse, ass, zebra, etc., and type of the family EQUINÆ (which see).

**E'ra** [Lat. *æ'ra*; Fr. *ère*, probably from a root akin to the Basque *era*, "time"], a period of time; an account of time reckoned from some particular date or epoch; a succession of years computed from some fixed point of time.

**Era, Christian.** See CHRISTIAN ERA.

**Erard** (SÉBASTIEN), an inventor and maker of musical instruments, born in Strasbourg April 5, 1752. He was the son of a poor cabinet-maker. His first pianoforte, constructed in 1780, may be said to have introduced that instrument into France. He soon became the best pianoforte manufacturer in Europe. He, in connection with his brother, established a manufactory in London. To Erard the piano owes some of its noblest qualities as a musical instrument. The grand piano, with single and double action, was his invention. He built the great organ for the royal chapel of the Tuileries. The pianos of Erard still preserve their reputation, though great improvements have been made in the instrument since his day, in a very large degree by American manufacturers. Sébastien Erard was inventor of a double-action harp which had immense popularity in London, and took out patents for many other improvements, all of which were of value. Died near Paris in 1831. A nephew, who succeeded him in the business, wrote an account of his uncle's work.

**Erased** [from the Lat. *e*, "out" or "off" and *ra'do*, *ra'sum*, to "scratch," to "scrape"], in heraldry, signifies that an object is forcibly torn off, so that the edges are ragged or jagged.

**Erasis'tratus** [Gr. *Ἐραστράτος*], an eminent Greek physician and anatomist, is supposed to have been born in the island of Ceos. He flourished about 300-260 B. C., and practised for many years at Alexandria, where he taught anatomy and founded a school. He attended Antiochus, the son of Seleucus Nicator, at the court of the latter, and discovered that his malady was caused by a secret amorous passion for Stratonice, his stepmother. His principal discoveries were those of the *vie lactée* and the functions of the brain and nerves. He wrote several works, which are not extant.

**Eras'mus** (DESIDERIUS), [Fr. *Didier* or *Désiré Érasme*], a celebrated Dutch scholar and philosopher, born at Rotterdam on the 28th of October, 1466. He was a natural son of Gerard Praet, and was called in his childhood GERHARDUS GERHARDI, which he exchanged for the Latin and Greek equivalents, each signifying "the well-beloved." He attended for about six years the school of the Brethren of the Common Life at Deventer, where he was a pupil of Alex-

ander Hegius. Having become an orphan about 1478, he was urged by his guardians to enter a monastery, in order that they might defraud him of his patrimony. Although he regarded a monastic life with aversion, he was at length induced in 1482 or 1483 to enter the Augustinian convent of Stein by the hope that he might there have opportunity for study. He pursued the study of the classics and distinguished himself as a Latin scholar. He became in 1492 a priest and secretary to the bishop of Cambray, with whom he remained nearly five years, and in 1496 went to Paris, probably for the purpose of completing his education. He was then nearly destitute of pecuniary resources, and gained a subsistence in Paris by teaching school. Between 1498 and 1500 he passed about two years in England, where he formed friendships with Sir Thomas More and John Colet. He resided at both the universities, and during his third and longest visit (1511-14) was professor of Greek at Cambridge. Impelled by a strong passion for travel, he visited various countries of Europe, and never remained long in one place. In 1508 he commenced a tour in Italy, where he passed several years, perfected his knowledge of the Greek language, and associated with the most eminent scholars. He obtained from the pope a dispensation from his monastic vows, and received the degree of D. D. at Turin. He revisited England in 1511, and was appointed professor of Greek at Cambridge. In 1511 he published "The Praise of Folly" ("Encomium Morie"), a witty satire, in which he exposed the follies and foibles of monks, priests, and men of various other professions. It was generally admired, and obtained a large circulation.

Having established his reputation as the most eminent scholar and the most witty writer of his time, he received invitations from several monarchs, and in 1514 or 1515 visited the court of the archduke Charles (afterwards Charles V.), who gave him the title of royal councillor, with a pension of 400 florins, and liberty to travel or reside wherever he might prefer. He produced in 1516 a good edition of the Greek New Testament—the first edition ever printed—with a corrected Latin version and notes. He was on friendly terms with Luther in the first stage of the Reformation, which he efficiently promoted by his witty satires against the monks and priests, and by his censure of the corruptions of the Church of Rome. But he disliked dogmatism, was too liberal and moderate to please the zealous supporters of either side in a religious controversy, and he dissented from some of the doctrines of Luther, who denounced him in severe terms as a coward and time-server.

Erasmus became a resident of Bâle about the year 1515, and published there in 1527 his celebrated "Colloquies" ("Colloquia"), which some consider his capital work. It is ostensibly intended for the instruction of youth in Latin and morals, but abounds in satire and invective directed against the monks and the abuses of the Roman Church. It is stated that 24,000 copies of it were sold in one year. He was involved in a dispute with Luther on the doctrine of free will in 1524, and wrote on that subject "De Libero Arbitrio." He was condemned as a heretic by the Sorbonne of Paris, but he persisted in maintaining the attitude of a neutral or mediator, and never formally revolted against the pope. In 1529 he removed to Freyburg, where he passed several years. He died at Bâle on the 12th of July, 1536. Among his works is "Adagia," a collection of proverbs, which displays immense learning. He greatly excelled as an editor of the Greek and Latin classics, for which he was qualified by superior critical sagacity as well as accurate scholarship. He was pre-eminent as a restorer of classical learning and sound philosophy. His voluminous "Epistles" contain valuable materials for literary history. His complete works were published by Beatus Rhenanus (9 vols., 1541), and by Leclerc (10 vols., Leyden, 1603-06). (See BURIGNY, "Vie d'Erasmus," 1757; KNIGHT, "Life of Erasmus," 1726; JORTIN, "Life of Erasmus," 1758; ADOLPH MÜLLER, "Life of Erasmus" (in German), 1828; CHARLES BUTLER, "Life of Erasmus," 1825; GLASIUS, "Erasmus als Kirchenreformer," 1850.)

**Erast'ians**, a name given to the adherents of the Swiss physician Erastus on church discipline. Erastus earnestly opposed the use by Protestant churches of ecclesiastical censures and punishments, and held that the Church ought merely to decide who by soundness of faith were to be regarded as members, but should not take upon herself to punish moral offences by withholding her privileges. This view is particularly developed in his posthumous work, "Explicatio gravissimæ questionis utrum excommunicatio mandato nitatur divino an," etc. (1589). The common belief that Erastus intended to subject all ecclesiastical bodies to the control of the state authorities is at least an exaggeration. During the great conflict in the Church of Scotland which led to the establishment of the Free Church, those who maintained that the Church had no power to nullify by law the operation of lay patronage were called

by their opponents Erastians, but they protested against this use of the word.

**Eras'tus** (THOMAS), M. D., a Swiss physician and theologian, whose proper name was LIEBLER or LIEBER, was born at Baden in Switzerland (according to others, at Angen, near Badenweiler), Sept. 7, 1524. He took the degree of M. D. at Bologna, wrote several medical treatises, and became a skilful practitioner. He was appointed physician to Frederick, the elector palatine, and was for many years professor of medicine at Heidelberg, which was the capital of that prince. As member of the church council he advocated the Zwinglian views of the Lord's Supper and of church discipline. He was charged with Socinianism, but without just ground. In 1580 he obtained a chair of moral philosophy at Bâle, where he died Dec. 31, 1583. His views on church discipline, according to which excommunication is not a divine ordinance, excited much controversy, though his book "Explicatio gravissima" was not published until six years after his death. It was translated into English in 1659, and again in 1844 by R. Lee, and its views were adopted by a distinct party in the Westminster Assembly, headed by Selden, Lightfoot, Coleman, and Whitelocke; they were called the ERASTIANS (which see).

**Er'ato** [Gr. Ἐρατώ], the sixth in order of the Nine Muses. She was the muse of the poetry of love, that being the significance of her name.

**Eratosthenes** [Gr. Ἐρατοσθένης], a celebrated Greek astronomer and geometer, born at Cyrene in 276 B. C., was a pupil of Callimachus the poet. He became superintendent of the great library of Alexandria in the reign of Ptolemy Euergetes, and rendered important services to the sciences of astronomy and geography. He displayed great versatility of genius, and wrote numerous works on philosophy, history, grammar, etc. Among his memorable performances was the measurement of the obliquity of the ecliptic, which he computed to be 23° 51' 20". In an attempt to ascertain the dimensions of the earth he invented a method which has been employed with success in modern times. His writings are not extant, but fragments of his work on chronology have been preserved by Syncellus. His computation of Egyptian chronology has been adopted by Bunsen. "Eratosthenes was," says Bunsen, "next to Aristotle, the most illustrious of Greek men of learning, and as far superior to him in the extent of his knowledge as inferior in grasp of intellect." Died about 196 B. C. The fragments of his works were published by Bernhardt (1822).

**Er'ben** (HENRY), U. S. N., born Sept. 6, 1832, in the city of New York, entered the navy as a midshipman June 17, 1848, became a passed midshipman in 1855, a lieutenant in 1856, a lieutenant-commander in 1862, a commander in 1865, took part in the engagements at Fort Pillow, Memphis, Vicksburg, and Baton Rouge during the year 1862, and in 1863 in the operations against Fort McAllister, Ga., and Forts Sumter and Moultrie, S. C. He afterward became captain. FOXHALL A. PARKER.

**Er'bium** [named from the last two syllables of *Ytterby*, a town of Sweden, whence gadolinite is procured], a rare dyad earth-metal, chiefly procured, as an oxide called *erbia*, from gadolinite, along with yttria, both earths existing naturally as silicates. Metallic erbium (symbol E; atomic weight, 112.6) has not been separated. Its salts have mostly a rose-color.

**Erci'lla y Zuñi'ga** (ALONSO), a Spanish epic poet, born Aug. 7, 1533, was a son of Fortunio Garcia, lord of Ercilla. He was in his youth a page of Philip II., whom he accompanied in a voyage to England in 1554. Having enlisted in the army, he went to South America in that year to fight against the Araucanians, a warlike tribe whom the Spaniards were never able to subjugate. He served with distinction in this war, returned to Spain in 1562, and published his "Araucana" (first part, 1569), which is considered the best heroic poem in the Spanish language, and is said to be a faithful narrative of the events which he had witnessed. He was afterwards a gentleman of the bed-chamber to the emperor Rudolph II., but appears to have passed his later years in poverty and obscurity. Died after 1590. (See TICKNOR, "History of Spanish Literature.")

**Erckmann-Chatrian**, the name of two French novelists whose works are jointly produced, and whose names, like those of Beaumont and Fletcher, are inseparably united. Émile Erckmann, born at Pfalzburg May 20, 1822, was the son of a bookseller, and after studying at the college of Pfalzburg applied himself to reading law in Paris. Alexandre Chatrian was born at Soldatenthal, near Pfalzburg, Dec. 18, 1826, and was an usher in the Pfalzburg college when he made the acquaintance of Erckmann in 1847. The two became fast friends, and composed numerous stories, feuilletons, and dramatic pieces without much

success. Unable to live in this way, Erdmann applied himself to the law, while Chatrian found employment in a railway-office. "L'Illustre Docteur Mathéus" (1859) was the first of their writings which attained any popularity; it was followed by "Contes fantastiques Madame Thérèse," etc. Their novels upon the events of the Revolution and the First Empire ("Histoire d'un conscrit de 1813," "L'Invasion," etc.) were much read, and after the German annexation of Alsace they produced a novel under the title of "The Story of the Plébiscite, related by one of the 7,500,000 who voted Yes," 1872, which made quite a sensation. Also their dramas ("Le Juif Polonais" and "L'Ami Fritz"), though only dramatizations of novels, were very successful.

**Erdmann** (JOHANN EDUARD), born June 13, 1805, in Livonia, became professor of philosophy at Halle in 1836. He wrote, among other works, "Versuch einer wissenschaftlichen Darstellung der Geschichte der neueren Philosophie" (3 vols., 1834-53), "Grundriss der Logik und Metaphysik" (4th ed. 1864), and "Grundriss der Geschichte der Philosophie" (2 vols., 1866).

**Erdmann** (OTTO LINNÉ), a German chemist, born at Dresden April 11, 1804. He became in 1830 professor of chemistry at Leipzig. Died Oct. 9, 1869. Among his works is a valuable "Manual of Chemistry" (1828). He published after 1834 the "Journal für praktische Chemie."

**Er'ebus** [Gr. Ἑρβος, probably from ἐρέβω, to "cover"], in classic mythology, the son of Chaos; also the name of a dark and gloomy region or subterranean cavern through which souls were supposed to pass after death.

**Erebus, Mount, and Mount Terror**, are two volcanoes in South Victoria Land, in lat. 77½° S., discovered by J. C. Ross Jan. 27, 1841. Mount Erebus, 12,400 feet high, is, as far as is known, the nearest volcano to the south pole, and when discovered was emitting flame and smoke in great profusion. Mount Terror, 10,900 feet high, is believed to be an extinct volcano. These two mountains were named from the British ships in which Ross's expedition sailed.

**Erechthe'um** [Gr. Ἐρεχθειον], in ancient Athens a sacred edifice on the Acropolis, consisting of the two temples of Athena Polias and Pandrosus. Its name was derived from Erechtheus (see below). It was burned by the Persians, rebuilt about 393 B. C., and became the most sacred of all the Athenian sanctuaries. The renewed Erechtheum was a most beautiful structure of the Ionic order. Unlike all other Grecian temples, it had three porticoes. It anciently contained a salt-well made by Poseidon's trident (not flowing in modern times), also the sacred olive tree of Athena, and the olive-wood image of that goddess, which is fabled to have fallen from the sky. The ruins of the Erechtheum stand north of the Parthenon, and are among the most interesting relics of antiquity. The six caryatides (gigantic female figures gracefully draped) which supported the roof of the southern portico are particularly fine. One of these is now in the British Museum.

REVISED BY R. D. HITCHCOCK.

**Erech'theus** [Gr. Ἐρεχθεύς; Fr. *Érechthée*], a hero of ancient Greek legends, was said to be a son of Vulcan or of Pandion, and the father of Cecrops. Homer represents him as a king of Athens. According to tradition, he was the founder of the Erechtheum, a temple of Minerva on the Acropolis of Athens. He was sometimes called *Erichthonius*.

**Er'eglee', or Ereklî** (anc. *Heraclea*), a seaport of Asia Minor on the Black Sea, 122 miles E. by N. of Constantinople. It has a good harbor, from which timber, silk, and wax are exported.

**Er'e'tria** [Gr. Ἐρέτρια; Fr. *Érétie*], an ancient city on the island of Eubœa, is mentioned by Homer ("Iliad," book ii.). At an early period it was a prosperous and independent state, and one of the chief maritime cities of Greece. It was captured and ruined by the Persians in 490 B. C., but was soon rebuilt. Eretria was the seat of a celebrated school of philosophy, founded by Menedemus about 330 B. C.

**Erfurt, or Erfurth** [Lat. *Erphordia* and *Erfurtum*], a fortified town of Prussian Saxony, on the river Gera and the Thuringian Railway, 15 miles W. of Weimar and 14 miles E. of Gotha. It is defended by two citadels, and is important as a military position. It has an old Gothic cathedral with a bell which weighs 275 hundredweight, fourteen Protestant churches, a royal academy, a public library of about 50,000 volumes, a normal school, and an edifice formerly occupied by the University of Erfurt, which was founded in 1392 and closed in 1816. Here was the Augustine convent of which Luther was an inmate for several years; it is now used as an orphan asylum. Erfurt has manufactures of cotton and woollen fabrics, hosiery, shoes, leather, etc. It was more populous in the Middle Ages than it is now. The Congress of Erfurt, held here in Sept.-Oct., 1808, was attended by Napoleon and Alexander I. of Russia.

In March and April, 1850, the so-called "Union Parliament" held its sessions here. (See GERMANY.) Pop. in 1881, 53,254.

**Er'got** [from the Fr. *ergot*, a "cock's spur;" Late Lat. *ergota*; Ger. *Mutterkorn*], or **Spurred Rye**, a curious fungus, the compact mycelium of the *Claviceps purpurea* of Tulasne, growing frequently in the heads of rye, though found on all grasses and some Cyperaceæ. It was long believed to consist of diseased kernels of rye, but microscopic examination shows that it has nothing at all in common with the rye, but growing originally from the ovary, it naturally assumes something of the shape of the mould in which it grows. It is believed that spores of this plant are taken up by the roots of the rye, and that they germinate in the ovary, where they are deposited from the sap.

Ergot is generally procured from rye after threshing. It is usually shaped somewhat like a cock's spur, and is from half an inch to one inch and a half long. It contains a volatile alkaloid secalin, identical or perhaps only isomeric with propylamine; also ergotic acid, and several other compounds which are little understood, including an oil which appears to be inert, and mycose, a peculiar sugar.

Ergot is much used in medicine, especially for the purpose of exciting uterine contractions in child-bearing. As a rule, it should never be administered except by persons skilled in its use. The contractions induced by ergot differ from the natural uterine effort, which is intermittent, with intervals of more or less perfect rest, while ergot causes a uniform and constant expulsive effort. In skilled hands it is a remedy of great value. Administered late in labor, it often prevents dangerous loss of blood, and it is further useful in some cases of menorrhagia and other hæmorrhages. It is also useful in puerile paralysis, and probably in other diseases requiring treatment which produces contraction of the muscular coat of the blood-vessels.

**Ergotism, or Rapha'nia**, a disease or train of symptoms produced by the long-continued use of grain in which ergot is mixed. It is characterized by stupor, convulsions, diarrhœa, and vomiting, often accompanied by morbid increase of appetite, by purpura, and at last by a dry, chronic gangrene of the extremities. Rye and wheat are especially apt to be infested with ergot when sown late in the season; and in some years the ergot has been observed in parts of Europe to exceed one-fourth of the whole amount of the winnowed grain; and several severe epidemics of this fatal disease have been observed in Europe. It is rare in the U. S., but in 1819 the cattle throughout a part of the State of New York suffered extensively from an epizootic of this nature, caused by ergot in the blue-grass crop (*Poa pratensis*). The poisonous qualities of the darnel grass (*Lolium temulentum*), so well known even in Virgil's time, are now ascribed to the presence of ergot, which is well known to infest many of the grasses. The treatment to be pursued is a supporting one—the use of concentrated food, stimulants, pure air, bathing, friction of the skin, with gentle purgation. No antidote to the severer effects of ergot is known.

The medicinal use of ergot is very seldom followed by any of the above-mentioned symptoms, but a few well-established cases are on record, showing the danger of excessive and long-continued use of the drug.

**Er'ic XIV.**, king of Sweden, born Dec. 13, 1533, was a son of Gustavus Vasa, whom he succeeded in 1560. He made an overture of marriage to Queen Elizabeth of England, but he married a Swedish peasant named Catharine Monsdoter. He was capricious, imprudent, momentarily insane, and always addicted to violent paroxysms of anger and cruelty. In his reign Sweden was involved in a war against Denmark. Several noblemen were unjustly put to death by his order. A conspiracy was formed against him by his own brothers and other nobles, who deposed him in 1568, and confined him in prison, where he died Feb. 16, 1577.

**Erica'ceæ, or Heathworts** [from *Erica*, one of the genera], a large natural order of beautiful exogenous plants, mostly shrubs, natives of Europe, Asia, South Africa, and North America. The leaves are entire, generally evergreen, and rigid or coriaceous. The anther is 2-celled. This order comprises about 900 known species, many of which have beautiful flowers. Among those which are natives of the U. S. are the *KALMIA*, *VACCINIUM*, *AZALEA*, *RHODODENDRON*, *PYROLA*, *GAULTHERIA*, *CLETHRA*, and *EPICÆA*, which will be noticed under their respective heads. The genus *Erica* (heath) abounds in South Africa. (See HEATH.) Many of the *Ericaceæ* are social plants, and a single species in some cases covers a tract of ground, of which it forms the almost exclusive vegetation. Several species bear edible berries, as *Vaccinium* and *Gaultheria* (wintergreen).

**Eric'sson** (JOHN), LL.D., an eminent mechanician, was born in Vermeland, a province of Sweden, July 31, 1803.



Showing decided mechanical ingenuity in childhood, he was appointed at the age of eleven to a cadetship in the engineer corps, in which he rose to a lieutenantcy, in 1820. In 1826 he visited England to introduce a "flame engine" of his own invention, but it was discovered that though it worked with a wood-fire, it failed when coal was used. Shortly after, he resigned his commission in the Swedish army in order to devote himself entirely to mechanical pursuits. One invention followed the other. He made improvements in steam-boilers on the principle of artificial draughts, and in 1829 produced a locomotive, the "Novelty," which ran 50 miles an hour, a great advance in speed over anything then attained, winning a prize of £500. The principle of artificial draught, effecting a great saving of fuel and doing away with the huge smoke-stacks, is still applied to all locomotive engines, as also for manufacturing purposes, though not exactly in the form proposed by Ericsson. He soon afterward made a steam fire-engine (1832) and a hot-air engine (1833). The latter attracted great attention in the scientific world in London, and its improvement and perfection occupied him for many years. In 1852 he employed it under a new form in the ship *Ericsson*, but the speed it gave was not found satisfactory. Afterward he applied it with great success in pumping, hoisting, printing machinery, etc. He also first successfully applied the screw to the propulsion of steam-vessels; but the invention not being at first well received in England, he came in 1839 to New York, and the U. S. screw-steamer *Princeton* was built under his direction—the first steamship ever built having its propelling machinery under the water-line, and consequently out of the reach of shot. Since then, this invention, with many modifications, has come into very extensive use. He has also invented a "solar engine," a pyrometer, an alarm barometer, a seal-lead, a hydrostatic gauge, and numerous other ingenious instruments. Mar. 9, 1862, his iron-clad vessel, the *Monitor*, just built, attacked and repulsed the Confederate iron-clad ram *Virginia*, formerly the U. S. steamer *Merrimack*, thereby producing a radical change not only in the building of war-vessels, but in the very art of naval warfare. One of his latest inventions is a new torpedo-boat.

**Eric the Red**, a reputed discoverer of America, was a Norwegian who emigrated to Iceland about 982 A. D. He made a voyage to Greenland, and there founded a colony. In 1000 A. D. his son Lief sailed southward, visiting a country called by him Markland (perhaps Nova Scotia), and another called Vinland, which appears to have been South-eastern New England. Among the crew was a German who was acquainted with the cultivation of the vine; and when the party penetrated into the interior of the country, they were surprised at finding the wild vine growing there luxuriantly, from which circumstance they gave the country its name. With far less probability it is said that Eric planted a colony in Vinland. The Sagas tell us that in 1059, 1121, 1226, and quite frequently during the latter part of the thirteenth and the first part of the fourteenth century, parties from the Norwegian colony in Greenland went down to visit their countrymen in Vinland, but that about 1348 all these colonies were destroyed, partly by the plague and partly by the Esquimaux. At all events, in 1448, when Nicholas V. appointed the last bishop of Greenland, every trace of Eric the Red and his colonies had disappeared. (See *RAFN*, "America discovered in the Tenth Century," New York, 1838.)

**Erie**, city, capital of Neosho co., Kan. (see map of Kansas, ref. 7-J, for location of county). Pop. in 1870, 418; in 1880, 270.

**Erie**, a city and important R. R. and commercial centre, capital of Erie co., Pa. (see map of Pennsylvania, ref. 1-A, for location of county), is the only lake-port of the State. It has the largest land-locked harbor on Lake Erie, being 5 miles in length by one in width. A line of first-class propellers runs between this port and the upper lakes, and over fifty sailing-vessels are owned here. The imports are principally grain, lumber, and iron ore, and the exports bituminous and anthracite coal and the merchant and pig-iron, engines, and other manufactured products of the port. It is very nearly equidistant from Cleveland and Buffalo on the Lake Shore R. R., which gives communication E. and W., and is the northern terminus of the Philadelphia and Erie R. R., which penetrates the lumber region of the State, and gives connection with Harrisburg and Philadelphia and the anthracite coal-fields. Erie is also the N. terminus of the Erie and Pittsburgh R. R., which passes through the bituminous and semi-bituminous coal-regions.

**Manufactures.**—The facilities for the receipt of raw material and cheap fuel, and the shipment of products by rail and water, have given Erie manufacturing interests a great impetus since about 1866. The census of 1880 shows 167 manufactories; capital, \$4,730,503; average number of

hands employed, 3767; wages paid, \$1,518,085; value of products, \$7,683,356. A great variety of articles are manufactured here; among the principal are foundry and machine-shop products, value of products \$2,291,529; flouring and grist-mill products, value \$809,800.

Erie is the market for a rich farming country. It has a custom-house, an academy, a very complete free-school system, and waterworks which cost \$750,000. It is the largest and most central point in a section covering the ten north-western counties of Pennsylvania. P. in 1870, 19,646; in 1880, 27,737. THOMAS MCKEAN, Ed. "GAZETTE."

**Erie Canal**, the most important, as well as the largest, canal in the U. S., extends from Buffalo to Albany, N. Y., and is 36½ miles long. De Witt Clinton, whose name is identified with the construction of this great public work, was in 1810 appointed a member of a commission to explore and survey a route for the proposed canal from the lakes to the Hudson; and his memorial to the State legislature in 1815 ensured the success of the undertaking. The bill for its construction was passed in 1817; but the "canal policy" was for years strenuously opposed. In 1825 the canal was completed at a cost of \$7,602,000, and navigation was opened in October with great rejoicings. Clinton was at that time governor of the State of New York, and at the head of a grand naval procession he sailed down the Hudson from Albany to the sea, and poured a keg of the water of Lake Erie into the Atlantic Ocean. Its construction presents many features of paramount interest. It is carried over several large streams on stone aqueducts whose construction has required the greatest engineering skill. It crosses the Mohawk River twice, at Schenectady and at Cohoes. It has in all 72 locks, of which 57 are double and 15 single. At Albany it rises 20 feet by two double locks, 110 by 18 feet, and at West Troy it is carried over a ridge 188½ feet high by 16 double lift-locks. Its original width was 40 feet at the surface, with a depth of 4 feet; but the canal has been subsequently so enlarged that the surface-width is 70 feet, the bottom-width 42 feet, and the depth 7 feet. The commercial importance of this canal is very great. It is chiefly employed for transporting grain and such other bulky articles as do not require quick transit, and its navigation is now free. (See *INLAND NAVIGATION*.)

**Erie, Lake**, one of the chain of great lakes drained by the St. Lawrence, is bounded on the N. by Ontario, a province of the Dominion of Canada, and on the S. by Ohio, Pennsylvania, and New York, and lies between lat. 41° 25' and 42° 55' N. and lon. 78° 55' and 83° 34' W. At its western extremity, where the Detroit flows into it, it contains quite a number of islands, fertile, well wooded, and partially under cultivation. The largest of these islands is about 14 miles in circumference. Otherwise, its surface presents one unbroken sheet of water. It is the lowest of that chain of lakes, except Lake Ontario, into which its water is discharged through the Niagara River. It is 290 miles long, is 57 miles wide at the broadest part, and has an area of about 10,000 square miles. The surface is 334 feet higher than Lake Ontario. It is shallow compared with the other lakes of this series, the greatest depth yet obtained being 312 feet. The mean depth is about 120 feet. The principal supply of water comes through Detroit River, which enters the W. end of the lake. The chief cities on its shores are Buffalo, Cleveland, Toledo, Erie, and Sandusky, which have good harbors. This lake is very important as a channel of trade and steam navigation. It is liable to violent storms, which sometimes cause disastrous shipwrecks. Large vessels can pass from Lake Erie into Lake Ontario through the Welland Canal. The navigation of the former is suspended for three or four months in winter, in consequence of the shallow parts being frozen. The fisheries are important.

Com. Perry, of the U. S. navy gained an important victory over the British commander Barclay in the western part of this lake, Sept. 10, 1813. This was called the battle of Lake Erie, and was fought near the Bass Islands, about 36 miles E. of Toledo.

**Erie Shale**, the name given by the Ohio geologists to the westward extension of the Chemung and Upper Portage rocks of New York. The oil-wells of Western Pennsylvania are bored on this foundation, though the petroleum which is found in it emanates from the Huron shale below.

**Erigena** (JOHANNES SCOTUS), the boldest and most brilliant thinker of his century. The events of his life are involved in some obscurity. He was probably born in Ireland between 800–815 A. D., and educated in the Irish monasteries. His name, *Erigena*, is often written "Iern-gena," which seems to indicate that Ierne in Ireland was the place of his birth or of his training. Between 840–845 he appears to have gone to France, where he was patron-

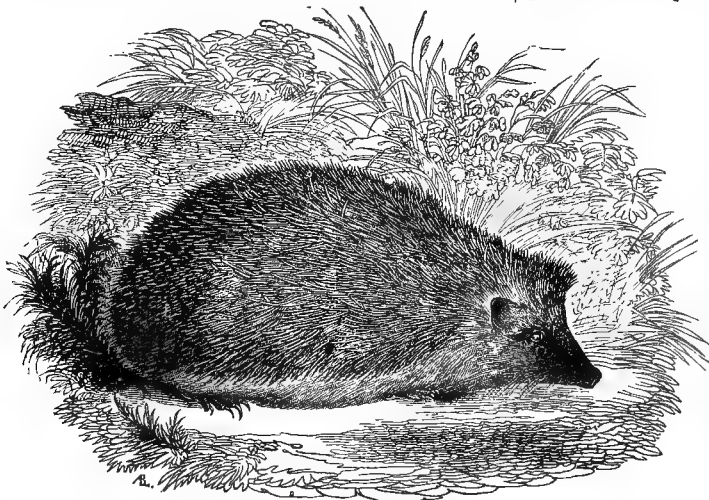
ized by Charles the Bald. He is credited with one of the best repartees on record. At table one day the king asked him, "Quid distat inter Sotum et Scotum?" Erigena instantly replied, "Mensa tantum." What happened to him after the death of Charles the Bald, in 877, is not so clear. According to one account, he went to England about 883, on the invitation of Alfred the Great, and was murdered by his pupils at Malmesbury in 891. Some who deny the Malmesbury story say that Scotus Erigena has been confounded with an Anglo-Saxon monk whom Alfred invited over from France to teach at Oxford. Erigena has been called "the morning star of scholasticism." He rebelled against Augustinianism, asserted the supremacy of reason, and wrought out a vague pantheism. He also translated into Latin the works (spurious) of Dionysius the Areopagite (of the fourth or fifth century), and thus planted the seeds of the mediæval mysticism. He wrote against Gottschalk (851 A. D.) on predestination, and against Paschasius Radbertus on transubstantiation, and was condemned as a heretic at Paris in 1209. Of his other works, the most important is a treatise in five books, "De Divisione Naturæ." It was printed at Oxford in 1681. The best editions are those by Schlüßer (1838) and Floss (1853). It is written in the form of a dialogue, and the process of reasoning moves on through syllogisms. But his speculation is very free and bold. It is not the given system of theology he will explain, but an original aspect of the universe which he wishes to set forth, and in the exposition of which he appeals to no external authority. In direct opposition to the theologians of his time, and to the schoolmen in general, he does not start from a conception of the body of theological doctrines as being the truth, needing only elucidation. His starting-point is a philosophical conception of the universe. (See THEODOR CHRISTLIEB'S "Leben und Lehre des Johannes Scotus Erigena," 1860; and JOHANNES HUBER'S "Johannes Scotus Erigena," 1861.)

**Erigeron** [Gr. ἡριγένων, "early old," from ἦρ, "spring," and γένων, an "old man," because the plants have a hoary appearance], a genus of herbs of the order Compositæ, including the fleabanes (which are weeds of several species, very common in Europe and North America) and other plants, such as poor robin's plantain (*Erigeron bellidifolium*), etc. The *Erigeron Philadelphicum*, *Erigeron Canadense*, and others are used as diuretics, and contain a volatile oil which varies somewhat in different species. The oil has a pungent, disagreeable odor, and sometimes also a tarry or oleo-resinous character. It is used in medicine.

**Erin.** See IRELAND.

**Erin**, on R. R., capital of Houston co., Tenn. (see map of Tennessee, ref. 6-D, for location of county). Pop. in 1880, 485.

**Erina'ceus**, the genus that includes the hedgehogs of



*Erinaceus Europæus*, the European Hedgehog.

the Old World, of which there are several species, inhabiting Asia, Africa, and Europe. The common hedgehog of England may be considered a type of the group. It is a harmless little nocturnal animal, which subsists mainly on insects, though sometimes eating fruit and even reptiles. The back of the hedgehog is covered with spines, and when attacked he rolls himself into a ball from which they radiate in every direction, and serve as a defence that enables him to defy all his enemies but man. Zoologically, the

hedgehog is of special interest, as he stands at the head of the order of Insectivora, and, though the sport of the school-boy and scorn of his dog, he is king of the moles and shrews.

**Erin'na** [Gr. Ἑριννα], a Greek poetess who lived about 600 B. C., and was a friend of Sappho. She acquired a high reputation by her lyric and other poems, among which was "The Distaff." It is said that she died at the age of nineteen.

**Erin'nys** [Gr. Ἑριννύς or Ἑρινύς; plu. *Erin'nyes*], a name given to the Furies or EUMENIDES (which see).

**Eriocaulon'acæ** [from *Eriocaulon*, one of the genera], a natural order of herbaceous endogenous plants, are nearly allied to Restiaceæ. They are mostly natives of the tropical parts of America and Australia. Many of the species are aquatic or grow in marshes. The flowers grow in close heads. Some of the *Eriocaulons* of Brazil are six feet high. Those of the U. S. are stemless. The *Eriocaulon septangulare* (pipewort) is indigenous both in the U. S. and in Ireland, and is interesting in reference to geographical distribution. It grows in ponds. Three genera and seven species of the order are found in the Atlantic States.

**Erioden'dron** [from the Gr. ἔριον, "wool," and δένδρον, a "tree"], a genus of trees of the natural order Sterculiaceæ, natives of tropical climates. They have large and beautiful flowers. They are sometimes called wool trees, because the capsules enclose a fibrous woolly or cottony substance. The cotton of *Eriodendron Sananna* is used in Brazil for stuffing pillows. The *Eriodendron anfractuosum*, which grows in the East Indies, Africa, etc., has edible seeds about the size of a pea. Other species yield useful medicines. The cotton produced by these trees cannot be spun, but its use in the paper manufacture has been proposed.

**Erivân'** [Lat. *Erivana*; Pers. *Revân* or *Revân*], a fortified town of Russian Armenia, in the government of Erivan, on the river Zenga, an affluent of the Aras, and near the latter river, 115 miles S. by W. from Tiflis. It has a citadel on a high rock, several Armenian churches, a large bazaar, and a few mosques; also a cannon-foundry and manufactures of cotton goods, earthenware, and leather. It was stormed and taken by the Russian general Paskevitch in 1827, and was ceded to Russia by Persia in 1828. Pop. in 1881, 15,040.

**Er'langen**, a handsome town of Bavaria, on the river Regnitz and on the railway from Bamberg to Nuremberg, 11 miles N. of the latter. It is enclosed by walls, and is divided into the old and new town, the latter of which is very well built. Here is the University of Erlangen, which was founded in 1742, and is celebrated as a school of Protestant theology. It has a library of 147,000 volumes, and a botanic garden. Erlangen has manufactures of hosiery, gloves, mirrors, plate glass, combs, and hats. Pop. in 1881, 14,876.

**Erlau**, ér'loû [Hung. *Eger*], a fortified episcopal city of Hungary, capital of the county of Heves, is on the river Erlau or Eger, about 75 miles E. N. E. of Pesth. It is enclosed by walls, and is pleasantly situated amid vine-clad hills. It has a cathedral, a bishop's palace, a gymnasium, a normal school, a lyceum, and a richly endowed hospital. Here are manufactures of linen and woollen fabrics. Erlau has an extensive trade in red wine of superior quality, which is produced in the vicinity. A bishopric was founded here in the eleventh century. Pop. in 1881, 20,669.

**Erl'king** [Ger. *Erlkönig*; Dan. *Elverkinge*, i. e. "king of the elves"], in German and Scandinavian mythology, a fabulous being, which through seductive allurements causes injury and destruction to human beings, especially to children. This tale has become widely known through the ballad of that name by Goethe.

**Er'man** (GEORG ADOLF), a German natural philosopher, born in Berlin May 12, 1806. He performed in 1828-30 a voyage around the world, during which he made a series of magnetic observations, and published a "Voyage Around the World, through Northern Asia and the Two Oceans" (5 vols., 1833-42). He became professor of physics in the University of Berlin. D. July 12, 1877.

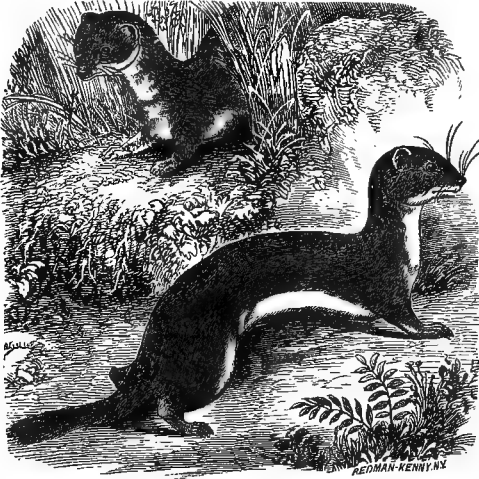
**Erman** (PAUL), a natural philosopher, the father of the

preceding, was born in Berlin Feb. 29, 1764. He became professor of physics in the university of that city and secretary of the Academy of Sciences. He wrote on electricity and other branches of physics, as well as mathematical and other subjects. Died Oct. 11, 1851.

**Ermenonville**, a village of France, department of Oise, 7 miles S. E. of Senlis. Here is a beautiful château with an extensive park, which is visited in summer by many Parisians. Among the attractions of the place is the tomb of J. J. Rousseau, who died here in 1778.

**Ermine**, er'min, in heraldry, one of the furs used in blazonry. It represents the skin of the ermine, white, spotted or timbered with black. The arrangement of the spots varies with the wearer's rank. A black fur with white spots is called *contre ermine* or *erminees*.

**Ermine**, or **Stoat** (*Putorius erminea*), a carnivorous



Ermine or Stoat.

animal nearly allied to the weasel, which it resembles in its slender form and its habits, but it is larger and has a longer tail. It is a native of the northern parts of Asia and Europe, and perhaps of America. It is about ten inches long, exclusive of the tail. In the summer the color of the upper parts is a pale reddish brown, and that of the under parts nearly white. In winter the whole of the body is covered with white fur, slightly tinged with yellow, but the tip of the tail remains black in all seasons. The fur is closer and finer in winter, and that which is obtained from Siberia, Norway, and other cold countries is one of the most valuable of furs. It is used for ladies' winter apparel and for the robes of kings and nobles. When made up the tails are inserted one to each skin, at regular distances and in the quincunx order or otherwise, according to the wearer's rank. The fur called miniver is a variety of spotted, "powdered," or "timbered" ermine. The ermine fur forms the distinctive doubling of the state robes of sovereigns and nobles, as well as of their crowns and coronets. It is also worn by judges in some countries. The ermine preys on mice, poultry, eggs, young rabbits, etc. Most of the so-called ermine fur of commerce is simply white rabbit fur, with spots of black rabbit fur inserted.

The U. S. have several white weasels which are properly classed as ermines, having white winter fur and the tip of the tail black. Such are *Putorius noveboracensis*, or common white weasel; *Putorius Kanei*, or Kane's ermine, of Alaska and Siberia; *Putorius Cicognonii*, a small species; *Putorius Richardsonii*, called little ermine; *Putorius longicauda*, or long-tailed ermine, etc. North America, however, furnishes a very small part of the ermine fur of commerce.

The ermines, like the other weasels, have the power of emitting a most offensive odor when irritated. The common stoat of Great Britain produces a fur much inferior to that of the same species in the far North. It is regarded as vermin, and zealously hunted by foresters, warreners, and park-keepers, for it is a most destructive pest among rabbits, hares, and fowl, wild and domestic. It is caught in snares or traps. It is most active by night.

**Erne**, ern [from the Ang.-Sax. *earn*, an "eagle"], or **Sea Eagle** (*Haliaetus*), a genus of eagles differing from other eagles in having no feathers on the toes and the lower part of the tarsi, also in the greater length of the bill. They have less courage than the eagle, and resemble the vulture in feeding on carrion as well as other prey. The common erne, cinereous eagle, or sea eagle (*Haliaetus albicilla*) is the only species known in Great Britain. It makes its

nest on the ledges of high precipices on the sea-coast, and sometimes near inland lakes, feeding on fish and waterfowl. It is about thirty-three inches long, the plumage brown, with a paler tinge on the head, and the tail of the adult pure white. The American white-headed eagle or bald eagle (*Haliaetus leucocephalus*) is found throughout the whole of North America, frequenting the sea-coasts as well as the mouths of large rivers. (See **BALD EAGLE**.) There is also an Australian species (*Haliaetus leucogaster*) and the Pondicherry kite (*Haliaetus Ponticerianus*), an Indian species, both of smaller size than the sea eagle.

**Erne**, a river of Ireland, in Ulster, flows nearly north-westward through the county of Fermanagh, and expands into two beautiful lakes, called Upper and Lower Lough Erne. After a course of 72 miles it enters Donegal Bay. The Lower Lough is 20 miles long, 7 miles wide, and over 200 feet deep. The Upper Lough is smaller. Each of them encloses numerous islands. The banks of these lakes and of the river present fine scenery. The town of Enniskillen stands upon an island between the loughs. On another island is the seat of the marquiss of Ely. The loughs cover 40,000 acres, and are 140 feet above the sea. The salmon and other fisheries are very productive. The river and both loughs are deep, and have lines of steamboats, but the river has several cataracts.

**Ernée**, a town of France, in the department of Mayenne, 17 miles N. W. of Laval. It manufactures carpet-tacks and linseed oil, and trades in hemp, flax, and cloverseed. Pop. 5262.

**Ernest** (**Ernst**), elector of Saxony, the founder of the line called Ernestine or Ernestinian, was born Mar. 25, 1441. He succeeded his father, Frederick II., in 1464, and annexed Thuringia to his dominions in 1482. "This prince loved a quiet life, and sought it by all the means in his power, at the same time permitting no man to offend him with impunity." He did much for the development of the resources of his territories. Died Mar. 22, 1486.

**Ernest** (**Ernst**) **I.**, surnamed **THE PIOUS**, duke of Saxe-Gotha, born Dec. 24, 1601, at the castle of Altenburg, was a brother of the famous Bernard of Saxe-Weimar. In the Thirty Years' war he served with distinction under Gustavus Adolphus as a colonel of horse. He completed the victory of the Swedish army at Lützen, where Gustavus was killed. He was a zealous Protestant, and a ruler of great wisdom and activity. He instituted reforms, some of which were very fruitful of good. Many of his institutions exist to this day. Died in 1675.

**Ernest** (**Ernst**) **IV.**, or **Ernst II.** of Saxe-Coburg-Gotha, duke of Saxe-Coburg, was born at Coburg June 21, 1817. His younger brother, Albert, married Queen Victoria of England. He succeeded his father in 1844, and sympathized with the efforts to promote the unity and nationality of the Germans. He composed operas entitled "Zayre" and "Casilda." In 1863 he declined the crown of Greece.

**Er'nest Augus'tus**, king of Hanover, born Jan. 5, 1771, was a younger son of George III. of England. He was styled the duke of Cumberland before he became king, and was a field-marshal in the British army. On the death of his brother, William IV., in 1837, he inherited the throne of Hanover, which was then separated from Great Britain, because it was not lawful for a woman to reign over Hanover. He was the object of intense popular dislike both in England and Germany. In the House of Lords he belonged to the extreme Tory party. In Hanover he was a tyrant, the unyielding defender of absolutism. He was generally considered, and with good reason, to be a man of grossly licentious habits. Died Nov. 18, 1851. He was succeeded by his blind son, George V., the last king of Hanover and the present duke of Cumberland.

**Ernes'ti** (**AUGUST WILHELM**), a German philologist, born in Thuringia Nov. 26, 1733, was a nephew of the following. He became a good Latin scholar, and was professor of eloquence at Leipzig in 1770. He produced a good edition of Livy (3 vols., 1769) and other works, several of which were explanatory of the text of Livy's writings, and are still valued. Died July 20, 1801.

**Ernesti** (**JOHANN AUGUST**), a celebrated German critic and the founder of a school of theology, was born at Tennstedt, in Thuringia, Aug. 4, 1707. He was liberally educated at Wittenberg and Leipzig, and was so excellent a Latin scholar that he was called the "German Cicero." He became professor of ancient literature in the University of Leipzig in 1742, and obtained the chair of rhetoric in 1756, to which the chair of theology was added in 1758. In theology he was liberal or rationalistic. He proposed a new system of biblical criticism in his "Institutes of an Interpreter of the New Testament" ("Institutio Interpretis Novi Testamenti," 1761). He wrote other theological

works, and published an excellent edition of Cicero (5 vols., 1737-39), including a "Clavis Ciceroniana." Died Sept. 11, 1781. (See A. W. ERNESTI, "Memoria J. A. Ernesti," 1781; J. VAN VOORST, "Oratio de J. A. Ernesto," 1804.

**Ernst** (OSWALD H.) See APPENDIX.

**E'ros** [*Ἔρως* (gen. *Ἐρωτος*)], the Greek name of the god of Love, corresponding to the Cupido of the Romans. In Hesiod, Eros is one of the great cosmogonic powers, but later poets represent him as a son of Aphrodite (Venus). (See CUPID.)

**Ero'sion** [from the Lat. *e*, "out," "away," and *ro'do*, *ro'eum*, to "gnaw" or "eat"], a geological term used to express the action of a river in excavating or enlarging its channel, the gradual abrasion of strata, by rain, frost, glaciers, etc. The deep hollows occupied by most lakes and rivers are supposed to have been formed by the action of rivers or glaciers, and are called "valleys of erosion." The action of atmospheric agencies, glaciers, etc. in wearing away the general surface of a country or district is called *surface erosion* or *denudation*. The changes wrought by this agency on the superficial features of the earth are much more grand and interesting than they are generally supposed to be; and it may be said that the surface configuration of the earth, and indeed the whole "aspects of nature," are the result of the antagonistic action of surface erosion and internal elevatory forces. (See SURFACE GEOLOGY.)

**Erot'ic** [Gr. *ἑρωτικός*, from *ἔρως*, "love" (see EROS); Fr. *érotique*], an epithet applied generally to that which relates to love or excites amorous passion. In a more restricted sense it is applied to poems of which love is the subject, and to classic authors of whom love is the favorite theme, as Anacreon, Sappho, Ovid, and Tibullus.

**Erpe'nianus, or Van Er'pen** (THOMAS), an eminent Dutch Orientalist, born at Gorkum Sept. 7, 1584. He graduated at Leyden in 1608, after which he visited France, England, Italy, and Germany. In 1613 he became professor of Arabic and other Oriental languages at the University of Leyden. A second chair of Hebrew was founded for him in 1619. He printed a number of Arabic works with a press which he kept in his own house. He produced in 1613 an "Arabic Grammar," the first ever written in Europe. Among his other works are a "Collection of Lokmân's Arabic Proverbs," with Latin version, and "Historia Sarcenica," which is an edition of Elmacin's history with a Latin translation (1625). Died Nov. 13, 1624.

**Errard** (CHARLES), a French painter and architect, born at Nantes in 1606. He was patronized by Louis XIV., for whom he adorned the Louvre, Tuileries, and other palaces. He was one of the twelve artists who founded the Academy of Painting in Paris in 1648, and was the principal founder of the French Academy of Art in Rome (1666). He died in Rome May 15, 1689.

**Erra'ta** [the plu. of the Latin *erratum*, a "mistake," from *erro*, *erratum*, to "err"], a term applied to the list of errors or faults committed in printing a book. This list is usually placed at the end or the beginning of the book.

**Errat'ic Blocks, or Erratics**, a geological term applied to fragments of rock which are found on the surface of the ground, and have been transported from a distance by glaciers, icebergs, etc. They are most numerous in northern regions. "The erratics which cover the Jura," says Lyell, "present a phenomenon which has perplexed the geologist for more than half a century. No conclusion can be more incontestable than that these angular blocks of granite, gneiss, and other crystalline formations came from the Alps, and that they have been brought for a distance of fifty miles across one of the widest and deepest valleys in the world." In the same manner large blocks of Scandinavian rock are scattered over the plains of Denmark and Northern Germany.

**Ersch** (JOHANN SAMUEL), a German bibliographer, born at Gross-Glogau, in Silesia, June 23, 1766. He became professor of geography at Halle in 1803, and published, besides other works, a "Handbook of German Literature from the middle of the Eighteenth Century" (4 vols., 1812-14) and a "General Repertory of Literature" (8 vols., 1793-1809). His capital work is the excellent "Encyclopædia of Sciences and Arts" ("Allgemeine Encyclopædie der Wissenschaften und Künste"), which he began conjointly with Gruber, and of which he edited seventeen volumes (1818-28). After his death, which occurred Jan. 16, 1828, it was continued by Gruber and others. He is called the founder of German bibliography.

**Erse.** See GAELIC LANGUAGE.

**Ers'kine** (DAVID STEWART), F. R. S., ELEVENTH EARL OF BUCHAN, and LORD CARDROSS, born June 1, 1742, a brother of Lord Chancellor Erskine, was author of several

antiquarian papers, "Lives and Writings of Fletcher of Saltoun and the Poet Thomson" (1792), and other works. He was a man of eccentric character. Died Apr. 19, 1829.

**Erskine** (EBENEZER), a Scottish preacher and the founder of the Secession Church, was born June 22, 1680. He preached at Portmalk, in Kinross, from 1703 to 1731, and acquired a high reputation. In 1731 he removed to Stirling, where he advocated popular rights in the settlement of ministers, and differed from the majority of the General Assembly in relation to lay patronage. He was deposed or suspended in 1733. In 1736, Erskine and his friends formally seceded and organized the Secession Church. Died June 2, 1754. In 1847 the Secession Church united with the Relief Church to form the United Presbyterian.

**Erskine** (HENRY), an able Scottish lawyer, born in Edinburgh Nov. 1, 1746, brother of Thomas, Lord Erskine, noticed below. He was a Whig in politics, became lord advocate of Scotland in 1782, and again in 1806. He was eloquent and witty, and was distinguished for tact and fascination of manner. During part of his career he was the most eminent member of the Scottish bar. D. Oct. 8, 1817.

**Erskine** (JOHN), eleventh earl of Mar, a Scottish Jacobite and ambitious politician, was born at Alloa in 1675. He was appointed secretary for Scotland in 1708. In Sept., 1715, he took arms for the Pretender, and obtained the command of about 12,000 insurgents. He was defeated by the duke of Argyle at Dunblane in November of that year, and soon escaped to the Continent. Died in May, 1732.

**Erskine** (JOHN), D. D., a Scottish divine, a son of the preceding, was born June 2, 1721. He was ordained minister of Kirkintilloch in 1744, and of Culross in 1753. In 1758 he was translated to the New Grey Friars' church, Edinburgh, where he became the leader of the orthodox and popular party in the Church. He was promoted in 1767 to the Old Grey Friars' church, where he was a colleague of Dr. Robertson, who was the leader of the moderate party. Erskine wrote many theological works, which are highly esteemed. Died Jan. 19, 1806. (See SIR H. M. WELLWOOD, "Life of John Erskine," 1818.)

**Erskine** (JOHN) OF CARNOCH, an eminent Scottish jurist, born in 1695, was a son of Col. John Erskine and a grandson of Lord Cardross. He was appointed professor of Scottish law in the University of Edinburgh in 1737, and filled that chair until 1765. He published in 1754 "Principles of the Law of Scotland," and wrote an important standard work entitled "Institutes of the Law of Scotland," which was published in 1773. It is a work of high authority. Died Mar. 1, 1768.

**Erskine** (RALPH), a Scottish theologian, born at Monilaws March 18, 1685, was a brother of Ebenezer, noticed above. He was ordained minister of Dunfermline in 1711, and attained eminence as a preacher. In 1737 he joined the Secession Church. He was author of "Gospel Sonnets" and other religious works. Died Nov. 6, 1752.

**Erskine** (THOMAS), LORD, a celebrated British orator and lawyer, born in Edinburgh Jan. 10, 1750, was the youngest son of Henry David, earl of Buchan. His father, whose income was about £200 a year, could not afford to give him a liberal education for a learned profession. Young Erskine therefore entered the navy in 1764 as a midshipman, after he had attended the High School of Edinburgh. Four years later he purchased a commission in the army, and in 1770 he married a daughter of Daniel Moore, M. P. In the social circles of London he was admired for his elegant manners, colloquial powers, and genial disposition. Renouncing the military profession, which he disliked, he resolved to study law, and was admitted as a student in Lincoln's Inn in April, 1775. In Jan., 1776, he entered Trinity College, Cambridge, as a gentleman commoner. It is said that in this part of his career he was very poor, suffered great privations, and boasted that he did not know a lord out of his own family. He was called to the bar in 1778, and obtained immediate and rapid success in his profession. One of his first clients was Capt. Baillie, prosecuted for a libel on Lord Sandwich, who was then a cabinet minister. He made his *début* in a court crowded with eminent men, yet when the judge interrupted him by the assertion that Lord Sandwich was not before the court, he had the courage to reply, "I know that he is not before the court, and for that reason I intend to bring him before the court." Lord Campbell expresses the opinion that Erskine's plea in this case was "the most wonderful forensic effort of which we have any account in our annals." In 1781 he defended Lord George Gordon, who was tried for treason and was acquitted. He was elected in 1783 to Parliament, in which his success was not so brilliant as in the forum. He was a Whig in politics, and was re-elected in 1790. In several political trials that occurred during the excitement of the French revolution he bravely defended the liberty of

the press and the friends of reform whom the ministers prosecuted on a charge of constructive treason. He was counsel for Mr. Hardy and Horne Tooke, who were tried in 1794 and were acquitted. On the formation of a Whig ministry by Fox and Grenville in Feb., 1806, he was appointed lord chancellor, and was raised to the peerage as Baron Erskine of Restormel Castle. He resigned this office when the Tories came into power early in 1807. He was the author of "Armata," a political romance, and a "View of the Causes and Consequences of the War with France," which ran through forty-eight editions. He died Nov. 17, 1823, leaving a son and several daughters. Many persons consider him the greatest advocate who ever practised at the English bar. "He spoke," says Lord Campbell, "as his clients respectively would have spoken, being endowed with his genius; and those who heard him seemed to be inspired with a new ethereal existence." His printed speeches, enriched with noble thoughts, brilliant imagery, and beautiful diction, retain in a great measure their original impressiveness. (See LORD CAMPBELL, "Lives of the Lord Chancellors;" LORD BROUGHAM, "Memoir of Erskine," prefixed to a collection of Erskine's speeches, 4 vols., 1847.)

**Erskine** (THOMAS) of LINLETHAN, a member of the Scottish bar, who published several theological treatises, the best known and most valuable of which is "On the Internal Evidence for the Truth of Revealed Religion," 3d ed. Edinburgh, 1821.

**Erskine College**, at Due West, Abbeville co., S. C., was organized in 1839, with the Rev. E. C. Pressly (afterwards made D. D.) for its president, assisted by several professors, and belongs to and is under the supervision of the Associate Reformed Synod of the South. Although the college had to struggle with low salaries for professors, with the want of suitable buildings, libraries, and scientific apparatus, and other inconveniences, it had a reasonable share of prosperity for the first seven years of its existence. Dr. Pressly resigned the presidency in 1846, and was succeeded by the Rev. R. C. Grier, D. D. About 1853 the plan of endowing the college by the sale of scholarships was adopted, and the result was that some \$50,000 were raised. These figures were enlarged afterwards by private donations of Capt. John Blair and Col. William Wright of Yorkville, S. C., and of Christopher Strong, Esq., of Tennessee, making the sum-total amount to \$70,000. In the mean time four large and beautiful buildings were erected for college uses—the college proper, Lindsay Hall, the Euphemian and Philomathean Halls—while a fine telescope, the gift of William Johnson of Alabama, crowns the observatory. In 1858, Dr. Grier, finding that the presidency of the college and the pastorate of Due West congregation were too exacting on his time and ability, resigned the former, that he might devote himself more fully to the latter. In 1859 the Rev. E. L. Patton was elected president, but the war breaking out some two years afterwards, he resigned, soon after which the institution was suspended.

The college was re-opened at the close of the war under unfavorable auspices, the country being demoralized and private and public institutions impoverished. Dr. Grier was re-elected in 1867, and with the assistance of the professors and other friends succeeded in resuscitating the college. Unfortunately, however, he died in 1871, leaving a vacancy which was hard to fill. In September of that year the synod elected the Rev. William Moffat Grier to fill the place of his father. A permanent endowment has been secured, amounting to about \$80,000.

The faculty now consists of the Rev. William M. Grier, D. D., president and professor of mental and moral science; J. J. McCain, professor of Greek and German; J. N. Miller, professor of mathematics and the natural sciences; Rev. J. M. Todd, professor of the Latin and French languages; and William Hood, A. M., professor of chemistry, history, and belles lettres. WILLIAM M. GRIER.

**Erwin**, capital of Unicoi co., Tenn. (see map of Tennessee, ref. 6-K, for location of county). Pop. of district in 1880, 555.

**Erwin** (ALEXANDER R.), D. D., a minister of the Methodist Episcopal Church South, born in Louisiana Jan. 12, 1820. His father was a Baptist minister. He was licensed to preach in 1840, and joined the Tennessee Conference in 1842. He occupied a high rank in the ministry, presided over the Clarksville Female Academy and the Huntsville Female College, and while stationed in Nashville received the degree of D. D. from the Nashville University. He died of consumption in Huntsville, Ala., Jan. 10, 1860. T. O. SUMMERS.

**Erysip'elas** [Gr. *ἐρύσιπλος*, probably from *ἐρυθρός*, "red," and *πέλος*, akin to the Lat. *pellis*, "skin"], a disease probably of miasmatic origin, sometimes associated with a peculiar rose-colored eruption of the skin, whence the name. The

inflammation attending this disease is of a peculiar low type which is but little understood. It may terminate favorably by resolution, less favorably by abscess (which is apt to be diffuse—i. e. not limited to a single spot—and is then very dangerous), or the termination may be in gangrene and the death of the patient. The disease is very common in military hospitals, seating itself in wounds, when it proves frequently fatal. Erysipelatous diseases sometimes assume an infectious and almost an epidemic character. Puoerpal fever, peritonitis, plebitis, and a long catalogue of diseases of low type are akin to erysipelas. Its infectious character is admitted. The famous old "Dread-naught" hospital-ship in the Thames became so poisoned by it that she had to be destroyed. The best treatment is a sustaining one. Pure air, a milk diet, and the use of quinia and iron, with stimulants, are in general indicated. The sulphites and other disinfectant remedies may be employed. Externally, it is safest to use only the blandest applications, carbolized lotions, etc.

**Erzgebirge**, *Erts-ga-beer'ga* (i. e. "ore mountains"), a mountain-chain of Southern Germany, extends along the boundary between Bohemia and Saxony, and is nearly 120 miles in length and 25 miles broad. The Schwarzwald and Keilberg, the highest parts of this chain, have an altitude of about 4000 feet, and are of granitic formation. The Erzgebirge is rich in minerals, among which are silver, tin, iron, and cobalt. On the S. E. side it presents a steep, abrupt declivity, often rising in a perpendicular wall 2000 feet high. On the N. W. side it opens up into beautiful and fertile valleys, and gradually loses itself in the North-German plain.

**Erzroom'**, **Erzroum**, or **Erzrum** [i. e. "land of Rome" or Byzantium, so called because it was originally founded under the Eastern Roman empire], a fortified town of Armenia (Asiatic Turkey), is on a fertile plain on the river Kars-Soo, a branch of the Euphrates, about 120 miles S. E. of Trebizond. It is about 6000 feet above the level of the sea. The streets are narrow and filthy; the houses are mostly built of mud, wood, or sun-dried bricks. It is the seat of an Armenian archbishop. It has a large citadel, a custom-house, about forty mosques, several Armenian and Greek churches, and a number of bazaars. Its position renders it an important military post. Erzroom has an extensive trade, which is carried on partly by caravans. The principal manufactures are utensils of copper, tin and iron, and leather. The inhabitants own large sheep-farms in the mountains or keep sheep and cattle in the town, sending them out daily to the mountain-pastures. The climate is very severe, snow covering the ground for about six months. Pop. estimated at 60,000, five-sixths of whom are Turks. A town called *Theodosiopolis* was founded here in 415 A. D. In 1201 it was taken by the Seljooks, who are said to have destroyed here 100 churches.

**Esarhad'don** [called in the cuneiform inscriptions *Ashur-akh-iddina*], the Old Testament name of an Assyrian king, the son and successor of Sennacherib. He appears to have reigned from 680 to about 667 or 660 B. C. He is shown by the monuments to have been one of the most powerful of Assyrian monarchs. His rule extended northward to Armenia, on the west it included Syria and Cyprus, while on the south Egypt, and even Ethiopia, were claimed by him. He built a palace at Babylon. Among the numerous and splendid remains of his reign is the south-west palace of Nimrod.

**E'sau** ("rough," "hairy"), the elder twin-brother of the patriarch Jacob (Israel), and the son of Isaac and Rebekah. He took his name from his hairiness of body. The story of his marriage to two Canaanitish and an Ishmaelite woman, of his loss of birthright through the craft of Rebekah and Jacob, and of his quarrel and reconciliation with Jacob, are beautifully told in the book of Genesis. He was the progenitor of the Edomites, who dwelt in Mount Seir, otherwise called Edom.

**Escalade** [Lat. *scala*, "ladder"], an operation of war, is an assault aided by ladders as the instrument of surmounting the obstacles presented by the scarp and counterscarp walls (or slopes) of a fortification in which no breach has been made; sometimes even a rapid blow directed at an unbesieged place with hope of success by surprise (e. g. the capture by the English troops of Almaraz, Sept., 1812). Among the most famous escalades are those of Adrianople by the Goths; of Beauvais by Charles the Bold, in 1472; of Fecamp in 1593; of Prague in 1741: still more remarkable, that at Corfu in 1717 by Count Schulerberg, who, reduced to extremity in the defence by the capture of the outworks, hastily prepared ladders, and by a desperate assault by escalade, retook them, and thus saved the place. The second siege of Badajoz (1812) presents an event unparalleled in the history of sieges, that after twenty days' open trenches and the opening of three practicable breaches,



two entire divisions of troops should, at the moment of assault, be employed to escalate the defences where entire; that each should *succeed*, while the regular assault on the breaches should be repulsed with terrible slaughter. The castle was successfully scaled where the walls were eighteen to twenty-four feet high, and "tolerably flanked;" the Bastion St. Vincente had a scarp-wall thirty-one and a half feet high, flanked by four guns, palisaded covered way, a counterscarp wall twelve feet high, and a "cunette" ditch five and a half feet deep. J. G. BARNARD.

**Escalante** (Don JUAN), a Spanish captain, was by Cortez appointed commander of the newly founded Villa Rica de Vera Cruz. The garrison consisted of one hundred and fifty men. Deceived by an Aztec chief, he made a campaign into the interior at the head of fifty Europeans and several thousand Indians, but was mortally wounded in the encounter, and died soon after, 1519.

**Escalop Shell**, in heraldry, is a shell used to decorate palmers and crusaders, and signifies that the bearer has made long voyages by sea. The common name is scallop shell. The edible escalop of Europe (*Pecten maximus*) is considered a great delicacy. It belongs to the oyster family. Like many other molluscs, it is able to move with considerable swiftness by means of repeated strokes of its valves, a single stroke carrying it for several yards. When at rest, the scallop lies on the right valve. The animal itself is very beautiful, its color being orange or fine scarlet, and the mantle marbled with brown of different hues. A series of round black dots called "ocelli," and thought to answer the purpose of eyes, are ranged around its edge and surrounded by long tentacular filaments. The heraldic escalop shell, worn by palmers, belonged to the *Pecten Jacobæus*, which, as monkish writers assert, was the cognizance of Saint James the Great. The genus is very large and worldwide in distribution, there being more than 100 living and nearly 500 extinct species.

**Escanaw'ba**, or **Escanaba**, capital of Delta co., Mich. (see map of Michigan, ref. 3-G, for location of county), 360 miles N. of Chicago, on R. R. and the N. end of Green Bay. It has a blast-furnace and a good harbor. The principal business is shipping Lake Superior iron ores; upwards of 500,000 tons are sent yearly. Pop. in 1880, 3026; in 1884, 4339.

**Escape**, in law, means the departure of a prisoner from confinement before he has been released by process of law. Any liberty given to a prisoner not authorized by law is technically an escape. Escapes may occur either in civil or criminal cases. They are either negligent or voluntary—negligent, when the prisoner escapes without the consent of the officer having him in custody; voluntary, when such officer consents to the escape. In criminal cases an escape is a public offence, of which the prisoner may be convicted, as also the officer through whose act or neglect the escape occurs. In civil actions there is an important distinction between *mesne* and final process, the former being that which is issued between the commencement and the termination of the action; and the latter, that which is used to enforce the judgment. If the escape be voluntary, the officer is liable in either case; but if he be negligent, he will not be liable in the case of *mesne* process if the prisoner is returned to his custody before an action is commenced against him for his neglect; though he will be liable in any event in the case of final process. The damages recoverable are measured by the injury sustained. In final process these would in general be the amount of the judgment. Nothing will excuse an escape but an act of God or of the public enemy or of the law. An instance of the latter would be an order of the House of Representatives at Washington directing the attendance of a person as a witness who was held by a sheriff of a State court in custody under an execution in a civil action against his person.

**Escapement**, in watches and clocks, the device by which the rotatory motion of the wheels gives rise to or perpetuates the vibration of a pendulum or balance-wheel.

Escapements have received various forms, many of which are still in use. The earliest, introduced by Huyghens, about 1650, was called the crown-wheel or vertical escapement. The crown-wheel has its teeth not in the plane of the wheel, but in a cylindrical surface of which the axis of the wheel is the axis. In the crown-wheel of the clock or watch, the teeth were acute-angled, and inclined in a common direction like saw-teeth. The axis of the pendulum, or balance, was longer than the diameter of the crown-wheel over which it extended. It carried two short arms or projections, called pallets, set in different azimuths, in such a manner that when one of them, being encountered by a tooth, was pushed out of the way by the advancing wheel, the opposite one was caught by another tooth, which pushed in the opposite direction. Thus the wheel made an intermittent progress as the teeth successively escaped from the pallets.

In a clock, when the pendulum is disturbed from the mean position, it is brought back by gravity. In the watch the same result is produced for the balance wheel by the action of the spiral spring attached to the verge, called the hair spring. The escapement most commonly in use for both clocks and watches is the anchor escapement, first introduced by Hooke in 1656. It is so called from its resemblance to the flukes of an anchor, the shaft of the anchor in the clock being parallel to the pendulum and connected with it. The escapement-wheel is a spur-wheel. The pallets project from the extremities of the anchor flukes, meeting the wheel at the points where tangent lines from the centre of motion would touch it. When one pallet is engaged with the wheel, the other is free; and *v. v.* The extremity of the pallet is inclined in such a manner that, as the tooth escapes, it gives an impulse to the pendulum. As, after the pallet first engages a tooth, the swing continues for some time in the same direction, anchor escapements are of two kinds, according to the manner of their action upon the train during this swing. In Hooke's escapement, the surfaces of the pallets are so inclined that by their pressure on the tooth, they turn the train slightly backward, or cause it to recoil, up to the end of the swing. In the *dead-beat* escapement, invented by Graham early in the last century, the surfaces of the pallets are circular arcs having the centre of motion for their centre; so that during the swing the train simply stands still. Though the *dead-beat* escapement is now generally used in clocks, there are not wanting those who prefer the recoiling escapement. Besides the anchor *dead-beat*, there are several other very ingenious forms, among which may be mentioned Lepaute's pin-wheel escapement, McDowall's ruby-disk escapement, and Denison's three-legged *dead* escapement.

The only escapement used for watches till about 1700, was the crown-wheel escapement. Graham invented the cylinder escapement, so called because a hollow cylinder of steel or ruby replaces in part the verge of the balance. This cylinder is cut away on one side for about one-fourth of the circumference, in order to allow the pallets, which are small triangular pieces of steel, to enter the interior. During the swing the pallet rests with little friction on the smooth exterior or interior surface. In entering and in escaping, it gives an impulse to the balance. The pallet is not in the plane of the wheel, but stands on a short stem at right angles to this plane. Hence, the cylinder must be much more extensively cut away at the point where the wheel passes; and on this account, the cylinder escapement, though performing very well, is too frail to be popular in use. The duplex escapement of Lepine receives its name from having a double escapement. The escapement-wheel carries spur teeth rather widely separated, which engage at every double vibration with a notch in a cylinder forming part of the verge, and constructed of a gem. The verge itself carries also an arm which engages with a set of pins, or crown-wheel teeth, fixed in the escapement-wheel at right angles to its plane. The impulse is chiefly derived from the escapes of this arm, but proceeds to some extent from those of the spur teeth also. It takes place only in one direction, and hence the system is called by the French an escapement *à coup perdu*. The duplex escapement, though attended with little friction and running without oil, is subject to the disadvantage that a sudden jerk may check the swing of the balance and prevent the escape. If a single such failure occurs, the watch will stop.

The lever escapement is a *dead-beat* anchor escapement, first applied to the watch by Mudge, in 1733. The lever is attached to the anchor, generally crosswise, or at right angles to the proper position of the anchor-shaft. At one extremity it presents a notch into which a pin attached to the verge strikes at each swing in either direction. This tilts the anchor and allows a tooth to escape. Except at these moments of locking and unlocking, the balance swings entirely free. The lever carries also a pin just at the summit of the notch, which enters an indent in the verge as the lever passes. As there is no other indent, the lever cannot tilt except when the verge pin strikes it.

The escapement which interferes least with the uniformity of movement of the train, is the chronometer escapement, introduced into England about a century ago by Earnshaw, though said to have originated in France. In this, the train is locked by a tooth projecting from a light bar tangent to the escapement-wheel, which yields by bending and not by turning on a pivot, the fixed extremity being a spring. The free extremity carries another delicate spring parallel to itself and extending a little beyond it. A tooth on the verge passes this slight spring in one direction without sensible resistance. On its return the bar behind the spring prevents its bending, and so is carried along with it, unlocking the train. The train being released, a tooth of the escapement-wheel strikes a pin, or enters a notch, connected with the verge, and gives an impulse to the balance.

This, like the duplex, is an escapement *à coup perdu*, and is liable like that to stop when subjected to sudden jerks. Hence chronometers carried on the person sometimes stop; but with nautical chronometers this accident hardly ever occurs.

The chronometer escapement is sometimes called a free escapement; since the balance is wholly free from contact with any other part of the work, except in the instant of unlocking and receiving the impulse. This is true also of the lever escapement; but in that, the unlocking requires more force, and is attended with larger friction. (See CLOCK.) F. A. P. BARNARD.

**Escarment**, a geological term applied to the steep faces which are often presented by the abrupt terminations of strata, and resemble sea-cliffs. These have been caused by subaerial denudation, according to Lyell, who thinks the term escarpment "should be confined to the outcrop of particular formations having a scarped outline, as distinct from cliffs due to marine action." The word is also sometimes used in speaking of fortifications, meaning the side or slope of the parapet or of the ditch next the rampart.

**Eschar**, *ēs'kar* [from the Gr. *ἐσχάρα*, "scurf," "scab"], a term applied to the slough caused by fire or caustics; the crust or scab, which is dry, rough, and of a gray color. (The word "scar" is supposed to have been derived from *eschar*.)

**Eschatology** [Gr. *ἐσχατολογία*, "doctrine respecting the last things"] is that section in dogmatics which treats of the second advent, the intermediate state, the resurrection, the last judgment, heaven, and hell. Upon these themes revelation does not go into minute details, while yet the salient points are strongly marked. The passages which must be relied upon to furnish the data are Matt. xxv., 1 Cor. xv., 2 Thess. ii., Rev. xx. and xxi.

As regards the second advent, the statement in the Apostles' Creed expresses the catholic faith. Christ "ascended into heaven, and sitteth at the right hand of God the Father Almighty; from thence he shall come to judge the quick and the dead." According to this symbol, which unquestionably presents the doctrine current in the primitive Church, there is no advent of Christ upon earth, after his ascension, until he leaves his session with the Father and comes directly to the final judgment of all mankind. This statement precludes millenarianism. According to this theory, there are two resurrections—the first of the righteous dead only at the time of the second advent of Christ, and the second that of the righteous and the wicked at the end of the world. Between these two resurrections a thousand years intervene, during which time Christ reigns personally, in corporeal presence, upon the renovated earth. Millenarianism was a revival of the later Jewish doctrine of the Messianic kingdom. Its most flourishing period was between 150 and 250 A. D. That it was not the general belief of the Church even then is proved by the above-quoted statement in the Apostles' Creed. Since that time it has had occasional advocacy, as by the Anabaptists of the Reformation period and the modern Millenarians.

The doctrine of the intermediate state has been somewhat fluctuating in its form, owing to the paucity of the Scripture data. The representation in the parable of Lazarus and Dives has furnished the basis of the general statement that the believer is happy and the unbeliever is wretched between death and the final judgment; yet the resurrection of the body adds somewhat to both the happiness of the believer and the misery of the lost. The majority of the ancient Fathers, in the opinion of Hagenbach, believed that men do not receive their full recompense of either reward or penalty until after the resurrection of the body. The doctrine of the intermediate state was soon vitiated, so far as the righteous dead are concerned, by the papal notion of purgatory; according to which the believer between death and the resurrection goes through a painful process that cleanses him from remaining sin. The Protestant rejects this, and affirms that at death the soul of a believer is made perfect in holiness. What precisely is the difference between the condition of a believer as disembodied and as re-embodied he does not affirm. He is content with denying purgatorial pains and purification, as well as an unconscious sleep of the soul between death and the resurrection.

The doctrine of the resurrection of the body was from the beginning a cardinal and striking tenet of Christianity. Perhaps no article of the new faith made greater impression at first view upon the pagan. When the philosophers of Athens "heard of the resurrection of the dead, some mocked, and others said, We will hear thee again of this matter." All the early Fathers maintain this dogma with great earnestness and unanimity against the objections of skeptics, of whom Celsus was acute and scoffing in his attack. Most of them believed in the resuscitation of the

very same body materially. Justin Martyr says that cripples will rise as cripples, but at the instant of resurrection, if believers, will be made physically perfect. The Alexandrine school alone adopted a spiritual theory of the resurrection. Origen went so far in this direction as to assert that a belief in the resurrection of the body is not absolutely essential to the profession of Christianity, provided the immortality of the soul were maintained. But these idealizing views were generally combated with great earnestness, and in some instances evoked an extremely gross and carnal view in opposition. The Patristic theory of the resurrection passed into the Middle Ages with little variation, excepting that in connection with the materialism of the papacy it naturally became more materialistic in its structure. The poetry of Dante and the painting of Angelo powerfully exhibit it. In the Protestant Church the existence of a real body, and of a body that preserves the personal identity, is affirmed; but the materialism of the Papal, and to some degree of the Patristic, Church is avoided by a careful attention to Saint Paul's dictum: "There is a natural body (*σῶμα ψυχικόν*), and there is a spiritual body (*σῶμα πνευματικόν*)." *σῶμα πνευματικόν*.

The doctrine of the last judgment was, from the first, immediately connected with that of the resurrection of the body. Mankind "must all appear before the judgment-seat of Christ, that every one may receive the things done in his body." 2 Cor. v. 10. The Fathers founded their views of the day of doom upon the representations and imagery of Scripture. They believed that a general conflagration will accompany the last judgment which will destroy the world, though some ascribed a purifying agency to it. Some of them, like Tertullian and the more rhetorical of the Greek Fathers, enter into minute details, while others, like Augustine, endeavor to define dogmatically the facts couched in the figurative language of the Bible. In the Middle Ages representations varied with the bent of the individual theologian. One popular opinion was that the judgment will be held in the valley of Jehoshaphat. Aquinas maintained that the last judgment will take place *mentaliter*, because the oral trial of each individual would require too much time. In the modern Church the course of thought upon this doctrine has been similar to that in the ancient and mediæval. The symbols of the different Protestant communions explicitly affirm a day of judgment at the end of the world, but enter into no description. Individual speculations, as of old, vibrate between the extremes of materialism and idealism.

That the blessedness of the redeemed is endless has been the uniform faith of the Church. Representations concerning the nature of this happiness vary with the culture and intellectual spirit of the age and the individual. Justin Martyr regards the blessedness of heaven as consisting mainly in the continuation and increase of the happiness of the millennial reign. Origen holds that the blessed dwell in the aerial regions, and pass from one heaven to another as they advance in holiness; at the same time he condemns those who expect merely sensuous enjoyment. The Greek theologians Gregory of Nazianzum and Gregory of Nyssa follow Origen. Augustine believed that the heavenly happiness consists in the enjoyment of peace which passes knowledge and the beatific vision of God. One important element in it consists in deliverance from all hazard of apostasy—the *non posse peccare et mori*. The Schoolmen held the Patristic theories, but with an endeavor to systematize. They divided heaven into three parts—the visible heaven, or the firmament; the spiritual heaven, where saints and angels dwell; and the intellectual heaven, where the beatific vision of the Trinity is enjoyed. The modern Church maintains the doctrine of everlasting blessedness in substantially the same form with the ancient and mediæval. The tendency to materialize or to spiritualize it varies with the grade of culture and modes of thinking.

The punishment inflicted upon the lost was regarded by the ancient Church as endless. The principal exception appears in the Alexandrine school, represented by Clement and Origen. But Clement is careful to say that the doctrine of endless perdition must be preached, in order to deter men from sin, although the hope of the final restoration of all is permitted to the thinker. Some faint traces of a belief in the remission of penalty in the future life are visible in the writings of Didymus of Alexandria. Gregory of Nyssa speaks more distinctly, pointing out the corrective design of punishment inflicted upon the wicked. The annihilation of the wicked was broached by Arnobius. The mediæval Church was likewise a unit in holding to the endlessness of punishment. The modern Church has also received the historical faith upon the subject, though recently a tendency appears in individuals and parties to the doctrine of a second probation and the final restoration of all mankind. The argument most relied upon is derived from the general nature of the Divine benevolence, rather

than from the testimony of Scripture. It is generally allowed, even by opponents, that the Bible, taken as a whole, apparently teaches the doctrine of endless punishment, and especially that the descriptions which Christ gives of the transactions and decisions of the day of judgment preclude the idea of a second probation. W. G. T. SHEDD.

**Escheat'**, a reverting of lands to their original owner (lord of the fee) because of some obstruction in the course of descent, either by failure of heirs or attainder of treason or felony; and the estate itself thus reverting is sometimes called an *escheat*. It differs from forfeiture in the fact that the latter is a penalty for a crime, and the property forfeited accrues to the king; while escheat depends solely on the failure of heirs, and the land reverts to the former proprietor. It was one of the incidents of the feudal system that when the heirs of the person last seized failed, the land reverted to the lord of the fee from whom it was derived. In this country, where the feudal tenure does not exist, the doctrine of escheat has a limited application; still, if an owner of land dies without heirs it escheats to the state. Incorporeal rights, such as ways and commons, do not escheat, but become extinct. It is still an unsettled question whether a trust estate will escheat by the death of the beneficiary without heirs, some authorities maintaining that the trustee is rather discharged from the trust. The land of a corporation, in case it becomes extinct, reverts to the grantor, and not to the state. The state takes an escheat subject to any charges or encumbrances attaching to the land when its title accrued. A proprietor may prevent an escheat by conveying or devising his estate. In this country the subject is generally regulated by statute.

**Esch'enbach', von** (WOLFRAM), a famous German mediæval poet or minnesinger, was born in Bavaria of a noble family. In the year 1204 he came to the court of Hermann, landgrave of Thuringia, whose bounty he enjoyed. He died after 1218 and before 1225. His principal poems are "Parcival" and "Titarel," which have been translated into modern German, and are much admired. They display a rich imagination and great mastery of language.

**Esch'enmay'er** (KARL ADOLF), a German philosopher and mystic, born at Neuenberg, in Würtemberg, July 4, 1768. He became professor of philosophy and medicine at Tübingen in 1811, and obtained the chair of practical philosophy there in 1818. He wrote, besides other works, "The Philosophy of Religion" (3 vols., 1818-24). Died Nov. 17, 1852.

**Esch'er** (JOHANN HEINRICH ALFRED), a Swiss lawyer and statesman, born at Zurich Feb. 20, 1819, was liberal in politics. He opposed the Jesuits and the Sonderbund, was elected a member of the council of the interior in 1845, and became president of the grand council in 1847. He advocated a reform of the federal system and a greater centralization. In Dec., 1848, he was chosen president of the new council of regency.

**Eschscholt'zia Californica**, the systematic name of a plant of the natural order Papaveraceæ, a native of California. It is cultivated for the beauty of its flowers, which are yellow. The calyx separates from the flower-stalk when the flower expands, and resembles the extinguisher of a candle. This genus was named in honor of J. F. Eschscholtz (1795-1831), a German botanist.

**Eschwege**, êsh-vă'gə, a walled town of Prussia, in the province of Hesse-Nassau, is on the river Werra, 26 miles E. S. E. of Cassel. It has a castle, a realschule, and manufactures of linen and woollen goods. Pop. in 1881, 9001.

**Eschweiler**, êsh-vi'ler, a town of Rhenish Prussia, on R. R. from Cologne to Aix-la-Chapelle, 8 miles E. N. E. of the latter, has extensive manufactures of ribbons, canvas, needles, glass, machinery, and woollen goods. Mines of zinc and lead occur in the vicinity. Pop. in 1881, 16,623.

**Esclot** (BERNAT). See D'ESCLOT, in APPENDIX.

**Escobar' y Mendo'za** (ANTONIO), a Spanish Jesuit and casuist, born at Valladolid in 1589. He wrote "Moral Theology" (1646), "Summula Casuum Conscientiæ" (1626), and other works. The lax morality of his writings was censured by Pascal in some of his "Provincial Letters." Died July 4, 1669.

**Escosu'ra, de la** (PATRICIO), a Spanish author, was born in Madrid Nov. 5, 1807. He was banished as early as 1824 on account of his connection with a secret political society. In 1826 he returned and joined the army, after having studied in Paris and London. In 1829 he became an officer, and joining the Carlists was exiled in 1831, but returned in 1835. Having been again banished, he was made secretary of state (in 1843) under Narvaez, and minister of the interior. Besides several novels, plays, and poems, he published a "Constitutional History of England" (1859), "Artistic and Monumental Spain," and other works.

**Escrow**, a deed deposited by a grantor with a third

person, to be delivered to the grantees on the happening of a certain condition. Until the condition is fulfilled and the escrow delivered, it has no effect as a deed, and the title of the estate remains in the grantor. It takes effect, in general, as a deed from the second delivery. Where the ends of justice require it, it may be referred, for its validity by a fiction of law, termed "relation," back to the first delivery.

**Escu'rial, or Esco'rial** (Sp. *escoria*, "dross," applied to all places where there are old or exhausted mines), a monastery and royal palace near Madrid, in Spain, built by Philip II., and dedicated to Saint Lawrence on occasion of the victory of St. Quentin in 1557, on that saint's day. It is whimsically built in the form of the gridiron on which that saint is said to have been broiled alive. The work was begun by Juan Bautista de Toledo in 1563, and completed by his pupil, Juan de Herrera, in 1584. The cross-bars of the gridiron are represented by ranges of buildings separated by intervening courts, and which were formerly inhabited by monks and ecclesiastics. The main portion of the building is 740 Spanish feet long, and 580 in breadth. The projection which forms the royal palace is 460 feet in length. The height of the edifice is about sixty feet, and at each angle is a square tower 200 feet high. It is one of the largest and perhaps one of the most tasteless buildings in Europe, though grand from its size. The church in the centre of this enormous mass of stone is very large and rich. The Pantheon, a repository beneath this church, is the place of interment for the royal family, whose remains are deposited in tombs of marble placed in niches, one above another. The richest part of this edifice, however, was that which contained the valuable pictures, and which altogether formed the best collection of the productions of the first masters that any place in Europe displayed. The French, when in possession of the Escorial, removed many of its best treasures, which included the finest productions of Rubens, Titian, Spagnoletto, Raphael, Baroccio, Velasquez, Murillo, and others. The most valuable treasures of the Escorial, however, are the immense collection of ancient manuscripts preserved in the library, especially those of the Arabian writers. (*Encyc. Brit.*) In 1872 it was fired by lightning, suffering some damage.

**Escutcheon** [Fr. *écusson*, from the Lat. *scutum*, a "shield"], a heraldic term applied to a shield on which arms are represented. The points of the escutcheon are nine in number, being the parts named in order to express the local position of the charges borne on the field. An escutcheon of pretence is the shield on which a man carries the arms of his wife, if she is an heiress and has children. It is placed in the centre of his own shield, and is mostly of the same form.

**Escutcheon, or The Milk Mirror**, in the Guénon method of selecting milch cows, is the shield-like outline upon the back of the cow's udder and the adjacent parts, formed by the upward growth of the hair. Some writers call the whole outline the "mirror," and the upper part only the "escutcheon." It is found by careful observation that the size and perfection of these marks afford valuable means of judging the milking qualities of cows, though much experience is required to make the estimate. (See C. L. FLINT, "Milch Cows and Dairy Farming," 1859.)

**Esdrae'lon**, in the apocryphal book of Judith, **Esdre'lon** [from the Gr. *Ἐσδραῖλα*, a corruption of the Hebrew *Jezreel*], the most picturesque, most fertile, and historically most important plain in Palestine, "lying between Tabor and Carmel, and between the hills of Galilee on the north and those of Samaria on the south." In Scripture it is twice (2 Chron. xxxv. 22; Zech. xii. 11) called "the valley (plain) of Megiddo." Jezreel is properly the south-eastern part of it, although this name is sometimes given to the whole. It is triangular in form, the length of its south-eastern side being about 15 miles, its south-western about 18 miles, and its northern about 12 miles. Its surface, whose elevation is about 400 feet above the Mediterranean, is slightly undulating. It sends off towards the Jordan three great arms or branches, which are separated from one another by the mountains of Gilboa and Little Hermon. Only one of these arms, however (the middle one), declines eastward. The greater part of the plain is drained by the Kishon, which empties into the Mediterranean near Acre. This great plain has been the scene of several important battles, and with it are associated the names of Barak, Gideon, Saul, Josiah, and Napoleon. (See ROBINSON, "Physical Geography of the Holy Land," 1865.) R. D. HIRCHCOCK.

**Es'dras, Books of**, are certain books of the Old Testament and of the Apocrypha ascribed to Ezra, whose name is Græcised into *Esdrae*, following the Septuagint. The canonical books of Ezra and Nehemiah (as they are called in the authorized English version) are denominated in the

Vulgate and in the Thirty-nine Articles of the Anglican Church the first and second books of Esdras, while the apocryphal books, now generally known as the first and second of Esdras, are there called the third and fourth of Esdras. The Geneva Bible (1560) first adopted the present nomenclature, calling the two apocryphal books first and second Esdras.

The first (apocryphal) book of Esdras was written in very good Greek, but whether in Palestine or in Egypt, and at what time, cannot be determined. It is not without historical value, and is for the most part a history of the restoration of the Jews after the Babylonian captivity. It is not received into the canon of either Jews or Christians.

The second apocryphal book of Esdras is purely pseudepigraphic, being a record of pretended revelations made to Ezra for the encouragement of the suffering Jews. Many interpolations have been made to it by some over-zealous Christian. The original is believed to have been written by a Jew of Egypt in the Greek tongue, either just before or soon after the Christian era. The original Greek is lost, but Latin, Ethiopic, and Arabic versions exist. It is canonical in the Abyssinian Church. English versions are the authorized, from the Latin, Ockley's, from the Arabic (1711), and Laurence's, from the Ethiopic (1820).

**Esk**, a small river of Scotland, in the county of Dumfries, flows southward through Eskdale Muir, and enters Solway Frith. Length, about 40 miles. Its valley is noted for picturesque scenery. Another river Esk is formed by the union of the North and South Esk, which meet in Dalkeith Park, Edinburghshire. It enters the Frith of Forth at Musselburgh.

**Esk'ee Sa'ra**, or **Eski Sagra**, a town of European Turkey, province of Room-Elee, on the south slope of the Balkan Mountains, 70 miles N. W. of Adrianople. It has manufactures of carpets, coarse linen, and leather. Here are several mineral springs. Pop. estimated at 20,000.

**Eskilstuna**, a Swedish town, 55 miles W. of Stockholm. It is the principal place for the manufacture of the better sorts of iron. Pop. 8161.

**Es'neh, Esné** (anc. *Latopolis*), a town of Upper Egypt, on the left bank of the Nile, about 30 miles above Thebes. It has manufactures of blue cotton and pottery; also an active trade with Sennar and Abyssinia. Here are the ruins of the populous ancient city of *Latopolis*, so called from the worship of the *latus* fish. Among them is a well-preserved portico of a grand temple, with twenty-four beautiful columns standing, and a zodiac on the ceiling like that at Denderah. All the rest of the temple is literally buried, the houses of the modern town standing even upon its roof. In visiting the portico, one goes down as into a deep vault. It was cleared of rubbish by order of Mohammed Ali in 1842. An older temple appears to have been built there by Thothmes III. of the eighteenth dynasty, but the present edifice dates from the times of Tiberius, Vespasian, Trajan, Hadrian, and Antoninus. On the river-bank are also the remains of a Roman quay. Pop. about 30,000.

**Esocide.** See APPENDIX.

**Esop.** See *ÆSOR*.

**Esoteric**, *ēs-o-tēr'ik* [from the Gr. *ἐσωτερικός*, "inner," "intimate"], a term applied to those doctrines which are designed for the initiated only. The ancient philosophers are supposed to have had a set of mysterious doctrines, which they imparted to their more enlightened and intimate disciples, and other doctrines, more popular, for the benefit of the multitude.

**E'sox**, a genus of fishes which includes the pikes, and

the type of the family of the Esocidæ. These are the most voracious of all fresh-water fishes, attain a large size, and live to a great age. The habits of the European pike (*Esox lucius*) have been often described. In North America there are many species of the genus *Esox*, of which the largest and finest is the muskallunge (*Esox Estor*). The pick-

erel (*Esox reticulatus*) is perhaps the most common and best known of our pikes.

**Espalier** [Fr.], in horticulture, a railing or trellis-work used as a substitute for a wall, on which to train fruit trees or ornamental shrubs.

**Espartero** (BALDAMERO), duke of Vitoria, born at Granatola, La Mancha, Spain, Feb. 27, 1792, died at Logrona Jan. 9, 1879. He was the youngest son of a common cartwright, and on account of feeble health was destined for the Church;

but in 1808 he enlisted in the army, became an officer, fought with great distinction in South America (1815-25), and put down the Carlist insurrection (1833-40) by a series of brilliant exploits, for which he was made a general, grandee of Spain, and duke. In 1841 he took the place of the dowager-queen Christina as regent during the minority of Queen Isabella, but in 1843 a revolution declared Isabella of age, and Espartero was banished. He took up his residence in England until 1848, when the law of exile was cancelled and he returned. From 1854 to 1856 he was prime minister, and after the revolution of 1868 he was twice mentioned as a candidate for the vacant throne.

**Esparto** (*Sti'pa* or *Macroch'loa tenacis'sima*), a species of grass growing in Spain, Barbary, etc., has a very strong fibre, which is used by the Spaniards for making cordage, mats, nets, etc. Large amounts are used in Great Britain in the manufacture of paper. Its culture in the U. S. has been recommended. Esparto, the *halfa* of Algiers, was first used for paper by an Englishman named Routledge, whose patent was issued in 1856. The paper produced is generally of good quality.

**Espinasse, de l'** (CLAIRE FRANÇOISE, or JULIE JEANNE ELÉONORE), a fascinating French lady, born in Nov., 1732. She was distinguished for her imagination and sensibility. In 1752 she went to live in Paris as companion to Madame du Deffaud, in whose house she remained nearly ten years. She gained the affection of D'Alembert, and became about 1762 mistress of a *salon* which was frequented by a brilliant literary coterie. Died in May, 1776. Her published letters are much admired.

**Espinasse** (ESPRIT CHARLES MARIE), a French general, born at Saissac, in Aude, April 2, 1815. He served in the Crimean war as a general, and distinguished himself at the Tchernaya (1855). In 1858 he was minister of the interior for about four months. He was killed at the battle of Magenta June 4, 1859.

**Espinell'** (VINCENTE), a popular Spanish poet, born at Ronda about 1544. He learned several ancient and modern languages, and became a priest. It is stated that he served some years as a soldier, and led an adventurous life in several foreign countries. Among his works are numerous songs, the "House of Memory" ("La Casa de Memoria"), and a novel entitled "Marcos de Obregon" (1618), from which Le Sage borrowed incidents of "Gil Blas." Espinell ranked among the best poets of his time. Died in 1634.

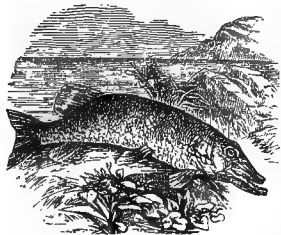
**Espinha'ço, Ser'ra do**, a mountain-chain of Brazil, in the provinces of Bahia and Minas Geraes. It contains diamond-mines.

**Espir'ito San'to** (i. e. "Holy Spirit"), [Port.], a province of Brazil, is bounded on the N. by Bahia, on the E. by the Atlantic, on the S. by Rio Janeiro, and on the W. by Minas Geraes. It is partly drained by the Rio Doce. The soil is very fertile, but a large part of the province is still covered with forests, in which are many valuable woods and drugs. The lowlands along the coast produce sugar, cotton, rice, and manioc. Capital, Vitoria. Pop. 65,000, of whom 15,000 are slaves.

**Espirito Santo** [Sp.], a town of Cuba, near the middle of the island, about 240 miles E. S. E. of Havana. Pop. about 10,000.

**Esplanade**, *ēs'plan-ād'* in fortification, is an open space of ground left between the glacis of a citadel or fort and the houses of a town, in order to prevent the enemy erecting breaching-batteries under cover of buildings. The term has also been applied to the glacis of the counterscarp, or the slope of the parapet of the covered way towards the country.

**Es'py** (JAMES P.), an American meteorologist, styled the "storm-king," born in Washington co., Pa., May 9, 1785. He was the author of a theory of storms which excited some controversy, and which he published in 1811, in systematic form, under the title "The Philosophy of Storms." According to this theory, every great atmospheric disturbance commences with the uprising of a body of air which has been rarefied by heat. The heavier air, flowing in beneath, creates currents converging from all directions to the central point. The rising mass dilates as it rises, in consequence of diminished pressure, and its temperature falls, in consequence of this dilatation, down to the dew-point and below, precipitating its contained vapor in the form of cloud. The latent heat of elasticity thus liberated dilates the air still more, and disturbs the equilibrium anew, so that the rising continues to go on, till the moisture in the air forming the upward current is practically exhausted. As the heavier air flowing in beneath finds a diminished pressure above it, this air also rises, causing still greater drafts upon the surrounding air, and establishing permanent converging currents, which meet in the



*Esox lucius.*

centre and rush upward, with constantly increasing violence. The vast amount of aqueous vapor precipitated during this atmospheric commotion gives rise to heavy rains. Mr. Espy's theory found many adherents. The physical principles on which it rests are sound, and it is so far supported by observation. It received also the approval of the French Academy of Sciences in a formal report. But his views as to the mechanics of storms are untenable, and are contrary to observed facts. Converging currents invariably produce rotation, and hence, though storms doubtless often originate in the causes assigned by him, their characteristic action is rotatory or spiral. A lively controversy was for some time maintained between the supporters of Mr. Espy and those of his principal opponent, Mr. Redfield, who held the rotatory theory. This long ago ceased, and the rotatory theory is now generally accepted. It has given to meteorology the familiar term *cyclone*. It has also been made the basis of instructions, for the use of navigators, by the British Admiralty and the U. S. bureau of navigation.

Mr. Espy entertained a sanguine belief that rains could be brought on at any time by means of great fires, kept up long enough and over a sufficiently large surface to initiate a powerful upward movement, relying on natural causes to maintain the current when once started. He even supposed that it might be possible in this way to maintain the navigation of the upper Ohio River through the dry season. He therefore petitioned Congress and the legislature of Pennsylvania to make a sufficient appropriation to enable him to try the experiment; but without success. He received, however, an appointment as meteorological observer under the government; and while holding this position he made arrangements, in accordance with a judicious suggestion of the Hon. A. H. Stephens of Georgia, with the press and with the various lines of telegraph converging to the capital, to publish daily bulletins of the state of the weather in different and distant localities. These were doubtless the first weather-telegrams ever regularly made public. The system, discontinued during the war, has been since revived and largely extended. It has also been introduced into England and into parts of continental Europe. While enjoying its benefits the world should not forget the meritorious observer with whom it originated. He died in Cincinnati Jan. 24, 1860. F. A. P. BARNARD.

**Esquimaux**, es'-ke-mo' (plu.), [a French orthography of the Algonquin *eskemo*, an "eater of raw flesh;" called in their own tongue *Inuit*, "men"], a race of men inhabiting the Arctic coasts of North America and its islands, and the coast of Labrador nearly as far south as the Gulf of St. Lawrence; also found on the extreme north of the Pacific coast of Alaska, and to some extent in the N. E. part of Asia. They are short, though broad and muscular, very seldom exceeding five and a half feet in height. In color they are of a rather light brown, and in features they approach the Mongolian type. Their food consists of the flesh of whales, seals, the walrus, birds, and fish. They have remarkable skill in fishing and hunting. Their only domestic animal is the dog, of which they possess a large and powerful variety, very useful to them, not only in the chase, but for drawing sledges. Their personal habits are extremely filthy. Their dress is made of skins, and is nearly the same in both sexes. Their religion is a rude superstition, in which only the vaguest notions of a Supreme Being can be found. In Greenland and on the Labrador coast the Moravian and the Danish Lutheran missionaries have, since 1721, brought to many of them the knowledge of Christianity.

The ethnological relations of the Esquimaux are not well understood. Physically, they approach the Mongolian type, and their presence in Asia would appear to confirm this view of their origin, but their language is of the American structure and inflection. There appears to be a remarkable uniformity in their vocabulary throughout the whole race. The opinion of Pritchard, that they are a link in the chain connecting the Mongolian and the American races, seems to be the prevailing belief with ethnologists. Their numbers in America are estimated at 47,500, of whom about 20,000 are in Greenland, 1500 in Labrador, 4000 on the coasts of Hudson's Bay, and 17,000 in Alaska. (See MONTÉ-MONT, "Mœurs et Coutumes des Esquimaux," 1841; C. F. HALL, "Life with the Esquimaux," 1864.)

**Esquirol** (JEAN ÉTIENNE DOMINIQUE), M. D., a French physician and philanthropist, born at Toulouse Jan. 4, 1772. He founded at Paris in 1799 an asylum for the insane, which was a model institution, and he initiated a reform in the treatment of the insane. In 1817 he began a course of clinical lectures for mental maladies, on which he wrote a valuable work, "Des Maladies Mentales" (2 vols., 1838). He became in 1826 chief physician of the asylum at Charenton. Died Dec. 12, 1840.

**Esquiros** (HENRI ALPHONSE), a French poet and novelist, born in Paris in 1814. On account of his work, "The Gospel of the People," he was in 1840 sentenced to eight months' imprisonment, during which time he became an intimate friend of Lamennais. After the revolution of 1848 he was elected a member of the Legislative Assembly, in which he belonged to the extreme Left. In consequence of the *coup-d'état* of 1851, he had to leave France, and lived in England until 1869, when the amnesty proclaimed by Napoleon allowed him to return. Soon after he was elected a member of the Legislative Body. After the overthrow of the empire, in Sept., 1870, the provisional government sent him as administrator-general of the department of Rhone to Marseilles, where he succeeded in suppressing anarchical tendencies. He favored the separation of the south of France from the north, and for a while refused to recognize the decree of Gambetta which suspended him, but finally resigned in Nov., 1870, in order to avoid a civil war. In Feb., 1871, he was elected a member of the National Assembly, and took his seat at the extreme Left. He published, besides other works, "The Magician" (1837), "Charlotte Corday," a novel (1840), "The Gospel of the People" ("Évangile du Peuple," 1840), "The History of the Mountain" ("Montagnards," 1847), "La Morale Universelle" (1859), "l'Angleterre et la vie anglaise" (5 vols., 1859-70); and in the English language, "Religious Life in England" (London, 1867). D. May 14, 1876.

**Ess, van** (LEANDER), a German Catholic theologian, distinguished at once for his learning and his liberality of opinion, especially with respect to the circulation of the Scriptures, was born at Warburg, in Westphalia, Feb. 15, 1772. In 1790 he entered the Benedictine monastery of Marienmünster in Paderborn, in 1796 became priest, afterward pastor at Schwelmburg, and from 1813 till 1882 was professor extraordinary of theology at Marburg. He aided his cousin, Karl van Ess (1770-1824), in publishing a German translation of the New Testament (1807), and in 1819, without assistance from his cousin, who had meanwhile given up his liberal opinions, published also a translation of the Old Testament. His edition of the Vulgate appeared in 1822, and his edition of the Septuagint in 1824. He lived in seclusion for several years, and died at Affolderbach Oct. 13, 1847. His library, rich in Bibles, patristic, mediæval, and Reformation literature, and comprising over 13,000 volumes, now belongs to the Union Theological Seminary in New York City. R. D. HITCHCOCK.

**Ess'ay** [Fr. *essai*], an attempt; an experiment; a literary composition. In literature this title is generally given to short disquisitions on subjects of taste, philosophy, morality, etc. In this sense it has been applied to periodical papers published at regular intervals under a collective name by one or more writers. From the appearance of the "Tatler," which was chiefly written by Sir Richard Steele, this species of literature continued to be a favorite in England for seventy years. Many series of essays were produced, the best of which are united in one collection under the name of "The English Essayists." The most celebrated of these writings was "The Spectator," to which Addison contributed the best essays; and next to it the "Rambler," chiefly written by Dr. Johnson. Among the eminent essayists of more recent times is Macaulay. The title of *essay* has been also adopted by way of indicating diffidence in the completeness of their work by authors of more extended performances, as by Locke, "Essay on the Human Understanding."

**Essek.** See ESZEK.

**Es'sen**, a town of Rhenish Prussia, on the Cologne and Minden Railway, and near the river Ruhr, 27 miles by railway N. E. of Düsseldorf. It has a cathedral, a gymnasium, a realschule, and a female high school; also manufactures of steam-engines, firearms, woollen cloth, paper, and iron wares. It derives its prosperity chiefly from the rich coal-mines which surround it. In the vicinity is a large iron-foundry, copper-mills, and Krupp's extensive manufactory of steel. Pop. in 1881, 56,944.

**Es'sen** (HANS HENRIK), COUNT OF, a Swedish general, born in West Gothland in 1755. He was appointed governor of Stockholm in 1795, and obtained in 1807 the command of an army with which he defended Stralsund against the French. He was sent as ambassador to Paris by Charles XIII., who became king in 1809. In 1814 he was raised to the rank of field-marshal and governor-general of Norway. Died July 28, 1824.

**Essenes**, ês-seenz' [Gr. *Ἐσσηνοί*; Lat. *Essēni*], or **Essēans** [Gr. *Ἐσσηαῖοι*], the latest, and apparently the smallest, of the three Jewish sects in existence in the time of Christ. They are not mentioned in the New Testament. The etymology of the name is doubtful, and the history of the sect obscure. The Essenes were mystics, and most of



them celibates. They are not to be confounded with the Therapeutæ, although a kindred sect. The greater part of them lived by themselves near the N. W. shore of the Dead Sea, but they were also scattered in various parts of Palestine, and are supposed to have numbered in all some 4000 or 5000. The first distinct trace of them is about 110 B. C., and they disappear from history after the destruction of Jerusalem by the Romans. (See JEWISH SECTS.)

R. D. HITCHCOCK.

**Essen'tial Oils** [so called because they were formerly supposed to contain the essence or active principle of the plant or substance from which they are extracted], called also **Vol'atile Oils**, a large class of compounds, mostly of vegetable origin, though some are derived from animal sources. They mostly exist already formed in plants. With a few exceptions they are colorless, and have in most cases a powerful odor and pungent taste, resembling that of the plant whence they are derived. A large number of them are isomeric (or identical in composition) with oil of turpentine and with caoutchouc. These are called terpenes ( $C_{10}H_{16}$ ); others are aldehydes; still others appear to be compounds of alcohol radicals with organic acids, etc. A very few contain sulphur. Most of them are obtained by distillation with water, others by pressure. They are in many cases changed by time and exposure into resins, or resolved into several distinct substances.

**Essequibo**, a river of British Guiana, rises near the S. frontier, flows northward through forests of gigantic trees, and enters the Atlantic by an estuary 20 miles wide; lat.  $7^{\circ} 0' 20''$  N., lon.  $56^{\circ} 42' 31''$  W. Length, 500 miles. It is navigable 60 miles.

**Es'ses, Collar of, or Collar of SS**, a heraldic ornament composed of S-shaped links joined together or embroidered somewhat after the manner of a chain. It enters into the insignia of various officers in England, and was, it is said, anciently worn by all esquires. It is claimed by some that the SS is emblematic of Saint Simplicius.

**Es'sex** ["East Saxons"], a county of England, bounded on the E. by the North Sea and on the S. by the estuary of the Thames. Area, 1657 square miles, of which nine-tenths are arable. It is partly drained by the Stour, the Lea, and the Chelmer rivers. The surface is pleasantly diversified, except the flat marshy land near the sea. The soil is mostly a fertile loam, which produces wheat, barley, oats, beans, hops, potatoes, etc. Essex is an agricultural county, having comparatively few manufactures. Many sheep are raised. The chief towns are Chelmsford (the capital), Colchester, Harwich, and Maldon. Essex was a kingdom of the Anglo-Saxon Heptarchy, which comprised Essex and parts of Middlesex, Hertford, and Bedford. Pop. 576,434.

**Essex**, Middlesex co., Conn. (see map of Connecticut, ref. 6-E, for location of county), on R. R. and the Connecticut River, 7 miles from its mouth, and about 17 miles W. of New London. It has manufactures of carriages and soap. Pop. in 1880, 1279.

**Essex (Robert Devereux)**, SECOND EARL OF, an English courtier, born in Herefordshire Nov. 10, 1567, was the eldest son of Walter, the first earl of Essex. He was educated at Cambridge, graduated in 1581, and was one of the most learned noblemen of the age. He served with distinction at the battle of Zutphen. In 1587 he was made master of the horse, and after the death of Leicester. In 1588, he became the declared favorite of Queen Elizabeth. He had a handsome person, agreeable manners, and possessed the art of ingratiating himself when he wanted to. He married, in 1590, Sir Philip Sidney's widow, who was a daughter of Sir Francis Walsingham. He commanded the land-forces of the expedition which took Cadiz in 1596, and was made earl-marshal of England in 1597. He was appointed lord-lieutenant of Ireland, and was sent in 1599 to subdue a revolt of the Irish, but was not successful. He was removed from office, deprived of all the honors the queen formerly had showered upon him, and ordered not to leave his house. In despair, he made an attempt at stirring the population of London to rise in his favor, but the attempt failed utterly. He was tried for treason, and beheaded Feb. 25, 1601. He was brave and generous, but impetuous and imprudent.

**Essex (Thomas Cromwell)**, EARL OF. See CROMWELL.

**Ess'ling**, a village of Austria, on the Danube, 7 miles E. of Vienna, was the scene of an indecisive battle between Napoleon and the Austrians in May, 1809. (See ASPERN.)

**Esslingen**, a town of Württemberg, on the river Neckar, 9 miles by rail E. S. E. of Stuttgart. It is on the railway which connects Stuttgart with Ulm, is enclosed by walls, and has an old castle. It has a splendid Gothic church, built in 1440, with a spire 230 feet high, a handsome town-hall, and a richly endowed hospital. Here are important manufactures of machinery, cotton and woollen stuffs,

paper, silver-ware, and wine. Esslingen became in 1209 a free city of the German empire. Pop. in 1881, 16,610.

**Estafette**, *ës'tã'fët'*, a French word which is used in nearly all the countries of Europe to signify an *express* employed to convey packages, letters, etc. Articles sent by the estafette are consigned to the care of successive postilions, who are changed with every relay of horses.

**Estaing, d'** (CHARLES HECTOR), COUNT, a French naval officer, born in Auvergne in 1729. He served in the land army in India, and was appointed lieutenant-general of the naval armies in 1763. He commanded as vice-admiral a fleet sent in 1778 to fight for the U. S. His fleet was damaged by a storm near Newport in August of that year. He soon repaired his ships, and sailed to the West Indies, where he captured Grenada in 1779. In September of that year he attacked the British at Savannah without success. He returned to France in 1780, and was guillotined April 28, 1794.

**Estaires**, a town of France, department of Nord, on the Lys. It has considerable manufactures of linen, napkins, soap, candles, and oil. Pop. 6731.

**Estate**, a word sometimes used to indicate property generally, whether real or personal. Sometimes it includes land alone. In law it denotes the interest which one may have in property. It means the time during which ownership exists, as for a year, or for life, or for ever. Under the common law, estates in land are divided, as regards the quantity of interest, into two general divisions: 1st, freehold estates; 2d, estates less than freehold.

1st. A freehold is an estate which may last for life or longer. An estate which is circumscribed within a certain number of years, or one in which the possessor has no fixed right of enjoyment, is less than freehold; and although, in fact, it may endure longer than the life of its first possessor, still the law regards it as a lower estate than a freehold; it is in the eye of the law personal property, and does not descend to heirs, though it may pass to executors or administrators.

Freehold estates are divided into estates of inheritance, which pass to heirs, and estates not of inheritance; the former are again divided into estates in fee simple and estates in fee tail. A fee simple is the most extensive and highest interest a man can have in land. If not aliened or devised, it passes to heirs generally. A fee tail, on the other hand, is an estate which is limited to certain particular heirs or to a certain class of heirs, to the exclusion of the others, as to the heirs of one's body, which excludes collateral heirs, or to the heirs male of one's body, which excludes females. Fee tails have had only a limited existence in this country, and are now, in general, abolished. In New York, by the law of 1782, they were changed into estates in fee simple.

Freeholds not of inheritance are for life only, either for the life of the tenant or of some other person or persons, when the estate is called an estate *pur autre vie*. Life estates are created by the act of the parties or by operation of law. An example of the former is where A conveys land to B for the term of his natural life, or where A conveys land to B without expressing the duration of the term. Here, under the common law, B would take only a life estate, but by statute in New York and many other States a grant or devise of real estate passes all the interest of the grantor or testator, unless the intent to pass a less estate or interest appears in express terms or by necessary implication. Curtesy and dower are life estates created by act or operation of law. When a man marries a woman seized at any time during the coverture of an estate of inheritance, and has issue born alive during the life of the wife, which might possibly inherit from the mother, the husband on the death of the wife has an estate for his life in her land, which is termed curtesy. In many of the States a wife may alien or devise her land so as to defeat this estate, and in some it is altogether abolished. When a husband dies, the wife has a life estate in a third of all the land in which at any time during coverture he had an estate of inheritance. This estate of the wife is termed dower. In some of the States, by statute, a wife is entitled to dower only in the land of which her husband died seized, and in most of the States the interest which a wife takes in the land of her deceased husband has been a matter of statutory regulation.

2d. Estates less than freehold. These are divided into estates for years, at will, and by sufferance. An estate for years is an estate for a determinate period, whether it be for a longer number of years than a human life, or for only a portion of one year. An estate at will is where one man lets land to another to hold at his will, as well as that of the lessee. Such an estate is terminated by either party on due notice. Out of estates at will a class of estates has grown up called estates from year to year, which can be terminated only by six months' notice, expiring at the end of the year. An important element in creating this estate

is the payment of rent. An estate by sufferance arises when one comes into the possession of land by agreement, and holds over after his original estate has expired, and without any agreement, express or implied, by which it is continued. The landlord has a right to enter at any time, and dispossess the occupant without notice.

These estates may be created upon condition—that is, their existence may depend on the happening or not happening of some event whereby the estate may be created, enlarged, or defeated. A fee, a frehold, or a term for years may thus be upon condition. The condition must either be precedent—that is, must happen before the estate can vest or be enlarged—or subsequent, when it will defeat an estate already vested.

Estates may also be legal or equitable. They are called "equitable" when the formal ownership is in one person and the beneficial ownership is in another. Another form of expression is that a trust is created. This distinction does not affect the nature of the estate. Thus, a trust estate may be a life estate or a fee, and in the latter case is transmissible to heirs as though it were a strict legal estate.

In regard to the time of enjoyment, estates are divided into estates in possession and estates in expectancy. An estate in possession is one in which there is a present right of enjoyment. Estates in expectancy are those which give either a vested or contingent right of future enjoyment. They are subdivided into remainders, which are created by the express words of the parties, as where one gives a life estate in land to A, and the remainder to B; and reversions, which arise by operation of law, as where one gives an estate for life to A; here, on the death of A, the estate reverts to the grantor or his heirs, who, until the termination of A's estate, are said to have a reversion in the land. Besides these, there are future estates introduced into the law by the doctrine of uses (see USES) which are not governed by the technical rules applicable to remainders. They are called "springing and shifting uses." Similar provisions in a will are termed "executory devises."

In regard to the number of owners, estates are divided into estates in severalty, in joint tenancy, in common, and in coparcenary. An estate in severalty is one which has only a single owner. An estate in joint tenancy is an estate owned jointly by two or more persons, whose title is created by the same instrument. The distinguishing characteristic is the right of survivorship. On the death of any tenant his interest is extinguished, and the estate goes to the survivors. By the common law, where an estate is conveyed to two or more persons without indicating how it is to be held, it is understood to be in joint tenancy. But in most of the U. S. this rule has been changed by statute, and persons to whom an estate is conveyed or given take as tenants in common, unless they hold as trustees. An estate in common is where separate and distinct but undivided interests in land are held by two or more persons. Each tenant is considered as solely seized of his share, which on his death descends to his heirs. An estate in coparcenary is the estate which female heirs take in the land of an intestate ancestor. In this country this estate is essentially extinguished, and heirs take as tenants in common.

The English classification of estates in land has been much modified by statute in the U. S., but it forms the basis of the law of real estate throughout the American Union, except in Louisiana, where the civil law prevails.

T. W. DWIGHT.

**Estates, The Three, or the Estates of the Realm** [Fr. *Les États Généraux*], the political name designating the three classes of feudal society: 1, the nobles; 2, the clergy; and 3, the commons, including the bourgeois or middle class of towns and the peasantry. The term "estates of the realm" was used in Scotland before the Union (1707) as synonymous with Parliament. It consisted of lords spiritual (or mitred clergy), lords temporal (including the nobles and the commissioners of shires and stewartries), and the representatives, called bourgeois or commissioners, of royal burghs. They met in one assembly, and usually voted in one body. The "States General" of France were rarely convened after the fourteenth century, and had little or no legislative power. One of the exciting causes of the French Revolution was the dispute which arose between the "third estate" (*tiers état*), or bourgeois, and the nobles and clergy, as to whether the third estate had a right to sit with the first and second. This dispute arose in 1789. In Sweden there were four estates—nobles, clergy, bourgeois (middle class), and peasants, each sitting in a separate house; but since 1865 there are but two legislative houses, both representative. A convention of the States General was long (1580–1795) the supreme power in the Dutch republic.

**Es'te** (anc. *Ates'te*), a town of Italy, in the province of Padua, is picturesquely situated on the slope of the Euganean Hills, 18 miles, by rail, S. S. W. of Padua. Here

is a fine feudal castle called Rocca belonging to the noble family of Este; also an interesting Romanesque church with a leaning tower. Este has manufactures of silk goods, hats, and earthenware. Pop. 8697.

**Es'te**, an ancient sovereign family of Italy, from which the monarchs of Great Britain are descended. Among the first princes of this family was Oberto I., who married a daughter of Otho, king of Italy, and died about 927 A. D., leaving a son, Oberto II. The family received several districts and towns to be held as fiefs of the German empire. Albertazzo II., who succeeded Oberto II. about 1020, married a German princess of the house of Guelf or Welf. Their son, Guelf IV., received in 1071 the investiture of the duchy of Bavaria. He was the ancestor of the houses of Brunswick and Hanover. Obizzo took the title of marquis of Este in 1137, and Azzo VI., marquis of Este, was chosen as their sovereign by the people of Ferrara in 1208. Azzo VII. of Este was the chief of the Guelf faction in the civil war which they waged against the Ghibelines. He died after a long reign in 1264. His successor, Obizzo II., added to his dominions in 1288 the city of Modena, at the request of its citizens, who chose him as their sovereign. Died in 1293. Ereole (or Hercules) I., who began to reign in 1433, was noted as a patron of literary men. His son, Alfonso I., duke of Ferrara and Modena, who reigned from 1505 to 1534, was an able statesman and general. He married the notorious Lucretia Borgia. He was succeeded by his son, Ereole II., who married Renée, the Protestant daughter of Louis XII. of France. Died in 1559. The next duke of Ferrara was Alfonso II., a son of Ereole II. He was a patron of the poet Tasso, whom he afterwards imprisoned and treated with cruelty. He died without issue in 1597, when his cousin Cesare became duke of Modena, but lost Ferrara, which was annexed to the Papal States. The dukes who reigned after the death of Alfonso II. were comparatively obscure and feeble. Alfonso IV., who became duke of Modena in 1658, had a daughter Mary, who was the second wife of James II. of England, and a son, Francis II., who died without issue in 1694. The title was then inherited by Rinaldo, who, by his marriage with a daughter of the duke of Brunswick-Luneburg, united the Italian and German branches of the family. He died in 1737, and was succeeded by his son, Francis III., who died in 1780. Maria Beatrice, a granddaughter of Francis III., was married to Ferdinand, archduke of Austria. They had a son, Francis, who became duke of Modena in 1814, and died in 1846, leaving a son, Francis V., who was the last duke of Modena. He was deposed in 1859 by his revolted subjects joining the general movement for Italian unity. (See POMPEO LITTA, "Famiglia Celebri Italiane.")

**Estella** (Sp. pron. *és-tél'yá*), a city of Spain, in the province of Navarre, 22 miles S. W. of Pampeluna. It is well built, and has a fine church with a lofty tower, a college, and a hospital; also manufactures of linen and woolen fabrics, brandy, and earthenware. Pop. 5593.

**Estelline**, Dak. See APPENDIX.

**Este'pa** (anc. *Astapa*), a town of Spain, in the province of Seville, 60 miles E. S. E. of Seville. It has a church which is a noble specimen of Gothic architecture, and a fine palace; also manufactures of baize, oil, etc. Marble is quarried in the vicinity. Pop. 8133.

**Estepo'na**, a town of Spain, in the province of Malaga, on the Mediterranean, 63 miles E. of Cadiz. It has an old Roman castle, is well built, and has extensive sardine-fisheries. Pop. 9316.

**Es'terhazy**, an ancient and noble family of Hungary, which has produced many eminent men.

**Esterhazy** (NICHOLAS JOSEPH), a grandson of Paul, was born Dec. 18, 1714. He became a privy councillor and field-marshal-general. He was a liberal patron of musicians. Died Sept. 20, 1790.

**Esterhazy de Galantha** (NICHOLAS), PRINCE, a son of the preceding, was born Dec. 12, 1765. He was distinguished as a diplomatist, and obtained the military rank of field-marshal. He was employed as ambassador to Paris, London, and St. Petersburg between 1801 and 1816. He owned an immense fortune, and founded a rich collection of paintings in Vienna. Died Nov. 25, 1833.

**Esterhazy de Galantha** (PAUL), PRINCE, was born Sept. 8, 1635. He became a field-marshal in the Austrian army before the age of thirty, and was chosen palatine of Hungary in 1681. In 1686 he took Buda from the Turks, and in 1687 was created a prince of the empire. Died Mar. 26, 1713.

**Esterhazy de Galantha** (PAUL ANTONY), PRINCE, born Mar. 10, 1786, was a son of Nicholas, noticed above. He was ambassador from Austria to London in 1815–18, and again in 1830–38. In Mar., 1848, he became minister of foreign affairs in the liberal ministry of Hungary,

but he prudently resigned about the time when the war broke out, and he took no part in the war. He owned more land than any subject of the Austrian empire, and had a fine palace at Eisenstadt. Died May 21, 1866.

**Estes Park**, a favorite summer-resort in the Rocky Mountains, situated at the foot of Long's Peak, 25 miles W. of Loveland, Larimer co., Col., from which point, or Longmont, Boulder co., Col., it is reached by stage. Altitude, about 7500 feet. The earl of Dunraven owns a considerable portion of the park and a fine hotel.

**Es'ther** [which means "star"], the Persian name of **Hadas'sah** [which means "myrtle"], a beautiful Jewish maiden who became the queen of Xerxes, king of Persia (B. C. 486-465). Some critics make her a niece, others a cousin, of Mordecai the Benjamite, who became prime minister of Persia in place of Haman the Amalekite.

R. D. HITCHCOCK.

**Esther, Book of**, one of the latest of the canonical books of the Old Testament, consisting of ten chapters, and relating events which gave rise to the Jewish feast of Purim. The Jews call it emphatically *Megillah*, "the Roll." The whole of it is read in Jewish synagogues every year at the feast whose origin it explains; and still, in many synagogues, with noisy demonstrations, such as hissing, and clapping of hands, and stamping of feet at the mention of Haman's name. The inspiration of the book and its right to a place in the canon have been sharply questioned. Much account is made of the singular fact that the name of God does not once occur; that, although fasting is spoken of, no mention is made of prayer; and that the religious tone of the book throughout is low. On the other side it is urged that the providence of God is magnified; that we have a vivid picture of manners and morals at the Persian court; and, above all, a most valuable exemplification of the unspiritual character of that portion of the Hebrew people who chose not to return to the Holy Land. Its author is unknown.

R. D. HITCHCOCK.

**Esther, Apocryphal Book of**, consists of the ten canonical chapters described above, with interpolations here and there, and the addition of six chapters at the end. These additions are found in the Septuagint, and in versions made from it, but not in the Hebrew. For this reason Jerome placed them together at the end of Esther, but Luther was the first to place them in the Apocrypha. The object of the unknown author was to give a more religious tone to the book of Esther than it originally possessed. Though considered spurious by all Protestant churches, the Greek, Armenian, and Roman Catholic churches accept these additions as canonical.

R. D. HITCHCOCK.

**Es'therville**, R. R. junction, capital of Emmett co., Ia. (see map of Iowa, ref. 2-E, for location of county), pleasantly situated on the E. branch of the Des Moines River. It has a school-house costing \$8000, and superior educational advantages, machine-shop, two saw and grist mills, etc. Principal business, farming and stock-raising. Pop. in 1870, 168; in 1880, 138.

**Esthonia, or Reval** [Ger. *Esthland*], a government of Russia, and one of the Baltic provinces, is bounded on the N. by the Gulf of Finland, on the E. by St. Petersburg, on the S. by Livonia, and on the W. by the Baltic Sea. Area, 7817 square miles. The surface is generally flat, and extensively covered with forests of pine; the soil is sandy, and in some parts marshy. The staple products are grain, hemp, flax, tobacco, and cattle. The population of the towns and the nobility are predominantly German, while the people of the rural districts are mostly Esthonian, belonging to the Finnish race. Ninety-six per cent. of the population belongs to the Lutheran Church. The language of the Esthonians is soft and melodious. It is split, however, into two dialects—the Dorpat, or Werra, and the Reval Esthonian; and the difference between them is so great that they cannot well be treated in the same grammar. The Reval dialect is used in their literature, which consists chiefly of poems, the most important of which is the epic poem "Kalexa Poig." The Esthonian tribe inhabits also a part of Livonia, with an aggregate pop. of about 600,000. Esthonia was conquered from the Swedes by Peter the Great in 1710. Capital, Reval. Pop. 353,108.

**Est'llville**, capital of Scott co., Va. (see map of Virginia, ref. 7-A, for location of county), about 350 miles W. by S. from Richmond. Pop. in 1880, 155.

**Estop'pel**, a principle of law, whereby one is bound by his previous admission or declaration—not on the ground that it is true, but because to dispute it is regarded as contrary to sound policy or as subversive of the ends of justice. Estoppels are: of record, of deed, and *in pais*.

1. **Estoppel of Record**.—By record is here meant the VOL. II.—47

record of a tribunal of a judicial character. No one is permitted in a legal proceeding to contradict an admission made by him in his pleading. So the judgment of a court of competent jurisdiction is in most instances absolutely unimpeachable. If the judgment is *in rem*.—that is, if it determines the status of a person or thing—it is binding on all persons, whether rendered by a domestic or a foreign tribunal. If the judgment is *in personam*, it is conclusive if rendered by a domestic court, and the better opinion is that the same rule applies to a foreign judgment, unless it be shown in either case that the court which pronounced it did not acquire jurisdiction, or that the judgment was obtained by fraud. This respect for the decisions of foreign tribunals is based on the comity which nations show each other, and on the necessities of commerce. The Constitution of the U. S. provides that full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. Under this provision the judgments of the courts in one State are binding on the tribunals of another State, without reference to the doctrine of the comity of nations. But a judgment *in personam* has no binding force except as to the parties to the action in which it is rendered, and those who claim under them, who are technically said to be in privity with them. The doctrine of estoppel by record does not prevent one injured by a judgment from taking direct proceedings to attack it, and judgments are often set aside on application to the court in which they are rendered. In certain cases courts of equity interfere by injunction to stay proceedings on judgments obtained in courts of law.

2. **Estoppel by Deed**.—A party to an instrument under seal is bound by the statements contained in it to those who have acted upon such statements, or, as Lord Mansfield puts it, no man is allowed to dispute his own solemn deed. The estoppel applies to recitals as well as to direct averments. To create an estoppel the recital must be clear and of a material fact, and consistent with the general scope of the deed. As a general rule, estoppels of this class are reciprocal. Thus, in the case of a lease, while the tenant cannot dispute the title of the landlord, the latter cannot deny the right of the tenant. There is also an estoppel by deed of a more technical nature. This grows out of a covenant of warranty. Thus, should a person having no title to land convey with covenant of warranty, and afterwards acquire the title, he would be estopped by his covenant from asserting his claim to the land. The object of this rule is to avoid "circuitry of action."

3. **Estoppel in Pais**.—In the time of Lord Coke this division of the principle was applied only to certain acts relative to the title of real estate which the law regarded as possessing equal solemnity and notoriety with a deed. Since then the principle has been greatly extended, and now presents a twofold aspect. In the first place, it is rigorously applied, from motives of general policy, to certain classes of cases. A bailee in general cannot dispute the title of his bailor, neither is the endorser or acceptor of negotiable paper allowed to deny the genuineness of any of the preceding names to the paper. In the second place, it is applied when good conscience requires that one should not be allowed to insist on his strict legal rights. The rule which governs its application here may be thus stated: Where one has made a representation, or an admission by his words, his action, or, in cases where it is his duty to speak, by his silence, with the intent or expectation, or reasonable grounds for expectation, that others should rely and act thereon, he shall not be permitted to prove that the representation or admission was untrue, if thereby injury would result to one who has in good faith acted upon it. It was at one time supposed that *fraud* was an essential element to constitute an estoppel *in pais*. The better opinion is that no fraudulent design is necessary. It is enough if the party claiming the benefit of the estoppel has acted upon the representations as before stated. The principle, thus limited and applied, is free from the technicalities and harshness which for a long time caused the doctrine of estoppel to be regarded with suspicion by the courts: it is constantly invoked for the prevention of fraud and injustice, and has become one of the most effective agencies of the law. A few instances of its practical application may be cited: A principal may by his conduct be estopped to deny that a certain person is his agent; one who has permitted himself to be held out as a member of a mercantile firm may be estopped as to creditors from denying his membership; a man who has held out a woman as his wife may be estopped from proving that she is not as to tradesmen who have in good faith supplied her with the necessities of life on his credit. The principle has been extended to the law of real estate. An owner of land who has induced another to incur heavy expenditure on the representation that the latter was owner would be estopped from asserting his own title. T. W. DWIGHT.

**Esto'vers**, the right of a tenant to take wood from the

demised premises for fuel, fences, and general agricultural purposes. This right may be claimed by any tenant, whether for life, for years, or at will, unless forbidden in his lease. But only a reasonable amount of wood can be taken; the tenant must not destroy the timber, nor do any permanent injury to the inheritance.

**Estrades, d' (GODEFROI)**, COMTE, a marshal of France and able diplomatist, born at Agen in 1607. He negotiated the cession of Dunkirk to France in 1662, and rendered important military services in Holland between 1672 and 1675. He represented France at the congress of Nymwegen, 1678. Died Feb. 26, 1686.

**Estray'** [remotely from the Lat. *extra*, "outside," and *vagor*, *vagari*, to "wander"], in law, is a domestic animal (the owner of which is unknown) found wandering outside the pasture or other enclosure where it belongs. In England the owner has a year and a day to claim such cattle in, and the proprietor of the enclosure where they are found must make due proclamation in a church and in two market-towns. When these conditions are fulfilled, they belong to the proprietor of the enclosure where they are found. The law of estrays varies in the different States of the Union. In some, after the estray has been duly advertised and kept a certain length of time, it is sold to pay the charges for advertising and keeping, any balance going to the town treasury. Cattle running about contrary to local, municipal, or other regulations, or breaking into growing crops and doing damage to them or to other property, can in most places be sent to a public pound, and after a short time sold to pay damages and expenses.

**Estrées, d' (GABRIELLE)**, a beautiful Frenchwoman, born in 1571, was a sister of the first duke of Estrées. She was the mistress of Henry IV., who gave her the title of duchess. It is said that he intended to marry her, but he was prevented by her early death (April 10, 1599). She was amiable and graceful. Her brother, the duc d'Estrées, was a marshal of France, and had a son who was also a marshal.

**Estremadu'ra**, a province of Portugal, is bounded on the N. by Beira, on the E. and S. by Alemtejo, and on the W. by the Atlantic, and intersected by the river Tagus. Area, 8834 square miles. The surface is mostly hilly; the soil is partly fertile and partly sterile. It is subject to frequent earthquakes. Among the minerals are granite, marble, and coal. The staple productions are wine, oil, cork, fruits, and grain. Pop. in 1880, 911,922. Capital, Lisbon.

**Estremadu'ra**, a former province of Spain, was bounded on the N. by Leon, on the E. by New Castile, on the S. by Andalusia, and on the W. by Portugal, and intersected by the rivers Tagus and Guadiana. Between these rivers a long chain of mountains extends nearly E. and W. The northern and southern parts are also mountainous. The soil is fertile, but not cultivated to much extent. Large flocks of sheep are pastured on it. This province contains mines of copper, lead, silver, and coal, which are neglected. It is comprised in the present provinces of Badajoz and Cáceres. Pop. 733,749.

**Estremoz'**, a fortified town of Portugal, in Alemtejo, is about 23 miles N. E. of Evora and 82 miles E. of Lisbon. It has a strong castle on a hill, around the base of which the town is built. Here are famous manufactures of porous jars which have the property of keeping water cool. The forms of these jars are said to be classical. Pop. in 1881, 7278.

**Es'tuary**, or **Es'tuary** [Lat. *æstua'rium*, from *æstus*, the "tide," because the tide is apt to be felt even more in an estuary than in the open sea], in geography, a term applied to the wide mouth of a river where the tide meets the current; also an arm of the sea or a frith.

**Esz'ek, Es'sek, or Esseck** (anc. *Mur'sia* or *Mur'sa*), a strongly fortified town of the Austro-Hungarian monarchy, the capital of Slavonia, is on the river Drave, 13 miles from its entrance into the Danube, and 150 miles S. by W. from Pesth. It has a prosperous trade, facilitated by the steam navigation of the river. It contains an arsenal, a town-house, and a normal school. Pop. 17,247.

**Étampes**, formerly **Estampes** (anc. *Stam'pæ*), a town of France, in the department of Seine-et-Oise, is on the Paris and Orléans Railway, 31 miles by rail S. S. W. of Paris. It has an old Gothic church, a castle, and many flouring mills; also manufactures of hosiery, linen thread, counterpanes, and soap. Pop. in 1881, 7710.

**Étampes**, or **Estampes** (ANNE), DUCHESS OF, a French lady, born in 1508. She was a favorite mistress of Francis I., and exerted much influence over public affairs. She is said to have been a woman of superior talents. Died in 1576.

**Et'anin** [Arab.], the fixed star called  $\gamma$  Draconis. Observations made on this star by James Bradley led him in 1727 to the discovery of the aberration of the fixed stars.

**Eta'wah**, a decayed town of India, in the N. W. Provinces, is on the Jumna, about 70 miles below Agra, and on the East Indian Railway, 97 miles N. W. of Cawnpore, and 837 miles from Calcutta. It presents some remains of former grandeur. Pop. about 20,000.

**Etchers' and Engravers' Proofs.** See APPENDIX.

**Etching.** See ENGRAVING, by PRES. M. B. ANDERSON.

**Ete'ocles** [Gr. *Ἐτεοκλῆς*], a mythical king of Thebes (in Boeotia) and a son of Œdipus. He and his brother Polynices agreed to reign alternately over Thebes, but Eteocles usurped the throne when his brother's turn came to reign. The famous expedition of the Seven against Thebes was undertaken to restore Polynices, who killed Eteocles in single combat.

**Ete'sian Winds** [Gr. *ἐτησιαί*, or *ἐτησιαὶ ἀνεμοί*; i. e. "annual (or periodical) winds," from *ἔτος*, a "year"], northerly and north-easterly winds which prevail in summer throughout a great part of Europe and in Northern Africa. The name occurs in its Greek form in several ancient writers, and is now occasionally seen in meteorological works. These winds arise in a great degree from the heat of the African Sahara.

**Étex** (ANTOINE), a sculptor, painter, engraver, architect, and author, was born at Paris Mar. 20, 1806, was educated at Paris and Rome, and has achieved distinction in all the departments to which he has given attention. He has published an "Essai sur le Beau" (1851), "Cours Élémentaire de Dessin" (1859), and "J. Pradier, Ary Scheffer: Études" (1859).

**Ethal.** See SPERMACETI, by PROF. B. SILLIMAN, M. D.

**Eth'elbert**, king of Kent, ascended the throne in 560 A. D., at the age of 8. He became the most powerful prince (bretwalda) of the Heptarchy about 590. His wife, Bertha, a daughter of the king of Paris, was a Christian, and induced Ethelbert and his subjects to profess Christianity in 597 A. D. Saint Augustine was instrumental in their conversion. Ethelbert gave to the Anglo-Saxons their first written code of laws. Died Feb. 23, 616 A. D.

**Ethelbert**, Anglo-Saxon king of England, was a son of Ethelwolf. He began to reign over Kent, Essex, and Sussex in 852 A. D., and obtained also the throne of Wessex on the death of his brother Ethelbald in 860. He died in 865 A. D.

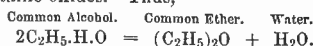
**Eth'elred** (or **Æthelred**) **I.**, Anglo-Saxon king of England, succeeded his brother Ethelbert in 866 A. D. In the first year of his reign the island was invaded by Danes, who conquered a large part of his kingdom. His brother Alfred defeated the Danes in 870. Ethelred was killed in battle at Merton in 871 A. D., and was succeeded by Alfred the Great.

**Ethelred II.**, surnamed the UNREADY, Anglo-Saxon king of England, a son of Edgar, was born in 968 A. D. His mother was Elfrida, notorious for her crimes. He succeeded his half-brother, Edward the Martyr, in 978. In his disastrous and inglorious reign the kingdom was invaded and ravaged by the Danes, to whom he paid large sums of money to purchase peace, but they soon renewed their piratical incursions. The Danish king Sweyn took London in 1014, and Ethelred fled to the court of the duke of Normandy, who was his wife's brother. He died in 1016, leaving two sons—Edmund Ironside and Edward the Confessor.

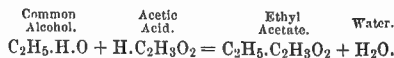
**Eth'elwolf**, Anglo-Saxon king of England, was the eldest son of Egbert, whom he succeeded in 836 A. D. His kingdom was harassed by several incursions of the Danes, who pillaged London in 851. He defeated these invaders at Okely in that year. He married, in 856, Judith, a daughter of Charles the Bald, king of France. Died in 858 A. D. He left four sons—Ethelbald, Ethelbert, Ethelred, and Alfred the Great.

**Ethene.** See ETHYLENE.

**E'ther** [Gr. *αἰθήρ*; Lat. *æther*, originally applied to the purer upper air; hence any subtle fluid], in organic chemistry, is a name given to numerous compounds, which are usually very volatile, fragrant, and, with a few exceptions, highly inflammable; they are generally derived from alcohols by the action of acids. When the alcohols are simply dehydrated by the action of the acid, "simple ethers" are produced, which are oxides of the alcohol radicals analogous to metallic oxides. Thus,



When the acids combine with the alcohol radical, "compound ethers" are produced, analogous to metallic salts. Thus,



"Haloid ethers" are compounds of the alcohol radicals with the halogens, chlorine, bromine, iodine, etc. They

are analogous to common salt (NaCl). Amyl chloride ( $C_5H_{11}Cl$ ) and methyl iodide ( $CH_3I$ ) are examples.

Sulphur, selenium, etc. form compounds analogous to the simple or oxygen ethers.

Common ether, properly known as ethylic ether, commonly and very incorrectly called sulphuric ether ( $C_2H_5)_2O$ , is generally regarded as an oxygen ether, and in this view is sometimes called ethyl oxide. It is formed by the action of sulphuric acid or some other dehydrating agent upon strong ethylic (common) alcohol. Ethylic ether is a fragrant, colorless, transparent, and highly mobile liquid, with a specific gravity of .720, and a boiling-point of  $96^\circ$  Fahrenheit. It is extremely combustible, and so volatile that when applied to the hand it causes a profound sensation of cold. Though very light in the liquid state, its vapor is more than twice as heavy as air. It is very useful in the chemical laboratory, especially as a solvent of fats and oils.

Ether is much used in medicine and surgery, both as a diffusible stimulant and as an anæsthetic. It was probably the first complete anæsthetic ever employed. It was introduced by Dr. Morton of Boston, Mass. (See *ANÆSTHETICS*.)

The other more important ethers are "acetic ether" (ethylacetate,  $C_2H_5.C_2H_3O_2$ ), an exceedingly fragrant stimulant and antispasmodic; "butyric ether" (ethyl butyrate,  $C_2H_5.C_4H_7O_2$ ), used in preparing artificial pineapple syrup; "pelargonic ether" (ethyl pelargonate), for making artificial quince flavor; "amyl acetate," for making "jargonelle pear essence," extensively used in confections, besides an immense number of other ethers and mixtures used in artificial flavoring; "iodic ether" (ethyl iodide), used in medicine; "nitrous ether" (ethyl nitrite,  $C_2H_5.NO_2$ ), used in making "sweet spirits of nitre."

**Ether**, a hypothetical medium which is assumed to pervade all space, and which is regarded as possessing extreme tenuity and elasticity, and as being the medium of the transmission of light and heat, these forces being transmitted by vibrations or undulations of this ether.

**Eth'erege**, or **Etheridge** (Sir GEORGE), an English dramatist, born in 1636. He wrote "Love in a Tub," "Sir Fopling Flutter, or the Man of Mode," and other successful comedies. He was a wit and libertine. Died about 1692.

**Ethics**. See MORAL PHILOSOPHY, by PRES. NOAH PORTER, S. T. D., LL.D.

**Ethio'pia** [Lat. *Æthiopia*; Gr. *Aithiōnia*, from *aĩthō*, to "burn," and *ῥῶψ*, "face;" Heb. *Cush*], a name given by ancient geographers to the regions situated S. of Egypt and Libya. The name Ethiopians was originally applied by the Greeks to all the peoples who lived in the southern parts of the known world, including the dark-colored natives of India. As the ancient Greeks and Romans had but little intercourse with the Ethiopians, the accounts which they have transmitted to us are very defective and uncertain. They supposed Ethiopia to be inhabited by several races called Troglodytes, Pygmies, Macrobii, and Blemmyes. According to some traditions, the Egyptians derived their civilization or came themselves from Ethiopia. The connection between Egypt and Ethiopia was at all periods intimate, but it is now generally believed that civilization ascended the Nile, instead of descending it. In its extended sense, Ethiopia corresponded to the modern Nubia, Sennaar, Kordofan, and Northern Abyssinia. The population of this vague region was a mixture of Arabian and Libyan races with the genuine Ethiopians. The latter had well-formed limbs, and a facial outline resembling the Caucasian in all but its inclination to prominent lips and a somewhat sloping forehead. Their language was Semitic. The Nubians and Shangallas of the present time are probably their descendants.

The term Ethiopia Proper was restricted to the kingdom of Meroë. The high civilization of Ethiopia, as attested by historians and confirmed by monuments, was confined to the island of Meroë and *Æthiopia Aegypti*. The kingdom of Meroë was bounded on the E. by the river Astaboras (Atbara) and on the W. by the desert of Bahiouda. It probably extended southward to the junction of the Blue Nile with the White Nile. The capital of this kingdom was Napata, on the Nile. It became one of the most powerful and civilized nations of the world as early as 1000 B. C. The government was a sacerdotal monarchy, the priests being the ruling class, as in Egypt. The military power of the Ethiopians was celebrated by Isaiah (xx. 5) and other Hebrew prophets, and the sacred history records their invasion of Palestine. In the eighth century B. C. an Ethiopian dynasty (the twenty-fifth of Egypt) reigned in Lower Egypt. The first king of this dynasty was Sabaco, whose son and successor, Sebichus (the So or Seva of the Bible), was an ally of Hoshea, king of Israel, in 722 B. C. It is stated that in the reign of the Egyptian king Psammetichus (630 B. C.) the military caste, number-

ing 240,000, migrated into Ethiopia. It was invaded by the army of Cambyses, king of Persia, in 530 B. C. According to Josephus, he conquered Meroë. In the reign of Augustus Cæsar, Candace, queen of Ethiopia, waged war against the Romans. Having been defeated, she sued for peace and became tributary to him in 22 B. C., but the Roman tenure of Ethiopia was always precarious. Early in the fourth century many Christian churches were planted in Ethiopia. (See *ABYSSINIA*, by PROF. A. J. SCHEM.)

**Ethiopic Language and Literature**. The name "Ethiopic language" is at present generally applied to the old written language of the Abyssinian Church. The name "Chaldaean language," which was given to it at the time when the knowledge of it was first introduced into Europe by J. Potken (1513), was incorrect. But even the name "Ethiopic language," by which it has been known since the middle of the sixteenth century, does not seem to fit exactly, for it has nothing in common with the language of that race called by the ancients *Æthiopes* (the Cushites of the Bible); and in the large empire of Abyssinia, which was called in the Middle Ages Ethiopia, there were and still are many other languages, some of which are related to, while others are of entirely different stock from, the Ethiopians. The native name is the Geez language. Geez, or, in the plural, *Ag'āzi* (i. e. "those who have travelled," or "the free"), was the name which the race who once spoke this language applied to itself, and consequently to its language; and modern philologists have begun to use "Geez" as the more accurate, in preference to "Ethiopic" language, the more general term. The Geez were one of the Semitic tribes, who had emigrated from Arabia to Abyssinia, and had settled in Tigre and its capital, Axoom. In the large Abyssinian empire which grew up around Axoom, and which was gradually Christianized after the fourth century, this Geez language became the official and the church language, beside which the dialects and languages of the different native tribes still continued to exist, but were not used as written languages. In this ruling position as the official language of the empire it continued to maintain itself until the middle of the thirteenth century, when, in consequence of a change of dynasties, the Amharic language gradually gained the ascendancy at the imperial court, and entirely superseded the Ethiopic as the official language. But its position as the language of the Church and of the scholars of Christian Abyssinia it did not lose in consequence of this political revolution. The clergy and literary men were for centuries compelled to have a knowledge of it, and understood it even well enough to write books; and even at the present day the old Geez books continue to be copied. During the last three hundred years books of all kinds have been prepared in the Amharic language, which is more familiar to the people, and even the Bible or parts of it have been translated, especially at the instance of the Protestant missionaries, into the modern languages of Abyssinia, in particular into the Amharic and Tigre, without diminishing, however, the influence of the old Geez translations. As a popular language the Geez has died out even in Tigre, its original home, or rather it has been modified in the mouths of the people into dialects. Among these descendants of the Geez language two principal dialects are distinguished: the Tigre, which is closely allied to the Geez, and which is spoken by nomadic tribes in the extreme north, in the regions bordering on Nubia and Sennaar, which for a long time have been cut loose from Abyssinia; and the Tigrifia, which is spoken in the old province of Tigre and the neighboring districts, and which has degenerated more than the other in sounds, forms, and fulness of words, and is largely mixed with Amharic words. (A grammar of this language has recently been published by Prætorius, "Grammatik der Tigrifasprache," 1872.)

The Geez is a purely Semitic language, but still, in its way, is very peculiar, and is justly regarded as a special branch of the Semitic family. Its relation to the language of the Himyaritic monuments can hardly be said to be nearer than its relation to the Arabic as now written. It has, however, much in common with the entire Arabic group of languages, not only in regard to the stock of words, but also in regard to the system of sounds and the formation of words; and although it has never attained the fulness of forms of the Arabic, it has developed some Semitic peculiarities, even more consistently than the written Arabic. But in many words, roots, forms, and even in many syntactic forms, it agrees more with the northern Semitic languages, especially with the Hebrew, but also with the Aramaic and the Assyrian. It must therefore be assumed that the Geez, after its branching off from the northern Semitic, continued to develop itself in connection with the southern Semitic (Arabic) languages, but separated itself very early from these, and continued to go along its own path. For this reason it has still many peculiarities of the ancient Semitic languages—peculiarities which have been aban-



done even in the Arabic; and in some respects has retained the most ancient forms (*e. g.* it has no article). Other forms it has developed in a peculiar manner, contrary to the method of all other Semitic languages (*e. g.* most of the prepositions and conjunctions). Especially in the method of construction it has formations which are hardly to be found in the other Semitic languages, and has acquired a flexibility of syntax which distinguishes it favorably from all the other languages related to it. On the other hand, besides many ancient and peculiar forms in the Geez, we meet, strange to say, with many forms which the other Semitic languages only reached in their latest stages of development (*e. g.* the disappearance of the inner passive and of the participial form, the dropping of short vowels, etc.); and we may infer from this that the Geez, as it is presented to us in the Abyssinian books, has already passed through a long stage of development. From this it is seen that the study of the Geez is very important and instructive to the Semitic philologist.

The Geez has never been grammatically treated by native (Abyssinian) scholars. In Europe, after several very incomplete attempts in the sixteenth and seventeenth centuries, it was treated in a grammatical and lexicographical exposition, which for its time was excellent, by Hiob Ludolf ("Grammar and Lexicon," 1661; 2d ed., Lexicon, 1699, Grammar, 1702). In accordance with the demand of modern linguistics, and on the basis of a much fuller knowledge of Ethiopic literature, the language has recently been treated of by A. Dillmann ("Grammar," 1857; "Lexikon," 1865).

The Geez is written with peculiar characters, which originally were identical with the Himyaritic and old Arabic characters found in the inscriptions of Syria and Assyria, and were afterwards only slightly modified. It is written not from right to left, but from left to right, and is also remarkable in that it separates the single words by two dots (:), and that the writing of vowels by means of little lines and hooks, which are attached to the consonants, is uniformly carried out. These characters were subsequently used in Abyssinia for the other dialects and languages also, especially for the Amharic and the Tigrîna, but enriched by several new characters, so that they can be said to have become the universal alphabet of Abyssinia.

The oldest monuments of the Ethiopic characters and language which are known at present do not date beyond the first centuries of our era. They are coins and inscriptions; among the latter especially the large inscriptions of Axoom, which have been made known to the world by Rûppel in the account of his travels. They mostly show an archaic mode of writing the consonants, and the vowel-signs are only in their infancy. An Ethiopic literature began to exist since the introduction of Christianity into Abyssinia (in the fourth century), and has always retained a predominantly religious character. Its basis was the translation of the Bible, both the Old and New Testament, together with the semi-biblical, apocryphal, and pseudepigraphic books belonging thereto, which in the other churches were rejected or lost (as the book of Jubilees, of Enoch, the Apocalypse of Ezra, the Ascension of Isaiah, the Shepherd of Hermas, and others). The entire translation has been made from the Greek, but was afterwards revised several times—the Old Testament at last even from the Hebrew; and we must therefore distinguish between the old, middle, and latest revisions of the text. The pseudepigraphic books are nearly all printed. A critical edition of the Old Testament has been begun by Prof. Dillmann, but has only progressed to the second book of Kings. The Psalms and Solomon's Song have been published already several times. The New Testament was printed at Rome in 1548, and was reproduced in the London Polyglot with many mistakes. The edition (now out of print) of the English Bible Society (by P. Platt, 1826) gives a mixed text, which cannot be used for critical purposes. The other literature consists, for a large part, of translations of Greek and even Coptic works, and after Mohammedanism had taken root in Egypt, the mother-country of the Abyssinian Church, Arabic works also were translated. The literature comprises theological and religious works of every kind, such as collections of old canons (Clementina, Didascalia, Synodus), catene, and homilies, exegetical and dogmatic writings (especially those of Cyril, Epiphanius, Chrysostom, and also of the Syrian Fathers, especially those of the Monophysitic Church); Haimânôta Aban (*i. e.* a large collection of confessions of faith of the monophysitic teachers); lectionaries for the whole year, especially for the fasts and the Passion-time; horologia, liturgies of the mass, and church-books for the other sacraments, and for burials, church discipline (Faus Manfasawi), and church law (Fetha Nagast), Acta Sanctorum (Synaxa), a large number of monastic rules and monastic writings; in sacred and profane history and chronology the works of Joseph Ben Gorion, George Ben Amid, Abuschaker, and others, and even something relating to philosophy and the natural sciences.

Among the native productions of the Abyssinians themselves are dogmatic treatises, pseudonymous apocryphical writings, numerous prayer-books and formulas, meditations, eulogies and biographies of saints, martyrs, monks, and archangels in prose and verse, mostly productions of monkish imagination and an insane belief in miracles. More important in their way are the large ancient hymn-books (Degnâ, Marâs'et, Me'raf), with hymns and antiphones, not only for Sundays and holidays, but also for every day in the year, and containing formulas for the ceremonies in honor of all the saints of the calendar, with peculiar notes for singing, the use of which has been very imperfectly explained up to the present time. Most of these works, which indicate a considerable progress in religious poetry and music, have been traced back to a certain Jared in the sixth century. Besides these there were also large works on native history, and explicit annals of the several kings (from which J. Bruce in the second volume of his travels has given extracts), which were written in a peculiar language, a mixture of the Geez and the Amharic. After the extinction of the Geez a beginning of grammatical and lexicographical works was made, and was deposited in many Ethiopic-Amharic glossaries (Savasev). Much was also written in this period on medicine, witchcraft, exorcism, and divination for the superstitious people, either in Ethiopic-Amharic or entirely in the Amharic language. The poetry was almost entirely in the service of the Church and of religion. At all events, poems on secular affairs in the Geez language have not come down to us. Besides the peculiarly arranged hymns, only lyrical poetry was developed. The poems are divided into strophes of equal length. The construction of the strophes shows many varieties: the lines are rhymed; the syllables are neither measured nor counted. Of real poetic genius there are but few traces in these poems; many have of poetry nothing but the rhyme.

Of the entire literature very little has been printed besides the Bible. But it is at present very fully represented in manuscripts in all the large libraries of Europe, especially in Rome, Paris, Oxford, London, Tübingen, Frankfurt-on-the-Main, Vienna, and Berlin. The largest collection of manuscripts until lately was in the possession of Antoine d'Abbadie in France. But since the Abyssinian war the collection of the British Museum has been so largely increased that it is without doubt the largest in Europe. All the older and most of the later manuscripts are written on beautiful parchment. Among the manuscripts brought to Europe within the last century none date farther back than the fifteenth century.

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**E'thiops Min'eral**, the black powder obtained by triturating mercury with sulphur. It is a sulphide of mercury. The term Ethiops was formerly applied to other black powders.

**Eth'moid** [from the Gr. ἠθμός, a "sieve," and εἶδος, "form"] **Bone**, a spongy, irregularly cubical bone, situated below the anterior part of the brain, between the orbits of the eyes and at the roots of the nose. In man it consists of four parts—the cribriform plate, the perpendicular plate, and the two lateral masses. It is developed from three centres, commencing about the fifth month of foetal life, and is completed about the sixth year of childhood. It appears to be formed of the united neurapophyses of the first cephalic vertebra.

**Ethnology**. See MAN AND HIS MIGRATIONS. By PRES. M. B. ANDERSON, LL.D.

**E'thyl**, or **E'thule** [from the Gr. αἰθήρ and ἔλκω, "substance;" literally, a "substance of ether"], a name given to the organic radical (C<sub>2</sub>H<sub>5</sub>) contained in ether and alcohol. It may be obtained by the action of zinc on ethyl iodide. It is at ordinary temperatures a colorless and invisible gas, possessing a slight ethereal odor, and burning with a brilliant white flame. It is insoluble in water, but soluble in alcohol. It may be condensed to a liquid by the pressure of two and one-fourth atmospheres.

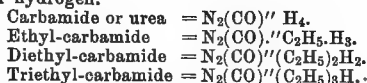
**Ethyl'amin**, a compound ammonia in which one atom of the hydrogen of the NH<sub>3</sub> is replaced by ethyl, C<sub>2</sub>H<sub>5</sub>. Thus,



It is a mobile liquid, with a boiling-point of only 66° Fahrenheit, and a specific gravity of 0.6964. It has the odor and many of the reactions of ammonia, being a powerful alkaline base. Its vapor, however, is inflammable. There is also a diethylamin, NH(C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>, a triethylamin, N(C<sub>2</sub>H<sub>5</sub>)<sub>3</sub>, and a tetraethylammonium, N(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub>.

**Ethyl-Carbamides**, or **Ethyl-Ureas**, compounds derived from carbamide or urea by the substitution of one

or more atoms of ethyl for a corresponding number of atoms of hydrogen.



**Ethylene** ( $\text{C}_2\text{H}_4$ ), **Ethene**, **Olefant Gas**, or **Bicarburetted Hydrogen**, produced by heating alcohol with strong sulphuric acid or boric anhydride; also by the dry distillation of many organic bodies, as fats, resins, wood, coal, many salts of organic acids, etc. It is an important constituent of coal gas, the illuminating power of which is largely due to its presence. It is a colorless gas, having a faint ethereal odor, which is attributed to a slight contamination with ether vapor. Its specific gravity is 0.9784. By pressure and cold it may be condensed to a limpid liquid. It burns in the air with a bright white flame which is very luminous. It is a diatomic radical, uniting with two atoms of Cl, Br, Cy, and other monatomic radicals, and with one atom of O, S, and other diatomic radicals. By replacing hydrogen in two or more molecules of ammonia, it produces diamines, triamines, etc. (See **ETHYLENE BASES**.) Its compound with chlorine ( $\text{C}_2\text{H}_4\text{Cl}_2$ ) has long been known as "Dutch liquid."

**Ethylene Ba'ses.** By the action of ethylene chloride, bromide, or iodide on ammonia, when heated in sealed tubes, Cloez, Nalanson, and Hofmann have shown that a series of compound ammonias are generated. When a molecule of ethylene replaces an atom of hydrogen in each of two molecules of ammonia, an ethylene diamine is produced,

$\text{C}_2\text{H}_5\text{N}_2 = \text{N}_2 \left\{ \begin{array}{c} \text{H}_2 \\ (\text{C}_2\text{H}_4)'' \\ \text{H}_2 \end{array} \right.$  Two molecules of ethylene, replacing two atoms of hydrogen in each molecule of ammonia, yield diethylene-diamine. Three ethylenes, replacing all six atoms of H, yield triethylene diamine,  $\text{N}_2 (\text{C}_2\text{H}_4)''_3$ . In the same manner, by replacements of hydrogen in three and four molecules of ammonia by ethylene, there are produced triamines and tetramines of various grades. The hydrogen remaining in the triamine or tetramine may be further replaced by the monatomic alcohol radicals, methyl, ethyl, etc.

**Ethylene Carbamides, or Ethylene Ureas**, compounds produced by the action of cyanic acid and the cyanic ethers on ethylene-diamines. Ethylene-dicarbamide may be considered as formed of two molecules of urea or carbamide, in each of which one atom of hydrogen is replaced by a molecule of ethylene, thus:  $\text{Urea} = \text{N}_2(\text{CO})''\text{H}_4$ ; ethylene-dicarbamide  $= \text{N}_4(\text{CO})_2''(\text{C}_2\text{H}_4)''\text{H}_8 = \text{N}_2(\text{CO})'' \left\{ \begin{array}{c} \text{H}_3 \\ (\text{C}_2\text{H}_4)'' \\ \text{H}_3 \end{array} \right\} \text{H}_3$ .

**Ethylene Alcohols.** By replacing two, four, six or more atoms of hydrogen in as many molecules of water, ethylene gives rise to a series of alcohols.

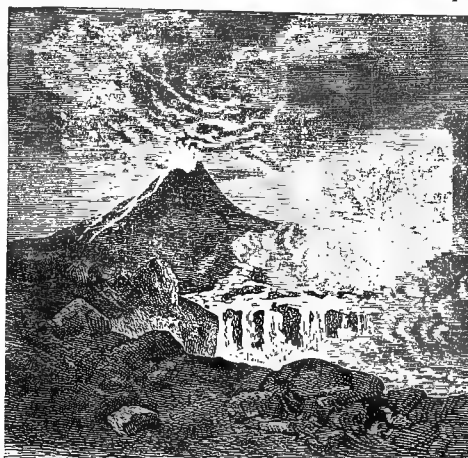
**Etiolation** [Fr. *étiolement*, from *étiolé*, "blanched"], the state of a plant which is deprived of green color by the exclusion of light. When it is obtained by keeping plants in the dark in order to render them tender and less acrid, it is called *blanching*, as in the case of celery.

**Etiquette** [from the Gr. *ἦθος*, plu. *ἠθῆς*, "manners" or "morals," and the Fr. affix *ette*, meaning "little," literally, "minute morals or manners"], the name given to the ceremonial forms required by good breeding to be observed in social or official life. Ceremonial observances were carried to the greatest extent by the Byzantine court, but the spirit of etiquette was probably never so tyrannical and predominant as at the court of Louis XIV.

**Etive, Loch**, in Scotland, is a salt-water lake or inlet of the sea in the county of Argyll. It is 20 miles long, and varies in width from half a mile to 3 miles. It receives the river Awe, and communicates with the Frith of Lorn. Grand and romantic scenery occurs along its banks.

**Etna** [Gr. *Αἴτνη*; Lat. *Ætna*; Sicilian, *Mongibello*], a celebrated volcanic mountain of Sicily, is in the N. E. part of the island, adjacent to the sea and very near to the city of Catania. It is an isolated mass of conical form, having no connection with the other Sicilian mountains, from which it is separated by the valley of the river Alcantara. It has an altitude of 10,935 feet above the level of the sea, and its base is about 90 miles in circumference. The volcanic phenomena which it presents on a greater scale than is elsewhere seen in Europe early attracted the attention of the ancients, and were described by Pindar, who mentions the rivers of fiery lava rolling down its sides into the sea. Thucydides informs us that an eruption occurred in 425 B. C. Four violent eruptions are recorded to have occurred in a period of twenty years—viz., 140, 135, 126, and 121 B. C. It appears that the volcanic action of Etna was in ancient, as it continues to be in modern times, irregu-

lar and intermittent. The city of Catania has repeatedly been nearly ruined by the eruptions and earthquakes. From the expressions of Strabo in his description of Etna, it is evident that in his time the ascent of the mountain to its summit was a common achievement. Several ancient writers describe the upper part of Etna as covered with per-



Etna.

petual snow, but at present the snow remains only eight or nine months of the year. Sir John Herschel, who ascended to the top of Etna in 1824, describes parts of its scenery in these terms: "Ascending from Catania, you skirt the stream of lava which destroyed a large part of that city in 1669, and which ran into the sea, forming a jetty or breakwater that now gives Catania what it never had before, the advantage of a harbor." "Among the remarkable features of Etna is that of its flanks, bristling over with innumerable smaller volcanoes. For the height is so great that the lava now scarcely ever rises to the top of the crater, for before that its immense weight breaks through at the sides." "From the summit," he adds, "extends a view of extraordinary magnificence." With regard to its general aspect, Etna forms a pretty regular cone with very gentle slopes. Only the eastern side presents a slight irregularity, being broken by the Val del Bue, a wild and dismal valley often visited by both fires and floods and completely sterile. The lower part of the mountain, up to an elevation of 2300 feet, is densely inhabited and very carefully cultivated. The soil, consisting of decomposed lava, is exceedingly fertile, and all the ordinary Sicilian products are raised there with ease and to perfection. Between 2300 and 6300 feet stretches the forest-belt. There are fourteen distinct forests, consisting of oak, beech, pine, poplar, chestnut, ilex, and cork trees. The famous Castagno di Cento Cavalli, one of the largest and oldest trees in the world, is in the forest of Carpinetto, on the E. side of the mountain. Above 6300 feet the desert-region—vast wastes of black sand, ashes, lava, etc.—begins, and extends to the summit. It is covered with snow for about eight months in the year, and snow may be found in certain rifts near the summit in midsummer. The Casa Inglesi, a house of lava, built by the English officers stationed in Sicily in 1811, stands at an elevation of 9652 feet.

**E'ton**, a town of England, in the county of Bucks, is on the Thames, opposite Windsor, 22 miles W. of London. It is the site of Eton College, one of the most famous educational institutions of England, founded and richly endowed in 1440 by Henry VI., but the buildings were not completed until 1523. It is a favorite school of preliminary instruction for the sons of the nobility and gentry. Many scholars are at the age of seventeen elected to valuable scholarships at King's College, Cambridge. Eton is governed by a provost and seven fellows. The main portion of the establishment, numbering nearly 900, consists of the *oppidans*, who live outside of the college, and for whose tuition the same price is paid as for that of the *collegers* or scholars. The number of the latter is limited to seventy.

**Etru'ria**, or **Tuscia**, an important country of ancient Italy, was called **Tyrrhenia** (Τυρρηνία) by the Greeks. It was bounded on the N. by the Apennines, on the E. by the Tiber, and on the W. by the Mediterranean or Tyrrhenian Sea. The inhabitants were called Etruscans (*Etrusci*) and Tuscans (*Tusci*) by the classic Latin writers, but the Greeks always called them Tyrrhenians or Tyrsenians. Their national name in the Etruscan language was *Rasena*.

Among the physical features of this country are the Monte Amiata, which rises 5794 feet above the level of the sea, the

river Arnus (now Arno), and the Lacus Trasimenus, now called Lago Trasimeno or Lake of Perugia. Ancient writers concur in the statement that the government of the Etruscans was a confederacy of twelve cities or cantons, each of which was independent and had the right of internal self-government. The chief rulers bore the general title of *lucumo*. The cities which composed the league of Etruria Proper are universally reckoned as twelve in number, but these cannot be all identified, as no ancient writer has preserved a list of their names. Among the most important of these twelve cities were Tarquinii, Veii, Clusium, Volturni, Cortona, Cære, Perugia, Arretium. The early traditions mention several Etruscan kings, as Porsena, king of Clusium, but during the greater part of the historic period the political constitution was an aristocracy. The Etruscans were very superstitious, and distinguished for their devotion to their national religion and the zeal with which they performed its rites and ceremonies (a word derived from *Cære*). The most important of the deities whom they worshipped were Tinia or Tina (Jupiter), Capra (Juno), and Minerva, whose name was the same in the Etruscan as in the Latin language. Besides these, and others whose names have been preserved, there were twelve divinities (six male and six female) whose proper names were unknown, but who were termed collectively *Dii Consentes*, and were counsellors of Tinia. They were believed to preside over the powers of nature. Superior to these, and to Tinia himself, were certain mysterious *Dii Involuti*, who were supposed to exercise an irresistible controlling power over the gods, like the Fates of the Greek and Roman mythology.

*Origin and History.*—The question of the origin and affinities of the Etruscans has long exercised the ingenuity of scholars and antiquaries, but it still remains undecided. The opinion generally adopted by Roman writers ascribed to them a Lydian origin. The earliest authority for this tradition is Herodotus, who states that he received it from the Lydians. This opinion was rejected by Hellanicus, who represents the Etruscans as Pelasgians, and by Dionysius of Halicarnassus, who considered them indigenous (*autochthones*), and states that in his time they were very distinct from every other people in language as well as manners and customs. Niebuhr maintained that they were a mixture of Pelasgians and Umbrians with a race of northern invaders (*Rasena*), who conquered the same at an unknown date. He believed that the Rasena or Etruscan nobility came originally from the Rætian Alps. Our knowledge of the history of the Etruscans, even during the period of their greatest power and prosperity, is very vague and imperfect. The Etruscan language is thought to be Indo-European in its grammatical construction, though its vocabulary, so far as ascertained, cannot be with any certainty affiliated. There is no Etruscan literature extant, and no bilingual inscriptions of any length have been found. There were three Etrurian centres of occupation: (1) from the Tiber northward to Pisa, where the Etruscans seem to have been limited by the Ligurians; (2) the settlement on the Po, of which Bologna, Verona, and Mantua were the principal cities; the Etrurian population is shown by inscriptions to have extended northward to the Rætian Alps; (3) that in the Phlegrean plains surrounding Capua and Nola, which are regarded as Etruscan cities. Livy informs us that before the Romans became the dominant people of Italy the power of the Tuscans was widely extended both by sea and land. Several Greek writers attest the facts that they were bold and enterprising navigators, and fitted out large fleets for naval warfare. In 538 B. C. they fought a naval battle against the Phœaciens at Corsica. The Tuscans and Carthaginians were allies on this occasion, and in other battles against the Greek colonies of Italy. Besides the twelve cities of Etruria Proper, these people possessed another state or confederacy on the northern side of the Apennines. According to the Roman traditions, the Tuscans were a powerful nation before the foundation of Rome, 752 B. C. It probably attained its greatest power about 150 years later. The Tuscan cities of Clusium and Veii were involved in several wars against the rising power of Rome. Tradition indicates the establishment of an Etruscan dynasty at Rome under the later kings, the two Tarquins, and assigns to this period of Etruscan domination the construction of the Cloaca Maxima and the Capitol. About 508 B. C., Porsena, king of Clusium, marched against Rome, which the best critics think he captured. Hostilities continued, with occasional intervals, between the Romans and the Veientes from 483 B. C. to 396 B. C., when Veii was captured by Camillus and destroyed. It does not appear that the other Tuscan cities gave any aid to Veii during this period. This apparent neutrality may be explained by the fact that their northern frontier was then infested by predatory hordes of Gauls, whom they were scarcely able to repel. In the subsequent wars it was sometimes Tarquinii and sometimes Veii

that fought against Rome. About 309 B. C. the combined forces of several Etruscan cities were defeated by Fabius Maximus in a battle which gave the first decisive blow to their power. The conquest was completed by a victory which the Romans gained at the Vadimonian Lake in 283 B. C. The Etruscans, however, retained long after this event their own language, customs, religious rites, and nationality. They were admitted to the Roman franchise in 89 B. C.

*Arts and Civilization.*—Ancient writers concur in representing the Etruscans as the most cultivated and refined people of ancient Italy, and as especially skilful in ornamental and useful arts. They often evince a singular similarity to Egyptian ideas and patterns which has astonished antiquarians. The Romans derived from them many arts and inventions that conduce to the comfort of life, besides the toga and other articles of dress, the curule chair, and the triumphal pomp. The genius of the Etruscans appears to have been practical rather than speculative. They excelled in agriculture, navigation, engineering, and in useful public works. They had made great progress in architecture, sculpture, and painting. The so-called Tuscan order of architecture is a modification of the Doric. The Cloaca Maxima at Rome proves that they were acquainted with the true principle of the arch, and exemplifies their skill in the construction of sewers. Of their temples, theatres, and amphitheatres no considerable remains have been preserved. Among the existing monuments of their massive and cyclopean masonry are fragments of walls which defended the cities of Cortona, Fæsulæ, Clusium, and Volaterræ. Their tombs present one of the most peculiar features in Etruscan antiquities. These are in some cases chambers hewn in a cliff or solid rock, and adorned outside with façades of temples. The interior walls are decorated with paintings, and the tombs contain vast numbers of vases, tripods, urns, etc. The Etruscans excelled in several branches of plastic art, especially in the fabrication of bronze articles and pottery. Bronze statues and utensils were exported from Etruria in immense numbers. Among the extant specimens of their bronze-work are the figure of a she-wolf in the Capitol of Rome, and the Chimæra in the Museum of Florence. It appears that the painted vases called Etruscan which have been found in great numbers especially at Chiusi (Clusium) and Vulci are Greek in design and workmanship. The metallic specula or mirrors, one side of which is adorned with figures, are peculiarly Etruscan, and are prized as illustrative of their customs, mythology, etc. (See K. O. MÜLLER, "Die Etrusker," 2 vols. 8vo, 1828; ABERKEN, "Mittel Italien," 1843; DENNIS, "Cities and Cemeteries of Etruria," 1848; INGHIRAMI, "Monumenti Etruschi," 7 vols. 4to, 1821-26; MICALI, "Storia degli Antichi Popoli Italiani," 3 vols., 1832, and the recent writings of Isaac Taylor and of Crawford on Etruscan Inscriptions, also Brunn's "Relievi delle Urne Etrusche," Rome, 1870.)

**Etruria, Kingdom of**, in Italy, was founded by Napoleon I. Mar. 21, 1801. Louis, duke of Parma (1773-1803), was the first king. His son Charles Louis succeeded him May 27, 1803, but Napoleon annexed the kingdom in 1807 to the French empire. Its capital was Florence.

**Etruscan Language.** See ETRURIA.

**Etshmiadzin.** See ECHMIEDZIN.

**Et'tlingen**, a town of Baden, on the river Alb and on a railway, 4 miles by rail S. of Carlsruhe. It has manufactures of gunpowder, cotton goods, and paper. Pop. 5092.

**Ett'müller** (ERNST MORITZ LUDWIG), a German philologist and antiquary, born at Gersdorf, near Löbau, Oct. 5, 1802, studied at Leipzig and Jena. He became professor of German at Zurich in 1833, and gained distinction by his researches in mediæval German literature. He produced in 1844 an epic poem called "The Chiefs of the Royal German Houses" ("Deutsche Stammkönige"), and in 1852 an "Anglo-Saxon Lexicon." He also edited several old German poets. D. Apr., 1877.

**Et'trick**, a pastoral vale of Scotland, in Selkirkshire, extends along the Ettrick River, which, after a course of 28 miles, enters the Tweed 2 miles below Selkirk. It is remarkable for beautiful scenery. Ettrick Forest, a royal hunting tract, included all Selkirkshire. It is nearly divested of trees. James Hogg the poet, called the "Ettrick Shepherd," was born in the vale and parish of Ettrick, which was also the haunt and residence of the famous freebooter Adam Scott, the king of the Border.

**Et'ty** (WILLIAM), an English painter, born at York Mar. 10, 1787, was a pupil of Sir Thomas Lawrence. He was admitted as a student into the Royal Academy in 1806, and visited Italy in 1816. In 1821 he exhibited in the Academy "Cleopatra arriving in Cilicia." He was elected an acade-

mician in 1828. Among his works, which were greatly admired and brought high prices, are "Pandora Crowned by the Seasons" (1824), "The Combat: Woman pleading for the Vanquished" (1824), three pictures illustrating the acts of Judith (1827-31), "Joan of Arc" (1847), "The Judgment of Paris" (1826), and "Youth at the Prow and Pleasure at the Helm" (1832). He was an excellent colorist. Died Nov. 30, 1849. (See A. GILCHRIST, "Life of William Etty," 1855.)

**Etymologicum Magnum**, a valuable lexicon or vocabulary of the Greek language by an unknown author. It is said to be the oldest extant Greek lexicon, and it contains many traditions respecting old and uncommon words. It is referred to the tenth century A. D. Editions of it have been published by Sylburg (1594), Schäfer (1816), Sturz (Leipzig, 1818), and Gaisford (Oxford, 1849).

**Etymology** [from the Gr. *ἔτυμον*, "literal sense," and *λόγος*, a "discourse"] is that branch of philology which traces the history of a word and of its grammatical variation from its primitive roots, and which shows the relationship of different languages by finding the same roots in these different languages. In grammar it is used in a more limited sense, as the name of that part of grammar which treats of the various parts of speech, the variations of declension, conjugation, etc. It is often used as nearly synonymous with the word "derivation." The study of the derivation of words is almost as old as civilization. Moses, Homer, and other very ancient writers often give explanations of the origin of proper names. Many tales of the Greek mythology give real or fanciful accounts of the appellations of gods and heroes. The Greek philosophers, the Alexandrian grammarians, the Roman Varro, and the later scholiasts wrote much upon the derivation of words, but to little purpose. They went to work with scanty information and with defective knowledge of the principles underlying a sound philology. Many of the derivations suggested by them are simply ludicrous, being suggested by mere resemblances of sound. Our knowledge of their labors is principally derived from the "Etymologicum Magnum" and "Etymologicum Gudianum," both probably written in the tenth century.

The revival of learning in the fourteenth century aroused anew the interest in etymological science; but it was not till the British occupation of India, and the beginning of the study of Sanscrit literature, that etymology received philosophical treatment. It is now known that the languages are properly regarded as members of greater or smaller groups or families; our own language being a member of the Teutonic group, which is itself a subdivision of the great Indo-European family, which comprehends many of the languages of Asia, and by far the greater number of those of Europe. A philosophic etymology seeks the derivation of words by judicious comparison of the vocabularies, the religious faith, the history, and the literature of nations ethnologically related, rather than by the comparison of words of any one or two languages.

The great etymologists are all modern, and are nearly all German, as is shown by the names of Adelung, Bopp, Pott, W. Humboldt, Grimm, Curtius, Benfey, and Schleicher. For Ugrian etymologies, the Finlanders Carsten and Ahlquist are high authorities.

**Eu** [Lat. *Au'ga* or *Augium*], a town of France, department of Seine-Inferieure, is about 20 miles E. N. E. of Dieppe and 5 miles from the sea. It has a fine Gothic church, and manufactures of lace, silk, and soap. Here is the chateau d'Eu, which was owned by King Louis Philippe, and is surrounded by a large and beautiful park. It contains a unique portrait-gallery, which is said to be the finest collection of historical portraits in France. Pop. in 1881, 5105.

**Eu** (PRINCE LOUIS PHILIPPE MARIE FERDINAND GASTON D'ORLÉANS, COMTE D'), was born at the chateau of Neuilly, April 28, 1842, the eldest son of the duc de Nemours, and a grandson of Louis Philippe, king of the French. In 1864 he married Isabella, daughter of Dom Pedro II., emperor of Brazil. As marshal of the empire he took command of the allied forces operating against Paraguay, and Mar. 1, 1870, the war was ended by the death of the dictator Lopez, who was killed in a battle at Aquidubon.

**Eubœa** [Gr. *Εὔβοια*; Fr. *Eubée*; Turkish, *Egripo* or *Egripoş*; It. *Negroponte*], formerly called **Negropont**, a Greek island, the largest island in the Ægean Sea, is about 90 miles long and comparatively narrow; the greatest breadth is about 30 miles. Area, 1574 square miles. It is separated from the N. E. coasts of Attica and Boetia by the narrow channels of Egripo (*Euripus*) and Talanta. It is connected with the mainland of Boetia by a bridge across the channel at Chalcis. The surface is mountainous. Mount Delphi, near the middle of the island, is said to be 7266 feet high. It is of limestone formation. The soil of the valleys is fertile, and produces cotton, wheat, grapes, etc. Among

the exports are wool, hides, and oil. The chief towns are Chalcis and Carystus. In ancient times Eubœa belonged to the Athenian republic. It now forms a nomarchy of the kingdom of Greece. Pop. in 1879, 95,136.

R. D. HITCHCOCK.

**Eubulides** [Gr. *Εὐβουλίδης*], a Greek philosopher of the Megaric school, flourished about 350 B. C. He was a native of Miletus, a disciple of Euclid, and an adversary of Aristotle.

**Eubulus** [Εὐβούλος], an Athenian comic poet of the middle comedy, flourished about 375 B. C. He wrote numerous comedies on mythological subjects, of which only small fragments are extant. His language is elegant.

**Eucalyptus** (plu. **Eucalypti**), a genus of trees of the natural order Myrtaceæ, comprises numerous species, mostly natives of Australia. They form a characteristic feature of the peculiar vegetation of that island, having entire leathery leaves, of which one edge is directed towards the sky, so that both surfaces are equally exposed to the light. The *Eucalypti* are called "gum trees," because they abound in resinous exudations. The timber is excellent, and is used for shipbuilding and other purposes. The *Eucalyptus gigantea*, called "stringy bark," it is said sometimes attains a height of 480 feet and a diameter of 27 feet. Mr. George Robbins reports trees of this kind 500 feet high. They are probably the tallest trees on the globe. The bark of several species abounds in tannin, and is used for tanning leather. The *Eucalyptus resinifera*, which grows to a great height, yields a red astringent gum, which is called "Botany Bay kino," and is used in medicine as a substitute for kino. An exudation resembling manna in medicinal properties is obtained from the leaves of *Eucalyptus mannifera* and *dumosa*. The blue gum (*Eucalyptus globosa*) produces ship-timber of the best quality. It is said to furnish a febrifuge principle surpassing quinia in efficiency. Several species of *Eucalyptus* have been successfully introduced into California and Europe.

**Eucharist** [Gr. *εὐχαριστία*, "the giving of thanks"], a name applied to the sacrament of the Holy Communion, or the feast of the Lord's Supper, in allusion to the blessing and thanksgiving with which the last supper of our Saviour with his disciples began and ended. This solemn festival has been kept in all Christian churches from the time of the resurrection, in commemoration of the passion and death of our Lord, and in obedience to his own divine institution. Among the earliest disciples in Judæa, the Lord's Supper seems to have been a regular meal, probably the principal meal of the day in each family, into which the commemorative breaking of bread and partaking of the cup of blessing were introduced as a part. Subsequently the disciples of many families came together and held a festival in common—a practice in which originated the *ἀγάπη*, or love-feast, in the course of which the brethren saluted each other with a holy kiss. The abuses which grew out of this, and which are severely rebuked by Saint Paul in the First Epistle to the Corinthians, led to a separation of the two institutions; and the commemorative observance has since been celebrated, with a solemnity in harmony with its character, by itself.

No part of the Christian practice and doctrine has given rise to larger diversities of opinion or to a more voluminous polemical literature than the sacrament of the Eucharist. These controversies were not known to the Church during its first eight or nine centuries. It seems entirely just to believe that, during all this early period, the visible elements employed in the celebration, the consecrated bread and wine, were regarded only as symbols and emblems of the body and blood of Christ given for our redemption; inasmuch as the expression of an opinion or doctrine different from this appears to have been first publicly made in the year 831 by a monk, subsequently abbot of Corbey in France, named Paschasius Radbert, who maintained the two following propositions, which he declared to be the true doctrine of the Church, but which were received with loud and general remonstrance: viz., first, that, "after the consecration of the bread and wine in the Lord's Supper, nothing remains but the outward figure, under which the body and blood of Christ are really and locally present"—that is to say, the doctrine more recently known under the name of *transubstantiation*; and secondly, that "the body of Christ thus present in the Eucharist is the same body that was born of the Virgin, that suffered on the cross, and that was raised from the dead." The excitement which followed this announcement was such that the emperor of Germany, Charles II. (I. of France, called "the Bald"), directed counter-expositions to be prepared by Johannes Scotus, and Ratramn (otherwise called Bertramm). The work of Scotus, though often cited in subsequent centuries, has perished; that of Ratramn is still extant. Both held that the consecrated bread and wine in the Eucharist are

only signs or symbols, and not the veritable body and blood of Christ; but in the work of Ratramn there are some things said on this point which are ambiguous or obscure, while Scotus, on the other hand, is said to have been perspicuous, distinct, and intelligible. Out of this dispute arose some extraordinary and repulsive secondary controversies, as to the natural consequences of taking into the stomach and digesting the consecrated elements, whatever view be taken of their nature, for which those who desire to understand them must refer to the ecclesiastical histories.

The doctrine of Pascasius, or at least his first proposition, found no small number of adherents, but the struggle, though warm, was a struggle of private opinions, and not of opinions with authority. The Church set forth no definition of her own views on the subject, and the excitement after a time abated. About two centuries later, however, the controversy was renewed in a manner which presently led to the interposition of the Roman pontiffs, and subsequently of councils of the Church. The first incident in this renewal was a declaration, in 1004, by Leutheric, archbishop of Sens, to the effect that none but the sincerely pious receive the body of Christ in the Holy Communion. It is easy to see what questions may arise out of a doctrine like this, especially with those who hold the certainty of the Real Presence. Later, in 1045, the celebrated Berenger, at that time archdeacon of Angers, taking the work of Johannes Scotus, above mentioned, as his text and guide, attacked with vehemence the doctrine of the Real Presence. He was met by Bruno, his own bishop (of Angers), and also by Hugh of Laugres and Adelman of Bresse. But his most powerful and most dangerous antagonist was the pope, Leo IX., who assembled two councils in 1050—one at Rome and one at Vercelli—where he caused the writings of Berenger to be condemned and burned, and excommunicated their author. Retiring into Normandy, Berenger sought the support of William (afterwards "the conqueror" of England), but this prince having convened an assembly of the principal prelates and theologians of his province, the unfortunate polemic was again condemned; and in the Council of Paris, called by Henry I. in the same year (1050), he was not only condemned still a third time, but deprived of his benefices. The subsequent history of Berenger is a painful one. On three different occasions, under three different successive popes, Victor II., Nicholas II., and Gregory VII., he was compelled by threats and intimidation to renounce his opinions; and on two of these occasions, to subscribe to declarations drawn up for him by his enemies. The first of these declarations, made at what may be called his second trial, under Nicholas II., was to the effect that "the bread and wine after consecration are not only a sacrament, but also the real body and blood of Jesus Christ; and that this body and blood are handled by the priests and consumed by the faithful, and not in a sacramental sense, but in reality and truth, as other sensible objects are." This declaration he was not only forced to subscribe, but also to confirm with an oath; but hardly had he returned to France before he abjured it utterly, and resumed the teaching of his former views. He was accordingly arraigned a third time, and this arraignment took place under Gregory VII. (Hildebrand), who seems himself not to have partaken of the extreme views of Berenger's relentless persecutors, yet to have felt compelled to oblige him to renounce his own. The unfortunate man constrained himself consequently to subscribe to his belief of the following proposition, and to confirm this declaration by an oath—viz., that "the bread laid on the altar becomes, after consecration, the true body of Christ, which was born of the Virgin, suffered on the cross, and now sits at the right hand of the Father; and the wine placed on the altar becomes, after consecration, the true blood which flowed from the side of Christ." There was affirmed to be an ambiguity in this declaration, perhaps growing out of the construction to be put upon the words "laid, or placed, upon the altar." At any rate, it did not satisfy the enemies of Berenger, and he was therefore subjected to the humiliation of subscribing and making oath to still another confession of faith, in the following words—viz., that "the bread and wine are, by the mysterious influence of the holy prayer and the words of our Redeemer, substantially changed into the true, proper, and vivifying body and blood of Jesus Christ;" to which was added, that "the bread and wine are, after consecration, converted into the real body and blood of Christ, not only in quality of external signs and sacramental representations, but in their essential properties and substantial reality." This form of submission having been fully completed, Pope Gregory dismissed the humbled prelate with many marks of personal esteem, and visible and liberal evidences of his friendship. Notwithstanding which, no sooner was Berenger in his own country again, than he retracted this last declaration, as he had done all the former, and prepared an elaborate refutation of the doctrines to which he had just

subscribed. The pope took no notice of this retraction, whence the inference has been drawn that Gregory himself was personally not far from entertaining the same opinions as Berenger. The evening of the days of this greatly tried champion of the right to freedom of opinion where the Church has not spoken, was passed in acts of penance and mortification, to which he subjected himself in expiation of the guilt of his dissimulation and perjury at Rome.

It was not till the assembling of the fourth Lateran Council by Innocent III., in the year 1215, that the voice of the Roman Church was authoritatively uttered as to the true doctrine of the Eucharist. That pope, through a decree of that council, declared the true faith to be that the elements of bread and wine are really and truly, after consecration, the body and blood of Jesus Christ in actual substance, remaining bread and wine only to outward appearance; and he himself invented and introduced the term "transubstantiation," by which this doctrine has been ever since known and recognized as a doctrine of the Roman Church. It was a natural consequence of the admission of this doctrine as an established dogma, that that view of the Eucharist which regards the ceremonial consecration and placing upon the altar of the elements, as a *sacrifice*, in which the original great sacrifice upon Calvary is perpetually renewed, found easy acceptance; and other consequences have been the worship of the consecrated elements, as being a worship directly paid to Christ himself; the elevation or the Host in the celebration of mass, that it may be seen and revered by the people; and the custom, prevalent in Roman Catholic countries, of carrying this consecrated bread about in solemn processions through the public streets, to be administered to the sick and dying.

Another controversy in regard to the Eucharist arose in the sixteenth century, which continues still to divide opinions, the Church not having formally declared on either side. It was (and is) held by the Jesuits and Dominicans, that the sacraments have in themselves an instrumental and efficient power, by virtue of which they work in the soul, independently of any previous preparation or state of the propensities, a disposition to receive the divine grace; and this they call the *opus operatum*. Thus, according to their view, neither knowledge, nor wisdom, nor humility, nor faith, nor devotion is necessary to the efficacy of the sacraments, whose prevailing energy nothing but a mortal sin can resist. Hence, therefore, according to them, priests may give immediate absolution to all who confess their misdeeds and evil thoughts and wicked sentiments and propensities, and admit them directly to the use of the sacraments. This view was resisted by the Jansenists, and is rejected by all in the Roman communion who have the progress of vital and practical religion truly at heart. These demand that none shall be admitted to the sacrament of the Holy Communion, who do not give evidence of true penitence, and of an intent henceforth to lead a new life, following the commandments of God, and walking in His holy ways.

The same century saw the great uprising against the abuses which had gradually crept into the Church of Rome, commonly called the Reformation, inaugurated by the monk Martin Luther. It soon appeared that, upon some essential points of doctrine, there was as little harmony of doctrine in the ranks of the Reformers, as there had been in those of the Church. In regard to the Eucharist, the difference between Luther and Zwingle, if not quite so wide, was at least as irreconcilable as that between the Jesuits and the Jansenists, or that of the ninth century between Radbert and Scotus. Luther maintained that the body and blood of Christ are really, though in a manner far beyond human comprehension, present in the Eucharist, and are exhibited together with the bread and wine. This is the doctrine since known as "consubstantiation." Zwingle, on the other hand, regarded the bread and wine as being only symbols present, and typifying the body and blood of Christ, which themselves are absent. Numbers of zealous and able men enrolled themselves in this controversy, on both sides, and the consequent danger to the common cause of Protestantism was such, that Philip, margrave of Hesse, whose devotion to this cause was deep and sincere, appointed a conference to be held at Morpung between Luther, Zwingle, and other doctors of both parties. The result, so far as the main point is concerned, was a failure. The two great leaders separated without either having been able to convince the other, and without having been able to agree upon any statement of doctrine in regard to Christ's presence in the Eucharist which both could accept.

The doctrine of the Anglican Church, which is that of the Episcopal Church in America on this subject, is briefly set forth in the catechism, where, after defining a sacrament to be an outward and visible *sign* of an inward and spiritual grace, and affirming the object for which the sacrament of the Lord's Supper was ordained to have been "for the con-



tinual remembrance of the sacrifice of the death of Christ, and of the benefits which we receive thereby," it is declared that in this sacrament the outward and visible part or sign is the "bread and wine which the Lord hath commanded to be received," and that the thing signified is "the body and blood of Christ, which are spiritually taken and received by the faithful in the Lord's Supper." And in the "Articles of Religion, as established by the bishops, clergy, and laity of the Protestant Episcopal Church in the United States of America, in convention, on the 12th day of September, in the year of our Lord 1801," which are, with some alterations of minor importance, identical with the Thirty-nine Articles of the Church of England, it is declared (in "Art. xxviii.; of the Lord's Supper") that "transubstantiation (or the change of the substance of the bread and wine) in the supper of our Lord, cannot be proved by Holy Writ; but is repugnant to the plain words of Scripture, overthroweth the nature of a sacrament, and hath given occasion to many superstitions." And further, "that the body of Christ is given, taken, and eaten in the Supper, only after an heavenly and spiritual manner. And the mean whereby the body of Christ is received and eaten in the Supper, is faith."

F. A. P. BARNARD.

**Euchee Anna**, capital of Walton co., Fla. (see map of Florida, ref. 1-B, for location of county). P. in 1880, 78.

**Euchlo'rine** [from the Gr. *εὐχλωρος*, "bright green"], a name given to a green gas liberated when potassic chlorate is acted upon by hydrochloric or sulphuric acid. It possesses bleaching properties. It is prepared by heating gently a mixture of two parts of sulphuric acid, two of water, and one of chlorate of potash.

**Eu'chre**, a game of cards, originally German, but now a favorite in the U. S., chiefly as a social game. "Four-handed" euchre, where four persons are engaged, is the best form of the play, but two, three or even more than four persons may play, the rules being variously modified to suit such changes. Properly, two or four persons should play. The "euchre deck" contains the aces, the face-cards, and all spot-cards above the sixes, though many players reject all below the nines. In four-handed play the parties draw for deal, which falls to the one who draws the first jack. The right-hand adversary cuts, and the cards are dealt by threes and twos, or twos and threes, from left to right. The uppermost undealt card is turned for trump; the oldest hand "orders up" this card as trump if he sees fit; otherwise he "passes" to the next, who exercises the same choice, and so on. If not "ordered" or "taken" up the first time around, the players have in turn their choice of making a new trump or passing again. When a trump is "ordered" or "taken," the dealer may discard his poorest card, and take up the trump from the deck. The side which orders or takes up must take at least three tricks (one point), or lose two points (a euchre) to the other side. Four tricks also count one, but five tricks (a march) count two. In case one of the four players has a strong hand, he is at liberty to play alone, without his partner's help. In this case, if he makes a march, his side scores four; if he is euchred, the opposite side scores four. Five points make the game.

Another peculiarity of the game is, that the highest trump (right bower) is always the jack of trumps; the jack of the "next" suit—that of corresponding color—being always second best trump (left bower), the ace of trumps is third, the king fourth, etc. Jacks of a suit not trumps rank next below the queen of their suit. Euchre is an easy and simple game, and is consequently popular as a social pastime. Many varieties of it have sprung up, and at present almost every coterie has its own set of rules; some having a blank card for the highest trump, the bowers following; others allowing the victors to count on the next game all the points they have made above the five necessary to the victory, or allowing the possessor of a "lone hand" to call for his partner's best card, etc.

**Euc'lase** [from the Gr. *εὐ, "good," "well," "easily,"* and *κλάω, "to break,"* because it is so easily broken], a silicate of alumina and glucina which occurs in greenish crystals in Peru and Brazil. It is well adapted for jewelry, on account of its great hardness and the fine polish of which it is susceptible, but it is not much used as a gem in consequence of its rarity and fragility.

**Euclid** [Gr. *Εὐκλείδης*] of ALEXANDRIA, a celebrated Greek, called the "father of geometry." He was born at Alexandria in Egypt, and lived about 300 B. C., and is said to have belonged to the Platonic school of philosophy. The events of his life are mostly unknown, except that he taught mathematics in the reign of Ptolemy I. (Soter), who died about 282 B. C. He made important discoveries in geometry, and surpassed all preceding geometers in the rigorous method and arrangement of his demonstrations. When Ptolemy I. asked him if geometry could not be mastered by

an easier process than the ordinary one, he returned the celebrated answer, "There is no royal road to geometry." His "Elements of Geometry" present the most ancient system of that science that is extant, and have been considered an excellent standard work for 2000 years. (See SMITH, "Dictionary of Greek and Roman Biography.")

**Euclid** of MEGARA, an eminent Greek disciple of Socrates, flourished about 400 B. C. He is said to have witnessed the death of Socrates (399 B. C.), after which he founded at Megara a school called the Megaric or Dialectic. His system was based on, or partly derived from the principles of the Eleatic school, to which he added the ethics of Socrates.

**Eudémus** [Gr. *Εὐδήμους*] of RHODES, a Greek Peripatetic philosopher who lived about 320 B. C., was a disciple of Aristotle. He was a meritorious editor and commentator of Aristotle's works, and he wrote a "History of Geometry and Astronomy," which is not extant.

**Eudiometer** [from the Gr. *εὖ, "good,"* and *μέτρον, "measure,"*], an instrument originally intended for ascertaining the proportion of oxygen in the air, with a view of judging of its purity or impurity; but it is also employed to test the composition of any mixed gases. Many forms have been used, but one of the best consists of a graduated glass tube having two platinum electrodes within it, the tube closed at one end. To test the composition of air, for example, the carbon dioxide (carbonic acid) of the air within the tube is removed by strong liquor potassæ over a mercury bath, when the rise of the mercury within the tube indicates the proportion of carbon dioxide in the atmosphere. A large but determinate proportion of hydrogen is then introduced and exploded by means of the electrodes. After cooling, one-third of the loss of gas by explosion is the volume of free oxygen in the tube. Allowing for the hydrogen unconsumed, the volume of nitrogen is readily seen. The results are then reduced to a percentage of volumes.

**Eudoxia** [Gr. *Εὐδοκία*; Fr. *Eudocie*], sometimes called **Eudoxia**, the wife of Theodosius II., born in Athens about 393. She was a daughter of the sophist Leontius, and her name before she was converted to Christianity was Athenais. She was very carefully educated and thoroughly conversant with Greek literature and philosophy; she had even studied the sciences. A quarrel with her brothers concerning the inheritance after her father brought her to Constantinople, where she wished to lay her case before the emperor. Theodosius was completely captivated by her beauty and her accomplishments, and in 421 he married her, she having in the mean time embraced Christianity. In 438 she made a pilgrimage to the Holy Land, imitating, in a rather ostentatious manner, the empress Helena, the mother of Constantine the Great, and distributing enormous sums as alms and donations for pious purposes. Shortly after her return an estrangement took place between her and her husband, some imprudence upon her side having aroused his jealousy, and in 449 she was banished from the court. She settled in Jerusalem, and devoted herself entirely to the study of Christian theology and to religious exercises. She died there in 460. She wrote paraphrases in heroic verse of the Octateuch, Daniel, and Zechariah, and a poem on the martyrdom of Cyprian, etc.

**Eudoxus** [Gr. *Εὐδόξος*], a Greek astronomer, born at Cnidos in Caria, flourished about 366 B. C. He was a pupil of Archytas and of Plato, and he opened a school at Athens or Cnidos. Cicero called him the prince of astronomers. Eudoxus computed the length of the year to be 365½ days, and appears to have originated the doctrine of concentric solid crystalline spheres, by which he explained the apparent motions of the sun, moon, and planets. He is frequently referred to by ancient writers.

**Eufaula**, a city and R. R. junction of Barbour co., Ala. (see map of Alabama, ref. 6-E, for location of county), is on the right bank of the Chattahoochee River, which is navigable to this point for the largest boats at all seasons, 350 miles by river from Appalachicola, and 80 miles E. S. E. from Montgomery by the Montgomery and Eufaula R. R. It has a female college, a school for colored people, several cotton-warehouses, a public hall, and a fair-ground. Over 30,000 bales of cotton are sold here annually. Pop. in 1870, 3185; in 1880, 3836.

**Eugene**, ū-jeen' [Fr. *Eugène*; Ger. *Eugen*], PRINCE, or, more fully, **François Eugène de Savoy**, a celebrated general, born in Paris Oct. 18, 1663. He was a son of Eugène Maurice, count of Soissons, and Olympia Mancini, a niece of Cardinal Mazarin. Having been offended by Louis XIV. of France, he entered the service of the emperor of Austria in 1683. He served with distinction in the war against the Turks, and was rapidly promoted. In 1691 he

obtained command of the imperial army in Piedmont, where he fought against the French. Louis XIV. afterwards offered him a marshal's bâton if he would enter the French service, but he declined. Having been appointed commander of the Austrian army in Hungary, he gained a decisive victory over the Turks at Zenta Sept. 11, 1697. In the great European war of the Spanish succession, which broke out in 1701, Eugene first commanded in Italy, where he was opposed by the able French marshal Catinat, and afterwards by Villeroi, whom he surprised at Cremona and took prisoner in Jan., 1702. An indecisive battle was fought at Luzara in Aug., 1702, by Prince Eugene and the duke of Vendôme. About the end of that year he was appointed president of the council of war in Vienna. He commanded the imperial army which co-operated in Germany with the English army under the duke of Marlborough. These allies defeated the French and Bavarians at the great battle of Blenheim, Aug. 13, 1704. In 1705 he took command of the army in Italy, and was defeated by the duke of Vendôme at Cassano in August of that year. He gained a victory over the French duke of Orleans at Turin in Sept., 1706, expelled the French from Italy, and returned to Vienna in 1707. The seat of war was next transferred to Flanders, where Prince Eugene was associated with the duke of Marlborough in the command of the combined armies. They defeated the French at Oudenarde (1708), and claimed the victory at the great battle of Malplaquet (Sept. 11, 1709), although they lost there about 25,000 men. In 1712 he was sent to London on a diplomatic mission, the object of which was to persuade the English to continue the war and to restore Marlborough to the command, but he was not successful. A victory which Marshal Villars gained over Prince Eugene at Denain in July, 1712, induced Austria to negotiate for peace. In Mar., 1714, he signed a treaty of peace at Rastadt. He defeated a large Turkish army at Peterwardein Aug. 5, 1716, and took Belgrade from the same enemy in 1717. After the end of this war, in 1718, he rendered important services as a statesman, and enjoyed the confidence of the emperor of Germany. He died in Vienna April 21, 1736. He was never married. Though he made no great improvement in tactics, he is reputed one of the greatest generals of modern times, being distinguished for his rapidity of perception, his decision, and his promptitude to rectify his errors. (See JOHN CAMPBELL, "Military History of Prince Eugene and Marlborough," 2 vols., 1736.)

**Eugene City**, capital of Lane co., Or. (see map of Oregon, ref. 7-B, for location of county), on R. R. and the W. bank of Willamette river, here navigable for steamboats, 71 miles S. of Salem. The University of Oregon is situated here. Pop. in 1870, 861; in 1880, 1117.

**Eugenia**, a genus of trees and shrubs of the natural order Myrtaceæ, nearly related to the myrtle. It comprises numerous species, which are natives of tropical and sub-tropical countries, and some of them produce delicious fruits remarkable for their pleasant balsamic odors. The fruit is a berry of one or two cells, with one seed in each cell. The allspice or pimento of commerce is the unripe, sun-dried berry of the *Eugenia Pimenta*, which is indigenous in the West Indies. The *Eugenia Malaccensis*, a native of the Malayan Archipelago, is a small tree which bears a red fruit nearly as large as an apple, with a juicy pulp and an agreeable odor like that of a rose; hence it is called rose apple. The last name is also applied to the fruit of the *Eugenia Jambo*s, an East Indian tree, now cultivated extensively in many tropical countries. The *Eugenia Ugni*, a native of Chili, has a small edible fruit, from which a refreshing beverage is obtained. Florida has five or more unimportant species.

**Eugenia**, a post-village of Grey co., Ontario, 28 miles from Collingwood. It is noted for its scenery. Here the Beaver River falls 334 feet in a mile, including a perpendicular descent of 70 feet. Pop. of district in 1881, 3688.

**Eugénie**, or, more fully, **Eugénie Marie de Montijo**, empress of France, was born at Granada, in Spain, May 5, 1826. Her father was the Spanish count de Montijo, and her mother was Maria Manuela Kirkpatrick, a woman of Scottish extraction. Eugénie was styled the countess of Teba in her youth. She was married to Napoleon III. Jan. 29, 1853, and bore a son Mar. 16, 1856. As a zealous Catholic she used her influence to promote the power of the pope. In Oct., 1869, she made a voyage to Venice, Constantinople, and Egypt, was present at the formal opening of the Suez Canal (Nov. 17), and returned to France at the end of November. After Napoleon put himself at the head of the army, about Aug. 1, 1870, she acted as regent until the people of Paris proclaimed a republic, Sept. 4, 1870. She then escaped to England. Author of "Some Recollections from My Life" (1885).

**Eugenius I.** was consecrated pope Aug. 10, 654 A. D.,

as the successor to Martin I., who was banished by the emperor Constans. Died in 657.

**Eugenius II.**, a native of Rome, succeeded Pascal I. as pope in 824 A. D. He called a council, which met at Rome in 826 for the reformation of the clergy. He died Aug. 1, 827, and was succeeded by Valentinus.

**Eugenius III.**, a native of Pisa, was chosen pope Feb. 15, 1145, in place of Lucius II. The Romans, excited by the preaching of Arnaldo da Brescia, had revolted against Pope Lucius. Eugenius, being unable to enforce his authority, retired to France and held a council at Rheims in 1148. He also promoted the second Crusade. He died July 8, 1153, and was succeeded by Anastasius IV.

**Eugenius IV.** (GABRIELE CONDOLNERO), born in Venice 1383; was crowned pope Mar. 11, 1431, as successor of Martin V., who had convoked a council at Bâle. This council refused to recognize the supremacy of the pope. Eugenius therefore issued a bull proclaiming that the Council of Bâle was or must be dissolved, and he called another council at Ferrara in 1437. The Council of Bâle in 1438 deposed the pope, and elected as his successor Amadeus of Savoy, who assumed the name of Felix V. The result of this election was a schism in the Church, for Eugenius continued to act as pope in Rome, and was recognized by several powers. At the Council of Ferrara, Eugenius and John Palæologus signed in 1439 a convention for the union of the Greek and Latin churches, but this convention had no permanent effect. He died Feb. 23, 1447.

**Eugu'bian Tables**, the name of certain bronze tablets found near Gubbio (the ancient *Iguvium*) in 1444. Five of the inscriptions are in Etruscan and Umbrian characters, the other two in Latin. They were published by Lepsius in his "Inscriptiones Umbricæ et Oscæ" (1841), and contain the acts of a corporation of priests.

**Euhemerus**, a Greek philosopher from the third century B. C., was the founder of Euhemerism, or that principle of interpreting the pagan mythology according to which each myth is supposed to have originated from some simple historical event—a manner of interpretation which afterward was much employed by the Fathers of the Christian Church, Tertullian, Clement of Alexandria, Lactantius, Chrysostom, etc. His works have perished.

**Eu'lenburg** (FRIEDRICH ALBERT), GRAF ZU, born Jan. 29, 1815, went in 1859 as envoy to China, Japan, and Siam, concluded (Jan. 1, 1861) a treaty of navigation with Japan, and in September of the same year another with China, became in 1862 minister of the interior, and died June 2, 1881.

**Eu'ler** (LEONARD), an eminent Swiss geometer, born at Bâle April 15, 1707. He was educated at the university of that city, and went to St. Petersburg with his friend Daniel Bernoulli. In 1733 he became professor of mathematics in the Academy of St. Petersburg. He displayed great fecundity and inventive genius by the composition of a multitude of treatises on mathematics. It is said that he wrote more than half of the forty-six quarto volumes published by the Academy between 1727 and 1783. Having been invited by Frederick the Great, he removed to Berlin in 1741. He improved the integral calculus and the science of mechanics. Among his numerous works are "Mechanics, or the Science of Motion analytically explained" (in Latin, 2 vols., 1736-42), a "Treatise on Naval Science" (1749), a "Treatise on the Integral Calculus" ("Institutiones Calculi Integralis," 1768), "Letters to a German Princess" (in French, 1768), a "Treatise on Dioptrics" (1771), and "Theory of the Moon's Motion" (1772). He became blind about 1767, after which he resided in St. Petersburg until his death, Sept. 7, 1783. Condorcet, who wrote a eulogy on him, says, "He multiplied his productions marvellously, and yet was original in each."

**Eu'logy** (Gr. εὐλογία, "praise" from εὖ, "good," and λόγος, "word;" Fr. *éloge*), an encomium pronounced on a person; a laudatory speech or written composition. In ecclesiastical history it was applied to a present bestowed on the Church after having been blessed.

**Eu'lytine**, Silicate of Bismuth, Bismuth-blende, a rare mineral found at Schneeberg in Saxony.

**Eumenes** (Gr. Εὐμένης), a favorite officer of Alexander the Great, was born at Cardia, in Thrace, about 360 B. C. He had a high command in the army which Alexander conducted against Persia in 334 B. C., and gained the confidence of that prince. On the death of Alexander, Eumenes became governor of Cappadocia and Pontus. As an ally of Perdiccas he defeated Craterus in the year 321, soon after which Antigonus and Antipater formed a coalition against him. Eumenes was captured and put to death by Antigonus in 317 or 316 B. C. (See PLUTARCH, "Life of Eumenes.")

**Eumenides** [Gr. *Εὐμενίδες* (from *εὖ*, "good," and *μένος*, "mind," "disposition"), i. e. the "gracious ones," so called for the sake of propitiating them], or **Erinnyes**, the Greek name of the Furies, whom the Romans called *Furæ* or *Diræ*. They were supposed to be goddesses who punished crimes and pursued the guilty with burning torches. According to the later tradition, there were three Furies—namely, *Tisiphone*, *Alecto*, and *Megæra*. The Cave of the Eumenides is at the N. E. angle of the Areopagus, immediately below the seats of the judges.

**Eumolpus** [Gr. *Εὐμόλπος*], a personage of the Greek mythology, was supposed to be a Thracian bard, a son of Neptune, and the founder of the Eleusinian mysteries. *Musæus* is said to have had a son named *Eumolpus*, who was an instructor of *Hercules*.

**Eunapius** [Gr. *Εὐνάπιος*], a sophist and physician, born at Sardis, in Lydia, about 348 A. D. He was a Neo-Platonist, an opponent of Christianity, and a partisan of Julian the Apostate. He lived at Athens, and wrote in Greek "The Lives of Philosophers and Sophists," which is highly prized. It was published by Boissonade in 1822. Died about 420.

**Eunomians**, the followers of *Eunomius*, a strict Arian, who was made bishop of Cyzicus, in Asia Minor, in 360 A. D., but was deposed on account of his theological opinions. The Eunomians were for a time very numerous, but the sect soon died out.

**Eunomius** [Gr. *Εὐνόμιος*], the founder of an Arian sect called Eunomians, was born in Cappadocia. He was appointed bishop of Cyzicus in 360 A. D. by Eudoxius, bishop of Antioch, who four years afterwards deposed him for heresy. Eunomius was a man of superior abilities, and maintained the extreme Arian doctrines, for which he was several times banished. Died soon after 392 A. D.

**Eu'nuch** [Gr. *εὐνοῦχος* (from *εὐνή*, "a bed," and *ἐχω*, to "have" or "keep"), i. e. "having charge of the beds or chambers of the women"] was at first the title of servants who had the care of bed-chambers; and from the custom of placing women's apartments under the care of mutilated persons, the name came to be applied to the latter class exclusively. Mutilation was a very ancient practice, and was especially frequent in Syria and the East. It is a natural consequence of the system of polygamy. In Greece it was not common until the Byzantine period. In Rome under the emperors many eunuchs were kept. It is asserted that they were made to a considerable extent in mediæval Europe. In Italy they were formerly kept for their fine soprano singing. At present they are chiefly found in Mohammedan countries. At Moscow a community of eunuchs exists, who are jewellers by profession, and who add to their numbers by the purchase and mutilation of children. Eunuchs as a class are small, beardless, and weak, with a jealous, cowardly, and intriguing character; yet some, like Bagoas, the Persian minister, *Philetarus*, king of Pergama, and *Narses*, the Byzantine general, have possessed energy and ability. As used in the Bible and the classics, the word often means simply a chamberlain.

**Euonymus** [from the Gr. *εὖ*, "well," "propitious," and *ὄνομα*, "a name," by euphemism because it is poisonous], a genus of shrubs of the natural order Celastraceæ, natives of Europe and the U. S. The fruit is a capsule, with seeds enclosed in a red aril. The flowers, foliage, and fruit of some of the species are poisonous. The wood of the *Euonymus Europæus*, an ornamental shrub, is strong, compact, and yellow, and is applied to various useful purposes. The *Euonymus atropurpureus* (burning bush or wahoo), a native of the U. S., is an ornamental shrub, with crimson fruit drooping on long peduncles. The bark is used as a remedy for dropsy and other diseases, and has active properties. The *Euonymus Americanus*, or strawberry bush, is often cultivated for ornament.

**Eupatoria**, formerly **Koslof**, a seaport of Russia, in the government of Taurida, is on the Black Sea, and on the W. coast of the Crimea, 38 miles W. N. W. of Simferopol. It has a shallow harbor, a custom-house, a hospital, and a handsome Tartar mosque. Grain, wool, hides, and salt are exported from this place. The English and French armies landed here in Sept., 1854, and the Russians were repulsed here in Feb., 1855. Pop. 8294.

**Eupatorium** [Gr. *εὐπατόριον*, said to have been named in honor of *Eu'pator*, a king of Pontus], a genus of plants of the natural order Compositæ, having the florets all tubular and perfect. It comprises many species of perennial herbs, mostly American. The *Eupatorium perfoliatum*, called boneset and thoroughwort, is a native of the U. S., and is used in medicine as a tonic, stimulant, and sudorific. The leaves, as the specific name denotes, are connate-perfoliate—i. e. united at the base around the stem. The hemp agrimony (*Eupatorium cannabinum*), which grows wild in

England, has been used in medicine. The *Eupatorium purpureum* and several other American species appear to have valuable diuretic properties.

**Eu'pen**, oi'pen [Fr. *Néau*], a manufacturing town of Rhenish Prussia, on the Vesdre, and in a beautiful valley 10 miles by rail S. S. W. of Aix-la-Chapelle. It is well built and flourishing, and derives its prosperity chiefly from its manufactures of woollen goods (broadcloths and cassimeres). It has fourteen woollen-mills, dyeworks, and manufactures of machinery. Down to the Peace of Luneville (1801) it belonged to the duchy of Limburg, and consequently to the Austrian crown. Pop. 15,033.

**Euphemism** [Gr. *εὐφημισμός*], a figure in rhetoric by which an unpleasant idea is expressed by indirect and milder terms. The euphemisms of the ancient heathens generally originated in a desire to deprecate the ill-will of malevolent powers, by attributing to them characteristics opposite to those which really belonged to them. Thus, the Furies were termed Eumenides, "gentle," by the Greeks.

**Eu'phony** [Gr. *εὐφωνία*, "goodness of voice" (from *εὖ*, "good," and *φωνή*, "voice"), agreeable sound; that quality in language which results from happy combinations of the enunciative elements, such especially as, though essentially different in their characteristic powers, easily melt into or blend with each other, so as to maintain an uninterrupted flow. It is the reverse of *cacophony*.

**Euphorbia** [named in honor of *Euphor'bus*, physician to Juba, king of Mauritania], a genus of plants of the natural order Euphorbiaceæ, having an acrid, milky juice and monœcious flowers, included in a cup-shaped, four to five-lobed involucre resembling a calyx. Almost 100 species of this genus are natives of the U. S. An acrid drug called euphorbium is obtained from the *Euphorbia officinarum* and from other species. Several species bear the popular name of spurge. The seeds of "caper spurge" (*Euphorbia Lathyris*) of Europe and the U. S. yield the fixed oil known as oil of euphorbia, a powerful cathartic. Some African Euphorbias are large trees.

**Euphorbia'ceæ** [from *Euphor'bia*, the typical genus], a large natural order of exogenous plants which abound in tropical America, and are found in nearly all parts of the globe. They mostly have an acrid and poisonous milky juice and diœcious or monœcious flowers. They may be distinguished from other diœcious orders by their triœcous or 3-lobed fruit, and their definite suspended anatropous ovules. This order comprises, besides the EUPHORBIA (which see), the *Ric'inus* (castor-oil plant), the *Croton*, which yields croton oil, the *Sipho'nia*, from which caoutchouc is obtained, the *Bux'us semper-virens* (common box), and the *Jatropha Manihot*, the stem of which yields a nutritious food called cassava, manioc, or tapioca.

**Euphor'bium**, an acrid and inodorous gum-resin, is produced by the *Euphorbia officinarum* of Southern Africa and some other species, including *Euphorbia Canariensis* of Western Africa and *Euphorbia antiquarum* of the Levant. It is a violent emetic and purgative, and is sometimes used in the composition of plasters and in veterinary medicine.

**Eupho'rión** [Εὐφώριων], an Athenian tragic poet, was a son of *Æschylus*. He gained prizes with his father's dramas when Sophocles and Euripides were competitors.

**Euphorion**, an eminent Greek poet and grammarian, born at Chalcis in Eubœa, flourished about 250–220 B. C. He became librarian to Antiochus the Great. He produced epic poems entitled "Hesiodos," "Mopsopia," and "Chiliades," which were very popular; also several prose works. None of his works are extant.

**Euphra'nor** [Εὐφράνωρ], an eminent Greek painter and sculptor, born at Corinth, flourished about 350 B. C., and was a contemporary of Apelles. He excelled both in painting and in sculpture. Among his works, which are highly praised by Pliny and Plutarch, was a painting of the feigned insanity of Ulysses.

**Eu'phrasy** [Gr. *εὐφρασία*, from *εὐφραίνω*, to "delight"], or **Eyebright**, a plant of the order Scrophulariaceæ, the *Euphrasia officinalis*, a small annual herb from two to eight inches high, a native of Asia, Europe, and North America. Milton in his "Paradise Lost" speaks of its virtues in clearing the eyesight. It is not improbably somewhat useful in inflammation of the eyes, from its astringent character. Some varieties are said to have in their blossoms a spot or "signature" resembling the eye, and this spot caused, or at least strengthened, the popular faith in its powers.

**Euphra'tes** [Gr. *Εὐφράτης*; Turk. *El-Frat*], a large river of Western Asia, celebrated in all periods of history for the important events which have occurred on its banks, and the magnificence of the cities whose walls it washed. It rises in Armenia, in the Anti-Taurus Moun-

tains, by two branches—the Moorad and Kara-Soo—which unite near lat. 39° N. and lon. 39° E. The stream formed by this junction flows first south-westward, effects a passage through a defile of Mount Taurus, and forms the boundary between ancient Syria and Mesopotamia. Near the town of Bir it approaches within 100 miles of the Mediterranean. After crossing the 36th parallel of N. latitude it pursues a general south-eastern direction, flows through the extensive alluvial plains of Babylonia and Chaldæa, and enters the Persian Gulf at its north-western extremity. Its total length, says Guyot, is 1750 miles, and the area of its drainage is 255,000 square miles. It is navigable from Someisat to its mouth, 1195 miles. Its principal affluent is the Tigris, which is nearly as large as the Euphrates itself. It receives no large tributary from the right hand. The width in some places is nearly 600 yards, but below Hillah its volume and width are reduced by numerous canals cut for irrigation. The name Shatt-el-Arab is given by the natives to that part of the river below the mouth of the Tigris. The melted snows of the mountains of the Taurus and Anti-Taurus cause a periodical inundation of the Euphrates in the spring. The water is highest in May and June. In some parts of its course above Someisat the river passes through deep and narrow defiles or gorges between precipices nearly 1500 feet high, and presents much picturesque scenery. In ancient times the chief city on its banks was Babylon.

**Euphros'yné** [Gr. Εὐφροσύνη, from εὖ, "good," "easy," and φρήν, "mind"], one of the three Graces in Greek mythology, was supposed to be the daughter of Venus, and was a personification of the genius of mirth or joy.

**Euphuism** [from the Gr. εὐφύης, "graceful" (from εὖ, "good," and φύς, "growth," "form")], an affected style of speaking and writing which became a fashion in the reign of Queen Elizabeth. The term originated in the title of a pedantic romance called "Euphues" (1580), which was written by John Lilly (Lyly), and which abounded in affected conceits and extravagant antitheses. This style was ridiculed by Shakespeare and Ben Jonson.

**Eup'ion** [from the Gr. εὖ, "good," "very," and πῖον, "fat," "rich," named in allusion to its oily nature], a limpid, inodorous, and oily liquid obtained by destructive distillation of various vegetable and animal substances, as coal, wood, oils, bones, etc. It is of a highly inflammable nature, dissolves in ether and alcohol, but is insoluble in water. Its specific gravity is 0.74, and it boils and evaporates at 340°. It consists essentially, according to Frankland, of hydrate of amyl, C<sub>5</sub>H<sub>11</sub>H.

**Eup'olis** [Εὐπολίς], an eminent Athenian comic poet of the Old Comedy, was born about 446 B. C. He was a competitor of Aristophanes, whom, as some critics think, he surpassed in the charms of diction. Horace considered him worthy to be ranked with Cratinus and Aristophanes. Eupolis often satirized the persons and conduct of his eminent contemporaries, including Alibiades. Died about 410 B. C. His works are lost except small fragments.

**Eura'sians** [contracted from *Europe and Asia*], or **Half-Castes**, is the name given in East India to the descendants of Europeans and Indian mothers, who are especially numerous in the large cities, as Calcutta, Madras, and Bombay. They generally receive a European education, but, although they speak the English grammatically, they have a peculiarly disagreeable pronunciation. The girls are often very beautiful, and generally marry English officers; while the young men enter the government offices or serve as clerks with merchants. They are very useful in this position, but as soon as they become rich, or advance to higher offices, they generally become insolent and wild. The Europeans, who also call them "Vepery Brahmins," do not hold them in high estimation. The natives call them "Tschitschi." Their number is estimated at 91,000.

**Eure**, a department in the N. W. part of France, is a part of the old province of Normandy. It is bounded on the N. by Seine Inférieure, on the E. by Oise and Seine-et-Oise, on the S. by Eure-et-Loir, and on the W. by Orne and Calvados. Area, 2301 square miles. It is intersected by the rivers Seine and Eure, and is bounded on the N. W. by the estuary of the former. The surface is mostly level; the soil is fertile. The staple productions are grain, hemp, flax, apples, and pears. Good horses, cattle, and sheep are reared here. Eure has important manufactures of cotton and woollen stuffs, paper, glass, stoneware, and copper-ware. Pop. in 1881, 364,291. Capital, Evreux.

**Eure-et-Loir**, a department in the N. W. part of France, is bounded on the N. by Eure, on the E. by Seine-et-Oise and Loiret, on the S. by Loire-et-Cher, and on the W. by Sarthe and Orne. Area, 2268 square miles. It is drained by the rivers Eure and Loir. The surface is partly level, and is in some parts diversified by hills and valleys. The soil is very fertile, and produces large crops of wheat.

Good cavalry horses are raised here. This department is traversed by a railway connecting Paris with Chartres and Le Mans. Capital, Chartres. Pop. in 1881, 280,047.

**Eureka**, city, capital of Humboldt co., Cal. (see map of California, ref. 2-A, for location of county), is on Humboldt Bay, 7 miles from the ocean and about 225 miles N. N. W. of San Francisco. It has a safe harbor, with fifteen feet of water at low tide. Redwood lumber is largely shipped from this point. Pop. in 1880, 2639.

**Eureka**, R. R. junction, Woodford co., Ill. (see map of Illinois, ref. 4-E, for location of county), 19 miles E. of Peoria. It is the seat of Eureka College, connected with which is a normal school and a biblical school of the Disciples of Christ. Pop. in 1870, 1233; in 1880, 1185.

**Eureka**, a city and R. R. junction, capital of Greenwood co., Kan. (see map of Kansas, ref. 7-I, for location of county), 110 miles S. S. W. of Topeka, in the centre of a fine grazing-region. Pop. in 1880, 1127.

**Eureka**, capital of Eureka co., Nev. (see map of Nevada, ref. 3-E, for location of county), is situated about midway between Salt Lake and San Francisco, and 90 miles S. of the Central Pacific R. R., with which the town is connected at Palisade by the Eureka and Palisade R. R. Eureka is the third town in importance in the State. The principal business is mining. It produces large quantities of lead and silver ore. Pop. of Eureka district, 1870, 640; of v. in 1880, 4207.

**Eureka Springs**, Ark. See APPENDIX.

**Euric**, king of the West Goths, born about 420, died at Arles in 484, came into possession of the crown by killing his brother, Theodoric, 466. He consolidated the West Gothic empire in Gaul by subjugating the whole region between the Rhone, the Loire, the ocean, and the Pyrenées. He then sent Gothicer into Spain, and in a very short time the Romans were expelled and the whole peninsula was brought under the sway of the West Goths, with the exception of the small Suevic kingdom in Lusitania, which remained independent. The West Goths were Arians, and Euric is said to have persecuted the orthodox.

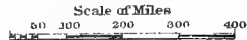
**Eurip'ides** [Gr. Εὐριπίδης], an eminent Athenian dramatist, and the latest of the three great tragic poets of Greece, was born in the island of Salamis in 480 B. C., or, according to the Arundel Marbles, in 485. According to a tradition, he was born on the day of the battle of Salamis, Sept. 23, 480. He was the son of an Athenian citizen named Mnecarchus, who sought refuge in Salamis when the Persian army captured Athens. He was a pupil of the great philosopher Anaxagoras, and he studied rhetoric under Prodicus. He also enjoyed the intimate friendship of Socrates. About 456 B. C. he produced "Peliades," the first of his dramas that was performed. As a rival of Sophocles he gained the first prize in several dramatic contests. His religious opinions were liberal, and excited the hostility of the conservative party, of which Aristophanes was the champion. Like Socrates, he was accused of impiety and unbelief in the gods. It appears that it was the violence and scurrility of these unscrupulous enemies that induced Euripides to remove from Athens about the year 408. He then retired to the court of Archelaus, king of Macedonia, who treated him with kindness. Euripides composed seventy-five, or, as some say, ninety-two, tragedies, of which eighteen are extant—namely, "Alcestis" (438 B. C.), "Medea" (431), "Hippolytus" (428), "Hecuba" (424), "Heracleidæ" (421?), "Suppliants" (421?), "Ion," "Hercules Furens," "Andromache," "Troades" (415), "Electra," "Helenæ" (412), "Iphigenia in Tauris," "Orestes" (408), "Phenissæ," "Bacchæ," "Iphigenia in Aulis," and "Rhesus." His style is remarkable for its brilliancy and pompous elegance. Among the warm admirers of Euripides were Aristotle (who calls him the most tragic of poets), Cicero, and Milton. "He was," says A. W. Schlegel, "a man of infinite talent and invention, possessed of the most varied intellectual accomplishments; but, although abounding in brilliant and attractive qualities, he wanted the sublime earnestness and artistic skill which we admire in Æschylus and Sophocles." According to a doubtful tradition, he was killed by hounds in 406 B. C., and buried at Pella. His works display great insight into human passions and skill in the analysis of character. Though his plots are censured as inartistic, he stands pre-eminent among the Greek tragic poets in the vigorous expression of individual passions and in knowledge of human nature. Among the best editions of Euripides are those of Musgrave, Oxford (4 vols., 1778), of Matthiæ, Leipsic (9 vols., 1813-20), of Kirchhoff, Berlin (2 vols., 1855), and of Nauck (2 vols.; 2d ed. 1857).

**Euroclydon** [Gr. εὐροκλύδων, from εὐρος, the "east wind," and κλύδων, a "billow"], the name of a violent wind of the Mediterranean, mentioned in Acts xxvii. 14. The Vulgate renders it *euro-aquilo*, i. e. "north-east wind."











But in some of the best manuscripts (Sinaitic, Vatican, and Alexandrian) *εὐρακῦλον*, "E. N. E. wind," is the reading, instead of *εὐροκλύδων*, "N. E. wind;" and this reading is adopted by the best recent editors. The wind in question is said to be half a point N. of E. N. E. (See SMITH'S "Voyage and Shipwreck of St. Paul," 1856; 3d ed. 1866.)

**Euro'pa** [Gr. *Εὐρώπη*], in classic mythology, a daughter of Agenor, king of Phœnicia, and a sister of Cadmus. According to the poetic legend, she was carried to Crete by Jupiter, who for that occasion assumed the form of a bull, and she was the mother of Minos and Rhadamanthus.

**Europe**, *ἡρὺς* [Lat. *Euro'pa*, so named by the Asiatic Greeks, either from its wide coast or from the Phœnician princess Europa], one of the four great continents, and historically the most notable, occupies an area of about 3,823,000 square miles; bounded N. by the Arctic Ocean, E. by Asia, S. by Asia, the Black Sea, and the Mediterranean, and W. by the Atlantic. Its greatest breadth is about 3400 miles, and its extent from N. to S. 2400 miles at the extreme points. Its territory has been more carefully mapped out than any other part of the earth's surface. Great Britain and Ireland, although distinct islands, always rank as a part of Europe, having been separated from the continent at no very remote period. In the N., Iceland and Nova Zembla, and in the Mediterranean, Corsica, Sardinia, Sicily, Malta, Crete, the Ionian and the Balearic Islands also belong to Europe. Europe is only about one-quarter as large as either Asia or America, and is more populous in proportion to area than any other continent, having about 81 inhabitants to the square mile. The length of coast-line is about 20,000 miles, 8000 of this being on the Atlantic, 3600 on Arctic Ocean, and 7800 on Mediterranean and Black Seas, giving unequalled advantages for commerce. Its two great peninsulas, Italy and Spain and Portugal, form very marked features of its topography.

**Geology.**—The great Mediterranean basin is the geological feature of Southern Europe, having its N. limit at the chains of mountains known as the Cévennes, the Jura, etc. The prevailing rocks are plutonic and metamorphic, of which the Alps are composed, and which are found in France, Germany, Scandinavia, etc. In Spain the Silurian rocks are found. Other palæozoic rocks—the Devonian, carboniferous, and permian—occupy large areas in Russia, the British Islands, etc. Germany, France, and England have extensive strata of the secondary formations, and the tertiary are still more widely distributed. Cretaceous rocks abound in Denmark, Greece, and Southern Russia, besides forming a large part of the Paris basin and the basin of the lower Rhine. Mineral wealth abounds. Mines of iron ore, lead, copper, coal, and salt are extensively worked, while for gold and silver Europe is mainly dependent on other countries. Europe abounds in mineral springs of great variety and chemical virtue.

**Mountains.**—The great characteristic groups lie in Switzerland, Austria, and Northern Italy. In elevation they are surpassed by the mountains of Asia and South America, the highest of all, Mont Blanc, being only 15,781 feet. The Alps are closely grouped over an area of 75,000 square miles, and all the other mountains, except the Pyrenees, may be ranked as secondary portions of the great Alpine system. The mean height of the Apennines varies from 2600 to 6400 feet. The Pyrenees, running across the isthmus between France and Spain, are about 240 miles long, and average from 3000 to 8000 feet high; highest point, 11,427 feet. Active volcanoes are now found only in Iceland and in Italy. The ratio of highlands to lowlands is greater in Europe than in most countries; South-western Europe is a high table-land, while North-eastern Europe presents the only plain of great extent.

**Rivers.**—The principal rivers are the Danube, Volga, Ural, Dnieper, Don, Neva, Oder, Rhine, Elbe, Vistula, Tagus, Rhone, Seine, Thames, Arno, Po, etc. The Volga drains half a million square miles of Russian territory, and the Danube has a basin estimated at 300,000 square miles. The flow of some of these is very irregular, and the Danube, the Elbe, the Loire, and others are subject to serious floods. Extensive engineering works to promote navigation and diminish the dangers of floods have been executed. The rivers penetrate the whole continent, fertilizing the soil and rendering great natural facilities to commerce. No European river has a great waterfall. The famous Staubbach fall is a mere rill, although the whole descent is 980 feet.

**Lakes.**—Europe abounds in lakes, Lake Ladoga in Russia being the largest, with 9000 square miles; Lake Onega in Russia has 5000 square miles. Minor lakes, celebrated for their beauty, are Lakes Geneva, Maggiore, Como, Neuchâtel, Constance, Zurich, Lucerne, etc.

**Climate.**—The numerous small lakes of Europe increase the area of evaporation, and tend to make the climate far

more moist than that of America or Asia. This is further increased by the Mediterranean, and the large water surface penetrating and hemming in the continent has a powerful tendency to ameliorate the climate; the temperature of any given parallel of latitude in Europe is several degrees warmer than the regions in the same latitude in America. The whole of Europe belongs to the N. temperate zone, except the small portion extending into the N. frigid zone. While no part of the continent touches the tropics, the S. portion is marked by the dryness of the summer peculiar to the sub-tropical zone. The rainfall occurs most largely in the winter in Southern Italy and Spain; autumn and spring are the rainy seasons in Northern Spain and Italy and in Southern France. Summer brings a rainy season to Switzerland, Germany, Austria, Prussia, and Sweden. The British Islands have their maximum rainfall in winter. Meteorological statistics show the maximum rainfall at Skye and in the W. of England, with 101 to 189 inches of annual rainfall, while that of Salamanca in Spain is only 9 inches, and the average in Sweden and Russia and parts of Germany is as low as 15 to 21 inches per annum. Western Europe has heavier rains than Eastern, and the most prevalent wind is the S. W. In South-eastern Europe the prevailing winds are from the N. and E., the latter in fall and winter. The snow-line in the mountains varies from 8000 to 13,000 feet above the sea among the Alps and Pyrenees, while in Norway the snow-line comes down to the altitude of 2360 feet.

**Soil and Productions.**—The climate of Europe has such variety as to favor the growth of the richest products of the vegetable kingdom. The regions of the Mediterranean, where ages of fertility have produced both vernal and autumnal growths, and the S. of Spain, where almost tropical luxuriance bears fruits every month, contrast strongly with the Arctic regions, with their short period of vegetation. Of the cereal crops, wheat is heavily grown in Russia, Austria, France, England, Germany, and the countries of the Danube. Barley is an almost universal crop, as are rye and oats in Central and Northern Europe. Maize or Indian corn is largely cultivated in the S.; the potato has spread over Central and Northern Europe. Beans, peas, clover, lucerne, sainfoin, hemp, flax, etc. are grown profusely. The cultivation of the vine is of prodigious extent (being profitably grown as far N. as 50°), and forms a vast industry in France, Italy, Austria, and Spain. The olive flourishes in Italy, Greece, Spain, and Portugal, growing two crops annually. Tobacco is grown all the way from Sicily N. to Sweden. The beet is cultivated in Central Europe for the manufacture of sugar. Among fruits and nuts, there are the orange, fig, almond, citron, pomegranate, pistachio, apples, pears, cherries, plums, and date-palms. The timber trees, though greatly depleted by centuries of consumption, still furnish forest products for fuel and the arts. Northern Europe has a large timber trade. Among the trees are the oak, chestnut, beech, ash, alder, birch, pine, elm, maple, poplar, hemlock, and fir.

**Zoology.**—According to Wallace, Europe belongs to the palæarctic region. While wild animals are by no means so numerous as on other continents, the domestic animals are reared in large numbers and in great perfection. The larger varieties of Carnivora are few. Among the characteristic animals are the reindeer, bear, wolf, fox, weasel, badger, hedgehog, chamois, hare, rabbit, squirrel, marten, etc. The birds number 247 genera and 531 species, but of these only two or three are peculiar to this continent. There are the thrush, warbler, magpie, jackdaw, linnet, sparrow, shrike, kingfisher, vulture, quail, eagle, hawk, kite, buzzard, owl, swallow, lark, nightingale, blackbird, etc. The waters, both coastwise and inland, are well stocked with fish, among which the salmon holds a chief place, while the herring, cod, sardine, sprat, perch, tunny, anchovy, etc. abound. Oysters are found all along the Atlantic coast, and their artificial culture is widely extending, though in quality they are inferior to the American oyster. The sponge and the coral fisheries are actively pursued on the Mediterranean. Among reptiles, the tortoise, turtle, chameleon, lizard, adder, viper, frog, and toad are the principal. Insects are not so numerous nor so annoying in Europe as in the warmer regions of the globe.

**Population.**—The inhabitants of Europe embrace many composite races, the characteristics of which have been greatly changed and modified in successive ages by migrations, intermarriages, and conquests. Modern archaeologists have found evidence of human inhabitants in Europe as early as the pleistocene period. Remains of these races, called the men of the Old Stone Age (and distinguished by some as the cave-dwellers and the inhabitants of the river-beds), are found in England, Belgium, France, Germany, and Switzerland. At a later but still pre-historic period came the neolithic people, still of the Stone Age. The great Aryan race, still predominant in Europe, came in at an

uncertain period, probably by way of Asia Minor. Writers on ethnology mark out four great Aryan detachments—viz. the Græco-Latin or southern, the Celtic or central, the Teutonic or northern, and the Slavonic or north-eastern. Of the Semitic race (mainly Jews), the migration into Europe was gradual. Brachelli estimates the 287,000,000 Europeans of Aryan origin to be composed approximately as follows: German peoples (including Germans, Dutch, Belgians, English, Swedes, Norwegians, and Danes), 95,000,000; Græco-Latin peoples (including French, Italians, Spaniards, Portuguese, Greeks, Roumanians, Moldavians, Wallachians, etc.), 96,400,000; Slavonic peoples (including Russians, Poles, Bohemians, Moravians, Wends, Croatsians, Servians, Bosniaks, Bulgarians, Slavonians, etc.), 82,170,000; Celts, 4,100,000; Semitic peoples, 3,200,000; Lithuanians, 2,800,000; Albanians, 1,300,000; Basques, 700,000; Gypsies, 600,000; Circassians, 400,000; Armenians, 260,000. There remain, besides this overwhelming preponderance of Aryanized populations, only about 4,000,000 Mongolians (Tartars, Turks, and Kalmucks) and 10,500,000 of Uralian peoples (Magyars and Finns).

**Language.**—There are about sixty distinct languages now spoken in Europe; most of these are of the Aryan family, including the Hellenic, Italic, Celtic, Teutonic, Slavonic, and Lettish branches. The Semitic branch includes the Hebrew, Arabic, etc., and the Tartaric, the Turkish, Magyar, Lapponic, and many other dialects of limited area. Rapid changes are going on which appear destined to extinguish ultimately many of the minor languages in favor of those great vehicles of speech, the English, French, German, Italian, Spanish, and Russian.

**Political Divisions.**—Recent changes in the political map of Europe have left its principal divisions as follows: 4 empires, 11 kingdoms, 4 republics, and 4 principalities. The areas and populations of these political divisions are as follows:

COUNTRIES.	Government.	Sq. miles.	Population.
Andorra.....	Republic.....	148	12,000
Austria-Hungary.....	Empire.....	240,415	37,741,413
Belgium.....	Kingdom.....	11,369	5,476,668
Denmark.....	Kingdom.....	14,784	1,969,454
France.....	Republic.....	204,030	36,905,788
Germany.....	Empire.....	208,624	45,194,172
G. Brit. and Ireland.....	Kingdom.....	121,571	35,246,633
Greece.....	Kingdom.....	20,918	1,679,775
Italy.....	Kingdom.....	114,880	28,209,620
Lichtenstein.....	Principality.....	69	9,124
Monaco.....	Principality.....	6	5,741
Montenegro.....	Principality.....	3,657	286,000
Netherlands.....	Kingdom.....	12,727	3,981,887
Norway.....	Kingdom.....	122,823	1,806,900
Portugal.....	Kingdom.....	34,595	4,348,551
Roumania.....	Kingdom.....	50,159	5,376,000
Russia.....	Empire.....	1,898,019	72,520,000
San Marino.....	Republic.....	24	7,816
Servia.....	Principality.....	18,781	1,669,397
Spain.....	Kingdom.....	193,171	16,333,293
Sweden.....	Kingdom.....	170,927	4,531,863
Switzerland.....	Republic.....	15,908	2,831,787
Turkey.....	Empire.....	130,935	8,866,500
Total.....		3,577,140	315,010,322

The increase of population in Europe is very slow, being probably less than 1 per cent. per annum. War and emigration are the principal causes retarding its growth; Great Britain and Ireland have lost over 8,000,000 of their population since 1815, and Germany over 2,000,000. The areas of densest population are near London, Paris, Milan, Naples, and Leipsic. The keeping on foot of great armies and the maintenance of costly navies constitute one of the chronic checks to the prosperity of Europe. In productions Europe (as has been estimated) raises annually less food than its population consumes, and for clothing it is dependent upon other countries for all its cotton and for much of its wool and silk, the raw materials. Europe, however, more than makes up by its labor and skill for all it lacks in materials; its industries are so vast that it may be called one great workshop, supplying with its manufactures not only its own wants, but a large share of the wants of other divisions of the world.

**Education.**—The condition of Europe exhibits a great advance in education during the present century. In every country (even including Turkey) laws exist for maintaining primary schools, and education is compulsory in all the nations except France, Russia, Belgium, and Turkey. Switzerland and Prussia hold the highest rank in the universal diffusion of education.

**Religion.**—Paganism has but little foothold in Europe, which is pre-eminent Christian. There are three grand divisions—the Roman Catholic Church, the Greek or Eastern Church, and the Protestant Church. Roman Catholicism has much the largest number of adherents, especially in

Austria, France, Italy, Belgium, Spain, and Portugal. The following table approximates the numbers attached to the various religions:

COUNTRIES.	Catholics.	Greeks.	Other Christians, chiefly Protestants.	Jews.	Mohammedans.
Germany.....	14,867,500	3,000	25,830,700	512,200	100
Austria.....	27,904,300	3,052,700	3,571,000	1,375,800	800
France.....	35,388,000	.....	610,800	49,400	3,100
Great Britain.....	5,500,000	.....	25,900,000	40,000	.....
Russia.....	6,755,000	54,000,000	4,157,000	2,277,000	.....
Italy.....	26,700,000	.....	35,000	40,000	2,092,000
Switzerland.....	1,084,400	.....	1,577,000	7,000	.....
Belgium.....	4,980,000	.....	15,000	1,500	.....
Netherlands.....	1,313,000	.....	2,198,000	68,000	.....
Luxembourg.....	197,000	.....	400	600	.....
Denmark.....	1,900	.....	1,865,000	4,800	.....
Sweden.....	600	.....	4,203,800	1,800	.....
Norway.....	350	.....	1,904,800	25	.....
Spain.....	16,500,000	.....	.....	.....	.....
Portugal.....	3,950,000	.....	.....	.....	.....
Greece.....	10,000	1,442,000	8,500	2,600	.....
Turkey.....	650,000	11,000,000	.....	100,000	4,500,000
Total (approximate).....	145,850,000	69,500,000	71,460,000	4,500,000	6,600,000

**History.**—The authentic annals of Europe commence with the Greeks. Greece founded colonies, but her people were not given to conquest, while the history of Rome, which soon supplanted Greece as a political power, is one of continual aggression and territorial acquisition. Early in the Christian era Rome had successively conquered Sicily, Spain, Greece, and Gaul. In the time of Augustus the Roman rule covered the whole region now embracing France, Belgium, Spain, Portugal, the most of Germany, Switzerland, Italy, Austria, Servia, Turkey, and Greece. When Constantine established the seat of government at Byzantium (now Constantinople) and made Christianity the religion of his empire, his territorial outlines were nearly the same. In A. D. 395 came the division of this great empire into Eastern and Western, the latter embracing much the larger territory and population. Gradually the German race became ascendant; the kingdom of the Franks was established, the English occupied England, the Western Goths and the Suevi divided Spain between them, and Gaul (or France) was under the Eastern Goths and the Burgundians.

Numerous conquests and changes mark the map of the Middle Ages. The papal power of Rome becomes dominant in the politics of many nations; France and England struggle for possessions on the Continent; all Europe sends forth a crusade for the recovery of Christ's sepulchre, and the advance of the Ottoman power is vigorously resisted by the nations of Western Europe. The sixteenth century is marked by the vast extension of the empire of Charles V. over the Netherlands, Spain, Naples, and the German states, leading to wars and rivalries which lasted for generations.

In the eighteenth century the German empire acquired greatly extended power, while Italy was broken up into many petty states; France was strong, and Spain and Great Britain were the other leading powers. From 1789–1815 war again broke up the political frontiers through nearly all Europe, ending in a temporary triumph of absolute government, followed by many more or less successful revolutions, which gave constitutional or representative government to most of the nations. In 1830, Belgium became a separate constitutional kingdom, France placed Louis Philippe, a constitutional king, on the throne, and the independence of Greece was secured. In 1848 a revolutionary storm swept over Europe; Rome expelled the pope, and Sicily the Bourbons; France became temporarily a republic, and the king of Prussia was forced to grant a constitution and a representative government to the people. A reaction set in, however, which carried back the tide of political reform. In 1855 the Crimean war was fought, England and France maintaining the integrity of Turkey against Russia. Great changes soon followed in Italy, the separate states of which consolidated under one constitutional king in 1861. Germany absorbed the provinces of Schleswig-Holstein in 1864, and in 1866 the North-German Confederation was formed; 1870 saw the great Franco-Prussian war, which lasted less than a year, ending in the firm establishment of the French republic and the crowning of the Prussian king as emperor of the German Confederation. In 1877, Russia declared war against Turkey, and but for the intervention of Great Britain and other powers would have swept her from the rank of a European nation. Turkey has lost Roumania, which became an independent kingdom, and Servia, which was established as a principality.

What are now known as the great powers of Europe are Great Britain, France, Germany, Austria, Italy, and Russia. To maintain what was called the "balance of power" in Europe has cost a long succession of bloody wars, a sacrifice of countless lives, a squandering of vast treasure, and

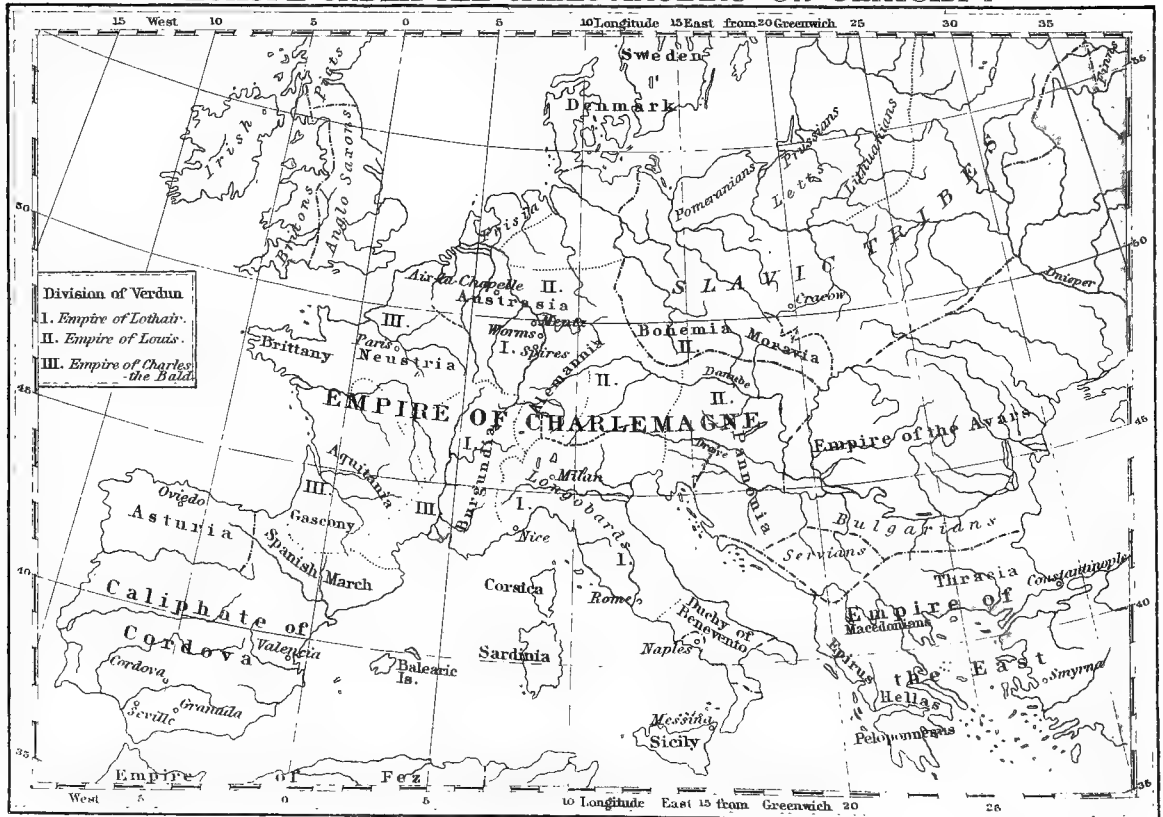




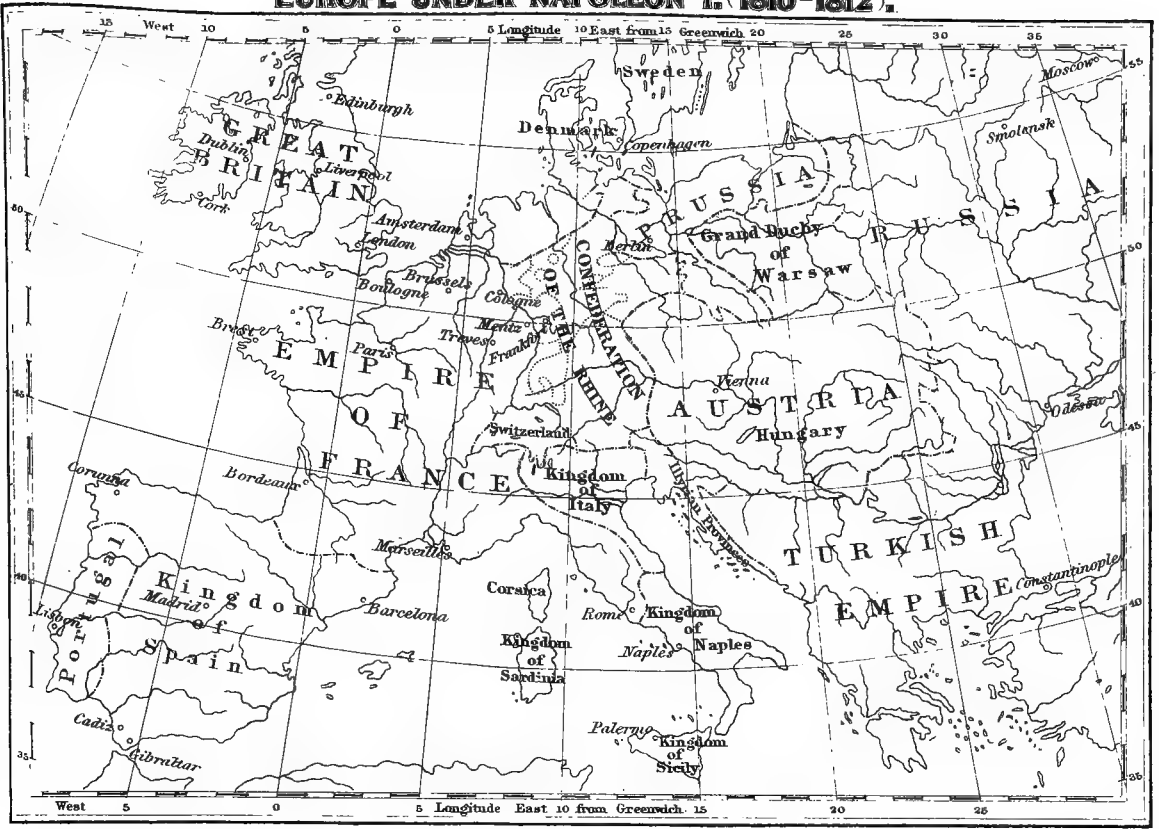
## EUROPE UNDER THE ROMANS (2<sup>nd</sup> CENTURY).



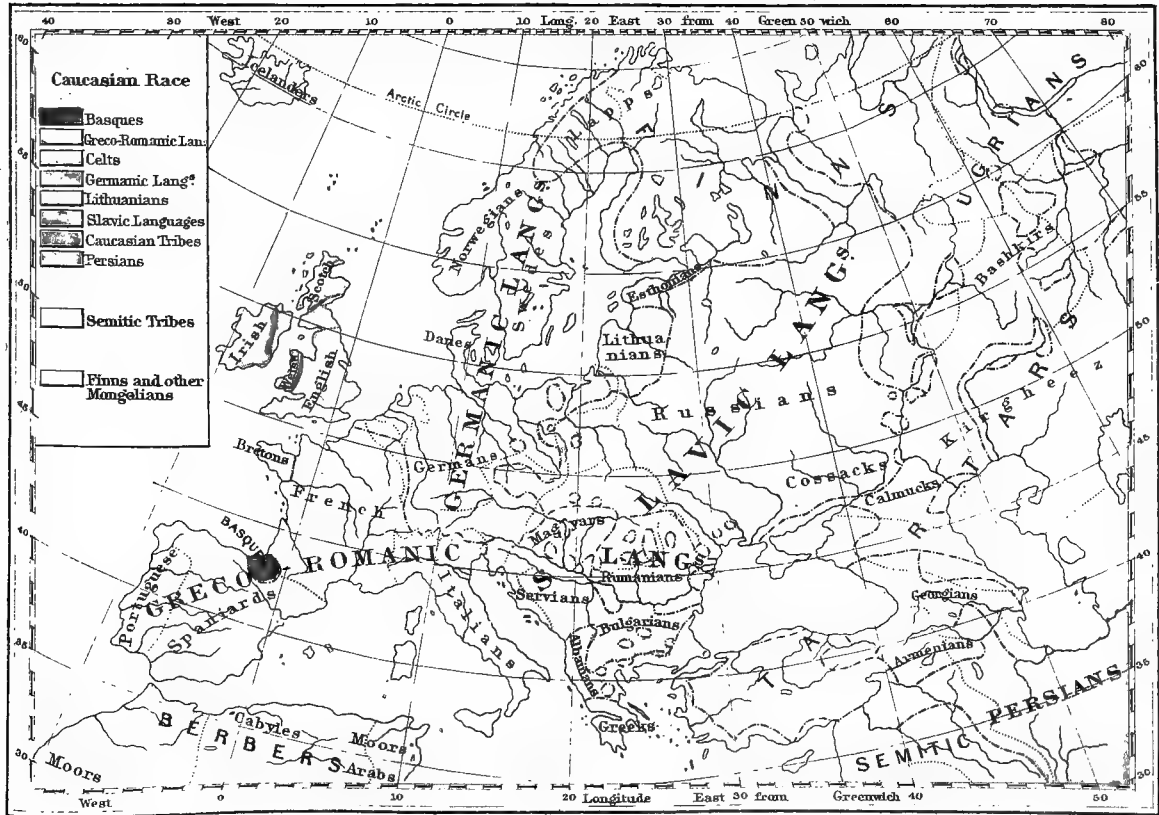
## EUROPE UNDER THE CARLOVINGIANS (9<sup>th</sup> CENTURY).



## EUROPE UNDER NAPOLEON I. (1810-1812).



## MAP OF THE LANGUAGES OF EUROPE.





the oppression by taxes and compulsory military service of the masses of the people. The increasing facilities of intercommunication, with the steady growth of intelligence, may yet lead to better methods of settling international differences. Several European congresses evince a tendency to adopt discussion and arbitration instead of war, and some believe in an ultimate confederation of the states of Europe for the common benefit and advancement of all.

ANSWORTH R. SPOFFORD.

**Eurydice** [Gr. *Εὐρυδίκη*], the wife of Orpheus, died in consequence of the sting of a serpent. According to the poetic legend, Orpheus descended to the infernal regions, and persuaded Pluto to restore her to him on condition that she should walk behind Orpheus, and that he should not look back until they had reached the upper world. But he was tempted to look back, and finally lost her. (See VIRGIL, "Georgics," book iv. 454.) There are seven other mythical persons bearing the name Eurydice, but the wife of Orpheus is the most celebrated of them.

**Eusebius Pamphili**, bishop of Cæsarea, an eminent theologian and writer of ecclesiastical history, was born in Palestine about 260 A. D. He assumed the surname PAMPHILI in honor of his friend Pamphilus the martyr. He became bishop of Cæsarea in 314 or 315 A. D., and took a prominent part in the Council of Nice (325 A. D.). The emperor Constantine the Great, who was his friend, selected him to open this council by an oration. Eusebius was inclined to moderation and peace, used his influence to reinstate Arius, and was a leader of the Semi-Arians. He was one of the bishops who censured Athanasius at the Council of Tyre (334). He was very eminent for learning, as well as for talents. He wrote in Greek, besides several works that are lost, an "Ecclesiastical History from the Christian Era to 324 A. D.," which is of great value, a "Life of Constantine the Great," "Gospel Preparation" ("Præparatio Evangelica"), a "Universal History or Chronicle," and a work "On the Proof or Demonstration of the Gospel" ("De Demonstratione Evangelica"). Died about 340 A. D. Complete editions of his works have been published by Migne in his *Patrologia Græca* (6 vols., 1856-57), and by Dindorf (1865, *seq.*). A new critical edition of his historical works has been published by Heinichen (1868, *seq.*). (See BAUR, "Die Epochen der Kirchlichen Geschichtschreibung," 1852.)

**Eustachian Tube** [named in honor of *Eustachius*, its discoverer], in anatomy, a canal leading from the middle ear to the pharynx. In man the Eustachian tube is nearly two inches long. Beginning at the ear, its first half inch is formed by a passage in the temporal bone, between the petrous and the squamous portions. The fishes have no true Eustachian tube, though some of them have a homologous passage from the ear to the air-bladder; but it exists in the true reptiles, in birds, and in mammals. Its use is probably to enable the hearer unconsciously to increase or diminish the tension of the air within the tympanum, and thus to increase or decrease the sensitiveness to sounds. Closure of the tube impairs the hearing. This organ is sometimes the seat of disease, which may be reached by the catheter, the syringe, and other instruments. Its surgical treatment requires great skill.

**Eusta'chius** [It. *Eustachio* or *Eustachi*], (BARTHOLOMEUS), an eminent Italian anatomist, born at San Severino in the March of Ancona, studied medicine in Rome. The events of his life are mostly unknown. He was a professor in the College della Sapienza, Rome, 1562. He made important discoveries in anatomy, among which was the Eustachian tube, and was the first anatomist who illustrated his works with good engravings on copper. His anatomical plates were engraved in 1552, but were lost for a long time, and were not published until 1714. He wrote a work "On the Controversies of Anatomists" ("De Anatomicorum Controversiis"), which is not extant. He published "Opuscula Anatomica" (1563). He died in poverty in 1574.

**Eustus**, Fla. See APPENDIX.

**Eus'tis** (ABRAHAM), born at Boston, Mass., Mar. 28, 1786, graduated at Harvard in 1804, was called to the bar in 1807, entered the army as captain of artillery in 1808, served with distinction in the war of 1812-15, received in 1834 a brevet of brigadier-general, and in the same year became colonel of the First Artillery. Died June 27, 1843.

**Eustis** (GEORGE), LL.D., born at Boston, Mass., Oct. 20, 1796, graduated at Harvard in 1815, was private secretary to his uncle, Gov. William Eustis, when the latter was minister at The Hague, removed to New Orleans in 1817, admitted to the bar in 1822, where he took a prominent part in public affairs, and was for some years chief-justice of the State supreme court. He was profoundly versed in the civil law. Died Dec. 23, 1858.

**Eustis** (HENRY LAWRENCE), an American officer and

engineer, born Feb. 1, 1819, at Fort Independence, Mass., studied at Harvard, and graduated at West Point in 1842, served as lieutenant of engineers in the construction of fortifications, etc., and assistant professor at the Military Academy till he resigned (Nov. 30, 1849), to become professor of engineering in Lawrence Scientific School of Harvard University, Mass. In the civil war he was colonel of the Tenth Massachusetts Volunteers, serving at Williamsport, Fredericksburg, Marye Heights, Salem, Gettysburg, Rappahannock Station, Mine Run, Wilderness, Spottsylvania, Cold Harbor, and many minor actions; and became brigadier-general of volunteers in 1863, but resigned June 27, 1864, to resume his professorship at Cambridge, Mass. D. Jan. 11, 1885.

GEORGE W. CULLUM.

**Eustis** (WILLIAM), LL.D., a physician, born in Cambridge, Mass., June 10, 1753. He served as a surgeon in the war of Independence, after which he practised medicine in Boston, and was a member of Congress (1800-05 and 1820-23). He was secretary of war from 1809 to 1812, resigning after Hull's surrender, and was sent as minister to Holland in 1814. In 1823 he was elected governor of Massachusetts. Died Feb. 6, 1825.

**Eu'taw**, on R. R., capital of Green co., Ala. (see map of Alabama, ref. 4-B, for location of county), 35 miles S. W. of Tuscaloosa. It has two seminaries. Pop. in 1880, 1101.

**Eu'taw Springs, Battle of**, was fought in South Carolina, about 60 miles N. W. of Charleston, Sept. 8, 1781. Gen. Greene, having about 2000 men, attacked a British force under Col. Stuart, who was compelled to retreat, and lost about 630, including prisoners. Gen. Greene lost 535, killed, wounded, and missing.

**Eutrop'ius**, or **Flavius Eutropius**, a Latin historian who flourished about 350-370 A. D. The events of his life are mostly unknown, except that he was secretary to the emperor Julian, and accompanied him in his expedition against the Parthians. He wrote an "Epitome of Roman History" from the foundation of Rome to the time of Valens ("Breviarium Rerum Romanarum"), which became very popular, was translated into Greek, and has been extensively used as a school-book in modern times. His Latinity is pure and his style simple.

**Eu'tyches** [Gr. *Εὐτύχης*], an aged superior of a monastery near Constantinople. He was a zealous opponent of the doctrines of the Nestorians, and was charged with teaching that there is in Christ only one nature—that is, the divine. He was condemned by the Council of Constantinople in 448 A. D., but this decision was reversed by the Council of Ephesus in 449. This triumph was obtained by the violent and disorderly acts of the soldiery and monks. The doctrines of Eutyches were again condemned as heretical by the general Council of Chalcedon in 451 A. D., soon after which he died. He was then above seventy years of age. The Eutycheans were often called *Monophysites*. (See MONOPHYSITES and JACOBITES.)

**Euxine Sea**. See BLACK SEA.

**Evag'oras** [Gr. *Εὐαγόρας*], king of Salamis in Cyprus, was descended from Teucer, a famous hero. He began to reign in 410 B. C., and as an ally of the Athenians and Egyptians waged a long war against the king of Persia, who invaded Cyprus. He was assassinated in 374 B. C., and was succeeded by his son Nicocles.

**Eva'grius**, a Church historian, born about 536, was at first a lawyer, and defended the patriarch Gregory of Antioch so well that he was appointed city prefect by the emperor Maurice. He continued the Church histories of Sozrates and Theodoret in six books from 431-594. His Church history is compiled with great care and impartiality. The best edition was published by Reading (Cambridge, 1720).

**Evangelical Alliance**. This is a voluntary association of evangelical Christians from different churches and countries for the purpose of promoting religious liberty, Christian union, and co-operation in every good work. It owes its origin to a widespread and growing desire for a closer union among Protestants, both for its own sake and for a more successful conflict with infidelity on the one hand and superstition on the other. Its object is not to create a union, but to acknowledge, exhibit, and strengthen that spiritual union which has always existed among true Christians as members of Christ's body, but which is sadly marred and obstructed by the many divisions and rivalries of Protestant denominations and sects. It aims not at an organic union, nor at a confederation of churches as such, but simply at a free Christian union of individual members from different churches who hold essentially the same faith; although such a union will naturally tend to bring gradually the churches themselves into closer fellowship and mutual recognition. It claims no official and legis-



lative authority that might in any way interfere with the internal affairs of the denominational organizations or the loyalty of its members to their particular communion. It relies solely on the moral power of truth and love. After a number of preparatory meetings and conferences, the Alliance was founded in a remarkable and enthusiastic meeting held in Freemasons' Hall in London Aug. 19-23, 1846, composed of some eight hundred Christians—Episcopalians, Presbyterians, Independents, Methodists, Baptists, Lutherans, Reformed, Moravians, and others, and including many of the most distinguished divines, preachers, and philanthropists from England, Scotland, Ireland, Germany, France, Switzerland, the U. S., and other countries. Sir Culling Eardly, Bart., presided and became the first president of the British branch. Eloquent addresses were delivered, fervent prayers offered, and nine doctrinal articles adopted; not, however, as a binding creed or confession, but simply as an expression of the essential consensus of evangelical Christians whom it seemed desirable to embrace in the Alliance. These articles are as follows:

"1. The divine inspiration, authority, and sufficiency of the Holy Scriptures.

"2. The right and duty of private judgment in the interpretation of the Holy Scriptures.

"3. The Unity of the Godhead, and the Trinity of the Persons therein.

"4. The utter depravity of human nature in consequence of the Fall.

"5. The incarnation of the Son of God, his work of atonement for the sins of mankind, and his mediatorial intercession and reign.

"6. The justification of the sinner by faith alone.

"7. The work of the Holy Spirit in the conversion and sanctification of the sinner.

"8. The immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked.

"9. The divine institution of the Christian ministry, and the obligation and perpetuity of the ordinances of Baptism and the Lord's Supper."

Some regard this doctrinal statement as too liberal, others as too narrow (especially on account of Art. 9, which excludes the Quakers, and Art. 8, which excludes the Universalists), while still others would have preferred no creed, or only the Apostles' Creed, the simplest and most generally accepted of all creeds. Nevertheless, it has answered a good purpose, and maintained the positive evangelical character of the Alliance. The American branch, at its organization (1867), adopted the nine London articles, with the following important explanatory and qualifying preamble:

"Resolved, That in forming an Evangelical Alliance for the U. S. in co-operative union with other branches of the Alliance, we have no intention to give rise to a new denomination; or to effect an amalgamation of churches, except in the way of facilitating personal Christian intercourse and a mutual good understanding; or to interfere in any way whatever with the internal affairs of the various denominations; but simply to bring individual Christians into closer fellowship and co-operation, on the basis of the spiritual union which already exists in the vital relation of Christ to the members of his body in all ages and countries.

"Resolved, That in the same spirit we propose no new creed; but, taking broad, historical, and evangelical catholic ground, we solemnly reaffirm and profess our faith in all the doctrines of the inspired word of God, and in the consensus of doctrines as held by all true Christians from the beginning. And we do more especially affirm our belief in the divine-human person and atoning work of our Lord and Saviour Jesus Christ, as the only and sufficient source of salvation, as the heart and soul of Christianity, and as the centre of all true Christian union and fellowship.

"Resolved, That, with this explanation, and in the spirit of a just Christian liberality in regard to the minor differences of theological schools and religious denominations, we also adopt, as a summary of the consensus of the various Evangelical Confessions of Faith, the Articles and Explanatory Statement set forth and agreed on by the Evangelical Alliance at its formation in London, 1846, and approved by the separate European organizations; which articles are as follows," etc.

The Evangelical Alliance thus auspiciously organized soon spread throughout the Protestant world. Branch Alliances were formed in Great Britain, Germany, France, Switzerland, Sweden, and even among the missionaries in Turkey and East India; quite recently also in Australia, in Brazil, and among the Protestant missionaries in Japan (Dec., 1873). There is no central organization with any

controlling authority, and the General Alliance appears in active operation only from time to time when it meets in general conference, which has assumed the character of a Protestant oecumenical council, but differs from the oecumenical councils of the Greek and Roman churches in claiming only moral and spiritual power. The various national branches are related to each other as members of a confederation with equal rights. The British branch, being the oldest and largest, and having the most complete organization, with a house (in London, No. 7 Adam street, Strand) and regular officers who devote their whole time to it, has been heretofore the most influential; the continental branches are more elastic, and confine themselves to occasional work; the American branch, which was organized at the Bible House, New York, in 1867 (a previous attempt having failed on account of the anti-slavery agitation before the civil war), has in a short time become the most vigorous and popular; for in the U. S., where all Christian sects are represented on a basis of equality before the law, there is also the greatest appreciation of religious freedom, the strongest desire for Christian union and co-operation, and the widest field for the realization of the idea of a universal Christian brotherhood on the basis of a free development of denominational peculiarities in dogma, discipline, and worship. We now give a brief summary of the history and results of the Alliance.

1. As regards the promotion and defence of *religious liberty* wherever assailed. The Alliance assumed from the beginning that freedom of conscience and Christian union, far from being inconsistent with each other, are one and inseparable; that freedom is the basis of union, and union the result and support of freedom; that a union without freedom is only a dead mechanical uniformity; that true union implies variety and distinction, and a full recognition of the rights and peculiar gifts and mission of other members and branches of Christ's kingdom. The Roman Church maintains union at the expense of freedom, and, while advocating liberty of conscience for herself, denies it to all others in principle, and, where she has the power, in practice also. Since the formation of the Alliance many cases of persecution more or less severe have occurred, especially in Southern Europe, under the operation of penal laws against religious dissenters; and the united efforts of the different branches of the Alliance, through the press and by deputations, have had a considerable moral influence in bringing about those remarkable changes in favor of religious liberty which have taken place among the Latin races and in Turkey within the last twenty years. The Alliance has successfully exerted its influence for the release of the Madiai family in Tuscany, and of Matamoros, Carrasco, and their friends who, during the reign of Queen Isabella in Spain, were thrown into prison and condemned to the galleys for the sole crime of reading the Bible and holding private meetings for devotion. It aided in inducing the sultan of Turkey to abolish the death-penalty for apostasy from Mohammedanism in his dominions. It interceded for the Methodists and Baptists in Sweden, which has since abrogated the penal laws against Roman Catholics and Protestants not belonging to the Lutheran Confession. It sent in 1871 a large deputation, in which prominent citizens of the U. S. took the leading part, to the czar of Russia to plead for the oppressed Lutherans in the Baltic Provinces, and these have not been disturbed since that time. It sent a similar deputation to the embassy from Japan, when they visited this country and the courts of Europe in 1872, to remonstrate against the persecution of Christians, mostly Roman Catholics, in that distant empire of the East, and the persecution has since ceased. It has not forgotten the Nestorians in Persia, who appealed to the Alliance for protection against the oppression of a Mohammedan government; and just now (1874) it prepared a memorial to the czar on the persecution of Baptists in the south of Russia. The force of public opinion on the subject of freedom of conscience and religious worship, as expressed by the Alliance, has always found a respectful hearing, and must sooner or later be obeyed by every civilized government on the globe.

2. As regards the cause of *Christian union*, which is the other great object of the Alliance, it is promoted mainly by means of general conferences of an international and interdenominational character, which are arranged from time to time in different capitals by the branch in whose bounds it meets, with the co-operation of the sister branches. These meetings last several days, and are spent in prayer and praise, brotherly communion, and discussions of the most important religious questions of the age. Six general conferences have been held so far. The first general conference took place in London in 1851, the year of the great exhibition of the works of industry of all nations in the British metropolis; the second in Paris, 1855; the third in Berlin, 1857; the

fourth in Geneva, 1861; the fifth in Amsterdam, 1867; the sixth in New York, 1873; the seventh at Basle, Switzerland, 1879. These meetings were all well attended, and left a most favorable impression upon the delegates and the country in which they were held. The most popular, enthusiastic, and effective of all was the one held in New York, Oct. 2-12, 1873, which from the beginning to the close was a most complete success, surpassing every expectation. For the first time in history, American, European, and Asiatic Christianity met face to face in the New World, and took council together on the state of Christendom, on Christian union, Christian life, Christianity and infidelity, Christianity and superstition, Christianity and civil government, Christian missions at home and abroad, Christian philanthropy and reform of social evils. The religious community of our commercial metropolis took the deepest interest, and thronged the meetings by thousands in the several churches and public halls from morning till night, and the secular and religious press, without exception, spread the reports among millions of readers. The foreign delegates were deeply impressed with the life and energy of American Christianity and American institutions, and spread their new convictions all over the Old World. "It is quite impossible," writes Sir Charles Reed, an influential member of the British Parliament, and one of the delegates, "to describe the course of these meetings in New York, much less the spirit in which they were conducted. The number of delegates from all parts of Europe and Asia, the attendance daily for ten days of thousands of persons, the subjects of discussion, are evidences of the success of the gathering, while the full reports by the daily press and the attention paid by public bodies showed that the influence spread far and wide among the population of the city. . . . It was occasionally felt that such a conference could not have been held elsewhere than in New York. . . . No words can convey the sense I have of the importance of this conference, as inaugurating a new era in the history of Christian union." The same testimony, in even more enthusiastic language, came back after the return of the delegates from every part of Europe, and the effect of the conference in encouraging faith and Christian work and cementing the bond of union, especially between Great Britain and America, cannot be estimated. For a full report of the addresses and proceedings see the stately volume, "History, Essays, Orations, and other Documents of the Sixth General Conference of the Evangelical Alliance held in New York," edited by Schaff and Prime, and published by the Harpers, New York, 1874 (pp. 773). The proceedings of the previous meetings were published by the British branch in English, and also in German, Dutch, and French by the continental branches. The American branch has issued seventeen documents of minor importance from its office in the Bible House, New York. The last contains an account of the Luther Celebration in the Academy of Music, New York, Nov. 13, 1883, with the addresses of Hon. John Jay, Dr. Wm. M. Taylor, and Dr. Phillips Brooks.

PHILIP SCHAFF.

**Evangelical Association**, popularly but incorrectly known as the **German Methodist Church**, a body of American Christians, chiefly of German descent, organized by the Rev. Jacob Albright, a native of Eastern Pennsylvania. Regarding the doctrines and morals that prevailed in the German churches of that part of Pennsylvania as corrupt, Albright undertook about 1790 a work of reform among them. At a meeting of his converts in 1800, called for the purpose of deliberating on the measures best suited for advancing the new religious movement, Albright was unanimously elected pastor or bishop, and authorized to exercise all the functions of the ministerial office over the members of the organization. In the course of time annual conferences were established, and in 1816 the first general conference was held in Union co., Pa., consisting of all the elders in the ministry. Since 1843 the general conference, consisting of delegates from the annual conferences, has regularly met once every fourth year. During the first thirty years of its existence the Evangelical Association met with violent opposition, but since then it has quietly and rapidly advanced. As the church repeatedly took action on the slavery question and sided with the anti-slavery churches, its progress was wholly within the boundaries of the Northern States, and even in 1873 no conference had been established in the Southern States. In 1863 there was one in Canada and one in Germany.

In doctrine and theology the Evangelical Association is Arminian; with regard to sanctification, Wesleyan; in the form of government and mode of worship it generally agrees with the Methodist Episcopal Church (of which Albright, prior to beginning his reformatory labors in the German churches, was a member). The ministers, who, like the Methodists, practice itineracy, are divided into deacons and elders; the bishops and presiding elders are elected

for a term of only four years—the former by the general conference, the latter by the individual conferences. The general conference is the highest legislative and judicial authority in the Church; the transactions of the annual and quarterly conferences are mostly of an executive and practical nature. A charitable society for the support of the widows and orphans of poor itinerant preachers was established in 1835, and a missionary society in 1838. There is moreover a Sunday school and tract society, and church-building societies have been established in several conferences. A denominational publishing-house at Cleveland, O., publishes six periodicals—three in German and three in English; besides, two periodicals are published in Germany. The literary institutions of the Church are—the North-western College, in Naperville, Ill.; the Union Seminary, in New Berlin, Pa.; the Blairstown Seminary, Blairstown, Ia.; and the Ebenezer Orphan Institution, at Flat Rock, O. At present the Church has twenty-two annual conferences, inclusive of those of Canada and Germany; 1523 ministers; 905 churches; 1033 Sunday-schools, with 56,023 scholars and 11,646 officers and teachers; and 113,871 members. (See the "History of the Association," by W. W. ORWIG.)

**Evangelical Church Conference**, the name applied to periodical meetings of the Protestant state churches of Germany. The idea of these meetings originated with King William of Württemberg in 1815. The first conference, held at Berlin in 1846, had representatives from almost every German state. At the second conference, held in 1852 at Eisenach, an official central organ was established at Stuttgart ("Allgemeine Kirchenblatt für das evangel. Deutschland"). The conferences from 1855 to 1868 were all held at Eisenach.

**Evangelical Churches** are those bodies of Christians which believe in the divinity of Christ, in the necessity of his atonement, and in personal repentance and faith as essential to salvation.

"*Evangelische Kirche*" ("Evangelical Church") is the official title of the Established Church of Prussia, formed in 1817 by the union of the Lutheran and the Reformed churches. The Lutherans and Reformed (Calvinistic) churches of Baden, Württemberg, and other German states have been similarly united.

The "evangelical party" in the Church of England is that section of the Church which professes to attach especial importance to the teachings of the New Testament, and which is charged with neglecting or slighting church authority and underrating the efficacy of the sacraments.

**Evangelical Counsels** [Lat. *consilia evangelica*] are such directions or admonitions in the Roman Catholic Church as are not in themselves obligatory upon any one, but are recommended by the Church to some persons as highly advantageous to spiritual excellence. The chief evangelical counsels are voluntary virginity, poverty, and obedience to monastic rules. Some writers reckon as evangelical counsels the scriptural recommendation to turn the left cheek to the man who has struck one's right cheek, to go two miles with a person who desires one's company for one mile, etc. There are reckoned twelve of these counsels.

**Evangelical Union**, a body of Scotch Independents, called **Morisonians**, from Rev. James Morison, their original leader. In 1843 they left the United Secession Church. They have been joined by some Congregational churches of Scotland and England. They reject a part of the Calvinistic doctrines, and have a theological school at Glasgow. The three propositions for which Morison was deposed and on which the union was formed were that faith is one's belief in Christ's dying for him; that the "Spirit is poured out upon all flesh" and strives with all unbelievers; and that the atonement was universal. The union now embraces ninety churches. (See FERGUSON, "Hist. of E. U.," Glasgow, 1876.)

**E'vans**, former cap. of Weld co., Col. (see map. of Colorado, ref. 1-G, for location of county), 47 miles N. by E. of Denver, on R. R. and South Platte River. It has a large flouring-mill, is the centre of the St. Louis Western colony, and has a thriving trade, good water-power, and ample means for irrigating the excellent lands which surround the town. Pop. in 1870, 189; in 1880, not in census.

**Evans** (AUGUSTA J.; since 1868 Mrs. L. M. WILSON), born near Columbus, Ga., in 1836, removed in childhood, with her father, to Texas, and in 1849 removed to Mobile. She has published "Inez, a Tale of the Alamo," "Beulah" (1859), "Macaria" (1864), "St. Elmo" (1866), "Vashti" (1869). She is a novelist of great talent.

**Evans** (SIR DE LACY), D. C. L., a British general, born at Moig, in Ireland, in 1787. He served at the battles of Baltimore (1814), New Orleans (1815), and Waterloo (1815). He was a Liberal member of Parliament from 1831 to 1841.

In 1835 he was appointed commander of a legion of 10,000 men raised in Great Britain to fight for the queen of Spain. He defeated the Carlists at several places in 1836 and 1837. In 1846 he was returned to Parliament for Westminster, which he represented for many years. Became lieutenant-general and commanded a division at the battle of the Alma and at Sebastopol, in Oct., 1854. Died Jan. 9, 1870.

**Evans (EDWARD P.).** See APPENDIX.

**Evans (ELICOTT), LL.D.,** was born at Batavia, Genesee co., N. Y., June 19, 1819, and was educated at Harvard. In 1860 he became professor of law and political economy at Hamilton College, Clinton, N. Y.

**Evans (FREDERICK WILLIAM),** born at Leominster, England, June 9, 1808, came in 1820 to the U. S. with his father. He was apprenticed to a hatter, and occupied his leisure hours with study. He became in theory a socialist, and studied the works of Owen, Fourier, and other leaders in the various projects for social reform. He visited England, and after his return went to visit the communities of United Shakers at Mount Lebanon, N. Y., for the purpose of studying their system, to which he became a convert. He afterwards became the presiding elder brother of the communities of that place and the leader of the sect in the U. S. His teachings have added new dogmas and considerably modified the old doctrines of Shakerism. He is known as a public lecturer, a contributor to periodical literature, and author of an "Autobiography," "Anne Lee," "Religious Communism," and other works.

**Evans (GEORGE),** born at Hallowell, Me., Jan. 12, 1797, graduated at Bowdoin in 1815, called to the bar in 1818, was a member of Congress from Maine (1829-41), U. S. Senator (1841-47), and held various important offices in his native State. Died April 5, 1867.

**Evans (HUGH DAVY), LL.D.,** born at Baltimore, Md., in 1792, was a prominent jurist and strong friend of the Protestant Episcopal Church. He wrote an "Essay on Pleading" (1827), "Maryland Common-Law Practice" (1839), and "Essays" upon various Church questions (1844, 1851, 1855, etc.). Died July 16, 1868.

**Evans (JOHN), M.D.,** geologist, was born at Portsmouth, N. H., Feb. 14, 1812, graduated at the St. Louis Medical College, served on several State and Territorial geological surveys under Dr. D. D. Owen, and discovered remarkable fossil deposits in the Bad Lands of Nebraska. He afterwards performed the U. S. geological survey of Oregon and Washington Territory. Died April 13, 1861.

**Evans (MARIAN C.).** See LEWES (MARIAN E.).

**Evans (OLIVER),** an American inventor, born in 1755 at Newport, Del. Died in New York April 25, 1819. His most valuable inventions were the automatic flour-mill and the high-pressure steam-engine. Before his time grain and flour were moved in the mill by manual labor. His improvements, which effected a complete revolution in the manufacture of flour, consisted of the elevator, the conveyer, the hopper-boy, the drill, and the descender. By means of this machinery grain was conveyed from a wagon or a boat into the mill, then cleaned, ground, bolted, and delivered into barrels without the intervention of human hands. After great opposition these improvements were introduced into the celebrated Ellicott Mills, near Baltimore, where 325 barrels of flour were daily made. The saving there effected by Evans's contrivances was estimated at more than fifty cents per barrel. As the production of wheat alone in the U. S. in 1880 were 459,483,137 bushels, the benefits arising from the use of the automatic flour-mill are not likely to be over-estimated.

In 1772, while yet an apprentice, Evans endeavored to discover some substitute for animal power in moving wagons; fortunately, an incident, related by his brother, gave the right direction to his investigations. In a blacksmith shop near by about a gill of water was poured into a gun-barrel, after stopping up its touch-hole; then a tight wad was rammed into the barrel, and it was placed in the smith's fire; "presently the barrel discharged itself with a loud crack, as if it had been loaded with powder." It instantly occurred to Evans that this was the power he wanted. He subsequently found a book containing a description of the atmospheric steam-pump used at the English coal-mines, and was astonished to find that steam was solely employed for obtaining a vacuum by its condensation, thus allowing only the pressure of the atmosphere to move the piston. He made experiments in which the pressure of steam moved the piston, and in 1781 announced that he could propel boats and wagons by means of steam. No attempt was made to introduce this invention until after the close of the Revolutionary war. In 1786 the State of Pennsylvania gave him the exclusive right to use in that State his flour-mill, but refused to grant the same right to use his steam-

wagon. In 1787, however, Maryland granted him the right to use both inventions in that State. In order to obtain assistance in building his road-engine, he exhibited his drawings and plans to capitalists and engineers; failing to find one who would join him in the enterprise, he twice sent his plan and specifications to England, in the vain hope of convincing foreign engineers of the feasibility of his device. Finally, in 1801 he decided to devote all his earnings from his other inventions, about \$3700, to the construction of a stationary steam-engine on the direct-pressure plan. It was completed and put into operation in the city of Philadelphia, and continued to be used successfully for many years in sawing marble and grinding gypsum. Thus, 1801 marks a new era—the introduction of the most important of all engines. Soon after, by order of the board of health of Philadelphia, Evans constructed a device for cleaning or dredging docks. It consisted of a small scow or flatboat, with a small steam-engine of five-horse power and boiler on board to work the dredging machinery. In order to show its adaptability to locomotion, he connected his engine, by means of pulleys and bands, with four wooden wheels turning on wooden axles beneath the boat, also with a paddle-wheel behind it. This singular contrivance for moving on land and water he called the "Erector amphibolis." By steam alone it was driven over the highway from his workshop to the Schuylkill River, about one mile and a half, where it was launched, and from thence propelled down the Schuylkill to its mouth, and up the Delaware River to the city, a distance of fourteen or fifteen miles. This was the first application of the high-pressure principle to locomotion, and the Evans engine, with important improvements made since his day, drives all the locomotives and steam-carriages now in use. Evans also invented the cylinder boiler, with a cylindrical internal flue, commonly known as the "Cornish boiler."

Three varieties of steam-engines are now in use—namely, the condensing or low-pressure engine, the non-condensing or high-pressure engine, and a combination of these two, called the compound engine. In the condensing and the compound engines power is derived from heat, which converts water into steam; also from cold, which reconverts steam into water. These engines are only available where the large quantity of cold water required for condensing steam can be readily obtained. No such condition attends the use of the Evans non-condensing engine, in which the direct action of high-pressure steam on a relatively small piston moving with great velocity gives the required power. Compared with the other two, it is small, of simple construction, cheap, always available, and therefore of almost universal application. Experience warrants the assertion that the high-pressure steam-engine is the most valuable prime mover ever devised. A great invention when brought into practical operation is an important element in human progress, for its power outlasts its originator and increases with time. It is a continual source of wealth, because labor saved is, virtually, labor gained. The devices of Oliver Evans were of this stamp, and have won for him a high place among the benefactors of our race.

SAMUEL D. TILMAN.

**Evans (ROBLEY D.), U. S. N.,** born Aug. 18, 1844, in Floyd co., Va., entered the navy as a midshipman Sept. 20, 1860, became an ensign in 1863, a lieutenant in 1866, a lieutenant-commander in 1868, and afterward commander. Served in both attacks upon Fort Fisher, N. C., and in the attempt to storm the fort was four times wounded.

FOXHALL A. PARKER.

**Evanson (EDWARD),** born at Warrington, Lancashire, April 21, 1731, died at Colford, Gloucestershire, Sept. 25, 1805. He studied theology at Cambridge and became a minister of the Church of England, but was tried for heresy in 1773 in the consistorial court of Gloucester. He omitted or altered such phrases in the church-service as seemed to him to be untrue; he corrected the authorized translation of the Scriptures; he conversed against the creeds and the divinity of Christ, etc. The case was carried on appeal to the court of arches, and there it was buried, 1777. But, in 1792, Evanson published his "Dissonance of the four generally received Evangelists," in which he rejected most of the books of the New Testament as mere forgeries. He was answered by Thomas Falconer.

**E'vanston,** on R. R., Cook co., Ill. (see map of Illinois, ref. 2-C, for location of county), on Lake Michigan, 12 miles N. of Chicago. It is a very handsome suburban town, the seat of the North-western University, a wealthy and flourishing institution, having substantial and costly buildings, extensive libraries, and a museum. It is noted for its pleasant situation, its numerous churches, rapid growth, and social attractions. No intoxicating liquors can legally be sold within 4 miles of the university. It is also the seat of Garrett Biblical Institute. Pop. of town-

ship in 1870, 3062; in 1880, including part of village, 6703; village, 4400.

**Evanston**, capital of Uintah co., Wy. Ter. (see map of Wyoming, ref. 5-D, for location of county), situated on Bear River and on the Union Pacific R. R., 76 miles E. of Ogden, and halfway between Omaha and San Francisco. The railroad machine-shops are here, employing over 100 men; it has also a large steam saw-mill and one library. Within three miles is found an abundance of coal, large quantities of which are shipped from this place. Iron ore is also found in the vicinity. Pop. in 1880, 1277.

**Evansville**, a city and important R. R. centre and port of entry, capital of Vanderburg co., Ind. (see map of Indiana, ref. 11-B, for location of county), is on the Ohio River, 185 miles below Louisville and 192 above Cairo. It is the southern terminus of the Evansville and Terre Haute R. R., which connects it with Terre Haute, 109 miles distant. It is 161 miles E. S. E. of St. Louis by the St. Louis and Southern division of L. and N. R. R. Evansville is pleasantly situated on a high bank, has an extensive trade, and is the principal shipping-point of South-western Indiana. It has a fine U. S. custom-house and post-office, a U. S. marine hospital, two theatres, several public halls, including Evans Hall, one of the finest exclusively temperance halls in the country, and five national banks and one savings-bank.

**Manufactures**.—The census of 1880 showed 313 manufactures; capital, \$4,733,815; average number of hands employed, 3669; wages paid during the year, \$1,365,006; value of products, \$8,091,914. It has a number of flour-mills, iron-foundries, machine-shops, and manufactures of wool, leather, etc. Pop. in 1860, 11,484; in 1870, 21,830; in 1880, 29,280; in 1883, about 40,000.

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**Evansville**, on R. R., Rock co., Wis. (see map of Wisconsin, ref. 7-E, for location of county), 22 miles S. by E. of Madison. It has a graded school, seminary, one machine-shop, one steam cabinet-manufactory, etc. Principal business, farming. Pop. in 1880, 1068.

**Evaporation** [from the Lat. *e*, "out," "off" and *vapor*, "steam" or "vapor;" literally, the act of going off as vapor] is the passage of a substance from the liquid or solid state to the condition of vapor, especially applied to such a change when it takes place at a temperature below the boiling-point. It was once taught that the air had a sponge-like power of taking up or dissolving a certain quantity of vapor of water and other liquids, and that this power increased with the temperature; but it is now known that evaporation takes place to the same degree in a vacuum as in the air, and far more rapidly. It has been shown by Dalton that the elastic force of all vapors is the same, whether mixed with gas or air, or not; and that air is never truly saturated with vapor unless it contains an amount sufficient to saturate a vacuum of the same extent.

Heat is the great cause of evaporation; so that the hotter the air becomes the more rapidly is vapor formed. When the air is at rest the space near an evaporating surface becomes loaded with vapor, and the process becomes much slower than when the air is in motion, both by reason of increased tension and of loss of heat; for evaporation is a great absorber of heat. Indeed, the most intense degree of cold with which we are acquainted is caused by the evaporation of volatile liquids, such as ether, rhigoline, etc.; the lowest point yet reported being  $-220^{\circ}$  F., artificially produced by the evaporation in vacuo of a mixture of liquid nitrous oxide ( $N_2O$ ) and carbon disulphide ( $CS_2$ ).

**Evart**, on R. R., Osceola co., Mich. (see map of Michigan, ref. 5-H, for location of county), situated in the heart of a great lumber country, about midway between the two great lakes. It has a number of saw and shingle mills, a foundry and machine-shop. Pop. in 1880, 1302.

**Evarts** (JEREMIAH), an American editor, born in Sunderland, Vt., Feb. 3, 1781, graduated at Yale College in 1802. Having studied law, he was admitted to the bar in 1806, and became editor of the "Panoplist," a religious paper of Boston, about 1810. In 1821 he was chosen corresponding secretary of the board of commissioners for foreign missions. Died May 10, 1831. He was a man of rare fineness and force of character.

**Evarts** (WILLIAM MAXWELL), LL.D., an eminent lawyer, a son of the preceding, was born in Boston, Mass., in Feb. 6, 1818; graduated at Yale College in 1837, and studied law, which he practised with great distinction in the city of New York, where he was admitted to the bar in 1840. He became a Republican soon after that party was organized. He was the leading counsel employed for the defence of President Johnson in his trial before the Senate in April and May, 1868, and was attorney-general of the

U. S. from July, 1868, to Mar. 4, 1869. He was one of three lawyers appointed by President Grant in 1871 to defend the interests of citizens of the U. S. before the tribunal of arbitrators who met at Geneva to settle the "Alabama claims." He is one of the most eloquent advocates in the U. S. Several of his public addresses have been published. Appointed secretary of state by Pres. Hayes Mar. 7, 1877; elected U. S. Senator for N. Y. Jan. 21, 1885.

**Eve** (PAUL FITZSIMONS), M. D., was born June 27, 1806, near Augusta, Ga., graduated at the University of Georgia in 1826, graduated as M. D. at the University of Pennsylvania in 1828, and studied several years in Europe, was a surgeon in the Polish revolution of 1831, and received the Golden Cross of Honor of Poland in that year, became professor of surgery in the Medical College of Georgia in 1832, in Louisville University (Ky.) in 1849, in Nashville University (Tenn.) in 1850, and in Missouri Medical College, St. Louis, in 1868. In 1870 he became professor of operative and clinical surgery in the University of Nashville. Prof. Eve was president of the American Medical Association in 1857. He served as a surgeon in the Confederate army. He was editorially connected with professional journalism for many years, and was the author of very numerous monographs upon surgery, etc. Dr. Eve long held a high position among the surgeons of the U. S. He crossed the Atlantic fourteen times in the interest of his profession. His youthful service in Poland was voluntary and without pay. In the Medical College of Ga. he delivered eighteen courses of lectures. He declined professorships in New York City and Philadelphia, and the surgeon-generalship of Tennessee. Of 92 bilateral operations by him for stone in the bladder, 8 only terminated fatally; of the last 48 cases, 46 recovered; of 195 applicants for relief, not one was refused. Died at Nashville, Tenn., Nov. 3, 1877.

**Vec'tion** [from the Lat. *e*, "out," and *veho*, *vectum*, to "carry;" literally, "being carried out" of its proper or natural position], an inequality of the moon's motion, depending on the position of the transverse axis of the moon's orbit, as compared with the earth's radius vector. The eccentricity of the lunar orbit varies with the relative position of these lines. It is maximum when they are coincident, and minimum when they are perpendicular to each other.

**Evelyn** (JOHN), born at Wotton, Surrey, Oct. 31, 1620, died in London Feb. 27, 1706. He was educated at Balliol College, Oxford, travelled abroad from 1641 to 1652, enjoyed after the Restoration great favor at the court, and held various positions of honor and trust, but no office. He was a very prolific writer, and published "Sylva," an elaborate treatise on arboriculture; "Navigation and Commerce, their Origin and Progress;" an introduction to a history of the Dutch war, which he began, but never finished; "A Parallel of Ancient and Modern Architecture," etc. But his most important and most interesting work is his "Diary," written without any idea of publication and containing numerous contributions to the history of the time.

**Evening Schools** are established in many of the larger towns of Great Britain and Ireland, and in the greater part of the cities of the U. S., for the instruction of artisans and others who have been unable to receive education in childhood. In many instances such schools have been maintained by private benevolence, but of late years they are, at least in the U. S., generally established, and wholly or in part maintained, by local or municipal authorities. Their sphere of usefulness is rapidly extending, and the course of study becomes more and more important. Boston, Mass., has an evening high school, and in our larger cities, as in nearly all the important towns of Massachusetts, industrial and free-hand drawing is taught. The Cooper Union, N. Y., has a flourishing evening school of design.

**Evening Shades**, capital of Sharpe co., Ark. (see map of Arkansas, ref. 1-D, for location of county). Pop. in 1880, 286.

**Ev'erdingen, van** (ALLART), a painter of landscapes, born at Alkmaar, Holland, in 1621, died in Amsterdam in 1675. His taste was for wild scenery, rocks, torrents, the stormy sea. His etchings are famous.

**Ev'erest, Mount**, the highest mountain of the earth, is in the eastern range of the Himalayas, in Northern Nepaul; lat.  $27^{\circ} 59' N.$ , lon.  $86^{\circ} 54' E.$  According to the measurement of Waugh in 1856, the altitude is 29,002 feet.

**Ev'ere'tt**, a thriving post-township of Middlesex co., Mass. (see map of Massachusetts, ref. 2-H, for location of county). Until 1870 it formed a part of Malden. It is supplied with water from the Mystic Waterworks of Boston. It adjoins Boston, and is connected with the central part of it by the Eastern R. R. It has excellent schools. Pop. in 1870, 2220; in 1880, 4159.

**Everett**, Pa. See APPENDIX.

**Everett** (ALEXANDER HILL), LL.D., an American scholar and diplomatist, born in Boston Mar. 19, 1792, was a brother of Edward Everett, noticed below. He graduated at Harvard in 1806, and studied law in the office of John Q. Adams, with whom he went to Russia as secretary of legation in 1809. Having returned home in 1812, he began to practise law in Boston, and married Lucretia Peabody. He was chargé d'affaires at The Hague for nearly six years (1818-24), and published in 1821 an able work entitled "Europe, or a General Survey of the Principal Powers," etc. In 1825 he was appointed minister to the court of Spain by President Adams. During his residence at Madrid he wrote "America, or a General Survey of the Political Situation of the Several Powers of the Western Continent" (1827). He returned home in 1829, and became editor of the "North American Review," to which he contributed many articles. Having been appointed commissioner to China in 1845, he died at Canton June 29, 1847.

**Everett** (CHARLES CARROLL), D. D. See APPENDIX.

**Everett** (EDWARD), LL.D., D. C. L., an orator and statesman, born in Dorchester, Mass., April 11, 1794. He was a son of Rev. Oliver Everett, who died in 1802. He attended a school in Boston, at which Daniel Webster for a short time supplied the place of his brother, Ezekiel Webster, the regular master. He was twice a "Franklin medal scholar" of the Boston public schools, and for a few months a pupil of Exeter Academy. In 1811 he graduated at Harvard University with the highest honors of his class, being then little more than seventeen years of age. In 1812 he was appointed a tutor at Harvard while pursuing theological studies in preparation for the ministry. On Feb. 9, 1814, he was ordained as pastor of the Brattle street (Unitarian) church in Boston, where the fascination of his manner and the power and beauty of his sermons made the deepest impression on his hearers. In Mar., 1815, he accepted the Eliot professorship of Greek literature at Harvard, and terminated his career as a settled clergyman before he was quite twenty-one years of age. Proceeding at once to Europe, he studied for two years at the University of Göttingen, of which he became Ph. D. in 1817, and then travelled extensively in Europe, making special visits to Athens and Constantinople with a view to thorough preparation for the studies of his professorship, upon which he entered soon after his return in 1819. A brilliant course of lectures on ancient Greece and its architecture, with illustrations of the magnificent ruins which he had just visited, inaugurated his accession to the chair, which he held until 1825. His fame as a secular orator—which will probably outlast all his other titles to the remembrance of posterity—may be dated from the delivery of his Phi Beta Kappa oration at Cambridge in Aug., 1824, when the presence of La Fayette inspired him with an eloquence which had never been equalled within the walls of the university, and which won for him a widespread popular celebrity. Succeeded as it was in a few months by his oration at Plymouth on the 22d of December of the same year, an enthusiastic admiration was kindled and kept alive, which could only be satisfied by calling him into political service. A nomination for Representative in Congress soon followed, and Mr. Everett served the district of Middlesex in that capacity from 1825 to 1835, distinguishing himself greatly by unwearied devotion to duty, as well as by elaborate and masterly speeches. In 1836, after ten years of congressional service at Washington, he was called home to be governor of Massachusetts, and was continued in that office, by successive annual elections of the people, until 1840. A single vote, out of more than a hundred thousand, defeated his re-election. Going at once, for a second time, to Europe, he established himself in one of the Medicean villas at Florence, and prepared to enter upon his long-cherished purpose of writing history. "Rome in the time of Cicero" was one among many of the congenial themes which he had meditated. But hardly a year had elapsed before he received a call to proceed without delay to London as minister plenipotentiary of the U. S., and he entered upon that mission in 1841 at a moment when questions of the greatest delicacy were pending between the two nations. Returning home in 1845 after four years of diplomatic service in England, he was met almost at the wharf on landing with an inexorable demand that he should assume the then vacant presidency of the university at Cambridge. Accepting the position reluctantly, he gave three years of anxious and strenuous labor to its duties, and then eagerly laid them down. A brief interval of rest, which he sorely needed and had richly earned, afforded him time to establish himself again in Boston with a choice library around him, and to contemplate afresh some larger literary work than had yet seriously engaged him. But the death of Mr. Webster in Nov., 1852, left a vacancy in the department of state at Washington, which he was immediately summoned to fill; and on the expira-

tion of his brief term as secretary of state, by the termination of President Fillmore's administration in 1853, he was elected by the legislature of Massachusetts a Senator in Congress. He held that place but a single year, when, owing to ill-health, he retired finally, as it proved, from the cares and burdens of official life. In 1860, indeed, he accepted a nomination for the vice-presidency of the U. S., but failed of an election; and the last ten years of his life were thus left undisturbed by political responsibilities. But nothing like private life, as that phrase is commonly understood, awaited his retirement. Calls were soon heard from a hundred sources for the exercise of his personal influence and his oratorical powers in behalf of some charitable institution, or in commemorating some historical event, or in eulogizing some illustrious person. It was not in his nature to decline such calls. During the first half of these last ten years his topics were within the common range of occasional discourses—"Dorchester (his native place) in 1630, 1776, and 1856;" "The Uses of Astronomy;" "The Importance of Agriculture;" "Charitable Institutions and Charity;" "Daniel Webster;" "Thomas Dowse;" "Academical Education;" "The Dedication of the Boston Public Library," of which he was one of the building commissioners, as well as president of the trustees. To this period also belongs his memorable and patriotic pilgrimage in the cause of rescuing Mount Vernon from the danger of falling into the hands of speculators, and securing it as a national possession; during which he delivered his address on "The Character of Washington" in all quarters of the Union, and paid over about \$60,000 to the treasurer of the fund as the product of his eloquence. But the remainder of these last ten years of his life was to be mainly devoted to more painful and pressing themes. The opening of the civil war gave a new field to the labors of his pen and of his tongue, and from "The Flag-raising in Chester Square" (Boston), on the 27th of April, 1861, to his last utterance for "The Relief of Savannah," in Faneuil Hall on the 9th of Jan., 1865, just six days before he died, his thoughts, his time, and almost all his numerous addresses, filling nearly 350 pages of an octavo volume, were given to the support of the Union cause. He died in Boston Jan. 15, 1865.

Of such a career the records are happily abundant. His political and congressional speeches and his official papers have, it is true, never been collected, and are to be found only in separate pamphlets or in the columns of newspapers. They would make an interesting and valuable volume. His literary essays, too, must be sought for in the pages of the "North American Review," of which he was for several years editor, and to which he contributed many admirable articles. An attractive and instructive volume of literary miscellanies cannot fail to be forthcoming at no distant day from these materials. His contributions to the "New York Ledger" during the war were collected and published by himself in a volume entitled "The Mount Vernon Papers." So also he published, in an independent volume, his "Biography of Washington," prepared for the "Encyclopædia Britannica" at the request of Lord Macaulay. His "Defence of Christianity," a little work printed as long ago as 1814, is to be found on the shelves of public libraries or among the rarities of bookworms, but it ought never to be omitted from the catalogue of his earliest and most remarkable manifestations. His fame, however, as a scholar, an orator, a philanthropist, and a patriot will mainly rest on the four substantial volumes of his "Orations and Speeches"—two of them published in 1850, the third in 1859, and the fourth (by his sons) in 1868. The exhaustive index to the three first, prepared as a labor of love by Dr. Allibone, affords an easy reference to their rich and curiously diversified contents. They form together a most striking illustration of the times in which he lived, as well as an almost perfect picture, in the choicest mosaic, of the man himself. The materials of a complete autobiography might well nigh be found in them, in language which could not be improved. The ardent and gifted young scholar, the accomplished and devoted professor, the cautious and conservative statesman, the sincere and earnest patriot, the exhaustless and consummate rhetorician are depicted in these volumes with the exactness of a photograph. The true man, the ever-obliging and faithful friend, the good citizen, are not less clearly delineated. It is too early to pronounce upon the permanent influence of such a career. His life must be taken as a whole, in order to form any adequate appreciation of its value. Certainly, there have been wiser and profounder statesmen among us, and scholars as learned and accomplished; but we think the annals of our country to the day of his death will be searched in vain for another so ready, prolific, and brilliant a writer and speaker, or for one who has done more both to adorn American literature and to advocate and advance every public interest and



patriotic cause. The statue of him by Story, ordered by his fellow-citizens, and placed (by no means to advantage) in the Public Garden of Boston, portrays him in the relation to his times in which he will longest be remembered—as one whose every word and gesture was untiringly and grandly employed in animating his hearers to the best and loftiest ends.

Mr. Everett's repeated visits to Europe, and his residence in London as American minister for four years, afforded him an opportunity of becoming personally known and appreciated in other lands besides his own. Sir Robert Peel and Lord Aberdeen, Rogers, Hallam, and Macaulay, were among his warmest English friends. Lord Macaulay died with an unfinished letter to him on his table or in his pocket. He received the highest literary honors from Cambridge and Oxford at a time when those universities were more chary than of late in decorating Americans. Humboldt and Guizot were among his friends on the Continent. The Institute of France enrolled him as a corresponding member. At home he enjoyed the lifelong intimacy and confidence of Daniel Webster, whose collected works he edited and published in 1851 in six volumes, with a carefully written biography in the first volume.

In 1822, Mr. Everett married Miss Charlotte Gray, daughter of the Hon. Peter C. Brooks, a distinguished merchant of Boston, of whom he prepared an elaborate memoir, which is included in the third volume of his "Orations and Speeches." Two sons and a daughter survived him.

ROBERT C. WINTHROP.

**Everett** (HORACE), LL.D., born in 1780, graduated at Brown University in 1797, settled as a lawyer at Windsor, Vt., became a prominent politician, holding important positions in Vermont. He was a member of Congress (1829-43), and was distinguished as a friend of the Indians. Died Jan. 30, 1851.

**Ev'erghem**, a Belgian town, a railway station in East Flanders. It makes cotton lace and beer. Pop. 6447.

**Everglades**, a marshy region in Southern Florida, S. of Lake Okeechobee, itself resembling a great shallow lake abounding in low islands, which are covered with a dense jungle of pines, palmettoes, vines, and tropical trees, many of which are found only in this State and the West Indies. The water between the islands is from one to six feet deep, and is covered with tall grass, which grows from the bottom and gives the region a beautiful appearance. The Everglades will no doubt in time become valuable for the cultivation of bananas and tropical fruits. They abound in game. They are 160 miles long and 60 broad. There is quite a number of Seminole Indians remaining here. The Everglades are elevated several feet above the sea, which often approaches within half a mile. Their drainage could therefore be easily accomplished. The islands in the Everglades vary from a fraction of an acre to hundreds of acres in extent, and have a very rich soil.

**Ev'ergreen**, on R. R., capital of Conecuh co., Ala. (see map of Alabama, ref. 6-C, for location of county), 97 miles N. E. of Mobile. Pop. in 1880, 985.

**Evergreen** [*Lat. sempervirens*], a term applied to trees and shrubs whose leaves are not deciduous, but persistent, retaining their verdure throughout the winter. Evergreen leaves are mostly thicker and firmer in texture than the leaves of deciduous trees. The greater part of the trees of the natural order Coniferae are evergreen, as the pine and cedar. Among other evergreens are the holly, orange, ivy, myrtle, box, and laurel. In general, the duration of the life of leaves is in inverse ratio to the activity of their evaporation. According to W. B. Carpenter, "Trees and shrubs which are spoken of as evergreen do not really retain their leaves for more than a year; but they are not cast off until a new crop appears, and the exchange does not take place suddenly, but gradually." (*Vegetable Physiology*.) "There are some falling leaves," says De Candolle, "as those of firs, which remain two, three, or more years, but which ought not to be confounded with persistent leaves, although both constitute the permanent foliage of evergreen trees and shrubs."

The following is a list of the more important coniferous evergreen trees indigenous to the United States.

Common Names.	Botanic Names.
White Spruce.....	Abies alba.
Hemlock.....	Abies Canadensis.
California Spruce.....	Abies amabilis.
Douglas Spruce.....	Abies Douglassii.
Menzies Spruce.....	Abies Menziesii.
Mexican Spruce.....	Abies Mexicana.
Black Spruce.....	Abies nigra.
Red Spruce.....	Abies rubra.
Sabine's California Spruce.....	Abies Sabini.
California White Cedar.....	Libocedrus decurrens.
White Cedar.....	Cupressus thyoides.
Lambert's Cypress.....	Cupressus Lambertiana.
Great Coned Cypress.....	Cupressus macrocarpa.

Common Names.	Botanic Names.
Mexican Cypress.....	Cupressus Mexicana.
Red Cedar.....	Juniperus Virginiana.
Great Flowered Magnolia.....	Magnolia grandiflora.
Balsam Fir.....	Abies balsamea.
California Noble Fir.....	Abies nobilis.
White Pine.....	Pinus strobus.
Yellow Pine.....	Pinus mitis.
California Yellow Pine.....	Pinus brachypterus.
California Nut Pine.....	Pinus edulis.
Jersey Pine.....	Pinus inops.
Scrub Pine.....	Pinus Banksiana.
Pitch Pine.....	Pinus rigida.
Long-leaved Pine.....	Pinus australis.
Pond Pine.....	Pinus serotina.
Spruce Pine.....	Pinus glabra.
Mountain Pine.....	Pinus pungens.
Loblolly Pine.....	Pinus taeda.
Lambert's Californian.....	Pinus Lambertiana.
Red Pine.....	Pinus resinosa.
Bald Cypress.....	Taxodium distichum.
American Yew.....	Taxus baccata Canadensis.
Florida Yew.....	Taxus Florida.
American Arbor Vitæ.....	Thuja occidentalis.
Giant Arbor Vitæ.....	Thuja gigantea.
Florida Torreya.....	Torreya taxifolia.
California Torreya.....	Torreya Californica.
Great California tree.....	Sequoia gigantea.
Redwood.....	Sequoia sempervirens.

Foreign coniferous evergreen trees common in the nurseries of this country:

Common Names.	Botanic Names.
Silver Spruce.....	Abies argentea.
Dwarf Alpine Spruce.....	Abies cuneiformis.
Blue Spruce.....	Abies cerulea.
Norway Spruce.....	Abies excelsa.
Spruce Himalaya.....	Abies morinda.
Spruce Mucronate.....	Abies mucronata.
Spruce New Holland.....	Abies Nova Hollandiæ.
Spruce Yew-leaved.....	Abies taxifolia.
Spruce Narrow-leaved.....	Abies tenuifolia.
Chili Pine.....	Araucaria imbricata.
Chinese Lance-leaved Pine.....	Araucaria lanceolata.
Brazil Pine.....	Araucaria Braziliensis.
Bidwill's Pine.....	Araucaria Bidwillii.
Moreton Pine.....	Araucaria Cunninghamhamii.
Norfolk Island Pine.....	Araucaria excelsa.
Graceful Pine.....	Araucaria gracilis.
Cedar African Green.....	Cedrus Africanus viridis.
Cedar Deodar, silvery foliage.....	Cedrus deodara.
Cedar Green Deodar.....	Cedrus deodara viridis.
Cedar of Lebanon.....	Cedrus Libani.
Mount Atlas Silvery Cedar.....	Cedrus Libani argentea.
Japan Dark-green Yew.....	Cephalotaxus adpressus.
Fortune's Chinese Yew.....	Cephalotaxus Fortunei.
Mountain Yew.....	Cephalotaxus montana.
Chinese Yew.....	Cephalotaxus Chinesis.
Japan Weeping Cypress.....	Cryptomeria Japonica.
Japan Dwarf Cypress.....	Cryptomeria nana.
Cypress Australian.....	Cupressus Australis.
Cypress Spreading.....	Cupressus expansa.
Cypress Chinese.....	Cupressus funebris.
Cypress Graceful.....	Cupressus gracilis.
Cypress Weeping.....	Cupressus pendula.
Cypress Pyramidal.....	Cupressus pyramidalis.
Cypress Sacred.....	Cupressus religiosa.
Juniper Silver-leaved.....	Juniperus argentea.
Juniper Berry-bearing.....	Juniperus bacciformis.
Juniper Bermuda Cedar.....	Juniperus Bermudiana.
Juniper Chinese.....	Juniperus Chinesis.
Juniper English.....	Juniperus communis.
Juniper Cracow.....	Juniperus Cracovia.
Juniper Himalaya.....	Juniperus excelsa.
Juniper Irish Spiral.....	Juniperus Hibernica.
Juniper Hudson's.....	Juniperus Hudsonii.
Juniper Japan.....	Juniperus Japonica.
Juniper Phœnician.....	Juniperus Phœnicia.
Juniper Sacred.....	Juniperus religiosa.
Juniper Swedish.....	Juniperus Suecica.
Juniper Spanish Incense.....	Juniperus thurifera.
Fir, or Spruce, European Silver.....	Picea pectinata.
Fir Weeping Silver.....	Picea pectinata pendula.
Fir Kumaon Pindrow.....	Picea Pindrow.
Fir Altaic.....	Picea Sibirica.
Fir Mount Atlas.....	Picea pinagop.
Fir Nepal purple-coned.....	Picea Webbiana.
Pine Austrian Black.....	Picea Austriaca.
Pine Calabrian.....	Picea Calabriensis.
Pine Siberian Cambran.....	Pinus cembra.
Pine Nepal short-leaved.....	Pinus Gerardiana.
Pine Hagueneæ.....	Pinus Hagueneæ.
Pine Aleppo.....	Pinus Halepensis.
Pine Dwarf Mountain.....	Pinus pumilio.
Pine Italian Stone.....	Pinus pines.
Pine Scotch Pine, or Fir.....	Pinus Sylvestris.
Yew English.....	Taxus baccata.
Yew Silver-striped.....	Taxus baccata argentea.
Yew Weeping.....	Taxus Dovastonii pendula.
Yew Irish Spiral.....	Taxus Hibernica fastigiata.
Arbor Vitæ Fern-leaved.....	Thuja asplenifolia.
Arbor Vitæ Australian.....	Thuja Australis.
Arbor Vitæ Japan.....	Thuja Japonica.
Arbor Vitæ Nepal, or Tartarian.....	Thuja Nepalensis.
Arbor Vitæ Chinese.....	Thuja Orientalis.
Arbor Vitæ Siberian.....	Thuja Sibirica.

**Everlasting Flowers**, the common name of several genera of the order Compositæ, having flowers which if

dried and preserved retain their form and color many years. They are often called immortelles.

**Eversley** (CHARLES SHAW-LEFEVRE), VISCOUNT, D. C. L., an English liberal, was born in London Feb. 22, 1794, was educated at the University of Cambridge, and was admitted to the bar. From 1830 to 1857 he was a member of Parliament, and for eighteen years (1839-57) was Speaker of the House of Commons. He became Viscount Eversley in 1857.

**Eversmann** (EDUARD FRIEDRICH), a German traveller and naturalist, born in 1794, went to Bokhara with the Russian embassy in 1820, to the shores of the Caspian Sea in 1825, and afterwards to the Southern Ural, Caucasus, and Algeria. In 1828 he became professor of zoology and botany in the University of Kasan, and died there in 1860. He published several accounts of his travels.

**Everts** (W. W.), D. D., a Baptist minister, born in Granville, N. Y., in 1815, graduated at Madison University in 1839, preached in New York City (1839-50), in Louisville (1852-59); since which time he has been a pastor in Chicago. He has published the "Pastor's Handbook," "Life of Foster," "Bible Manual," "Free Manhood," "Childhood, its Promise and Training," "Bible Prayer-book," and other works.

**Evesham**, a parliamentary borough of England, in Worcestershire, is on the navigable river Avon, here crossed by a stone bridge of eight arches, and in the beautiful Vale of Evesham, 15 miles S. E. of Worcester. Most of the surrounding country is occupied by market-gardens. It has remains of an abbey built about 700 A. D. It sends one member to Parliament. Here Edward, prince of Wales, afterward Edward I., defeated Simon de Montfort and the barons in 1265. Pop. in 1881, 5112.

**Eviction** [Lat. *evic'tio*, from *e* (*ex*), "out," and *vin'co*, *victum*, to "conquer"], the act of dispossessing one of his lands or tenements, as when a third person evicts a tenant by means of a title superior to that of the landlord, or a vendee by a title superior to that of the vendor. Technically, an eviction must be by judgment of law, but in the case of a tenant many acts done by the landlord to impair the enjoyment of the premises will amount to an eviction in law, and justify the tenant in leaving them; but in such cases he must actually leave, otherwise he cannot claim to have been evicted. When the grantee of premises is evicted, if the conveyance to him was with a covenant of warranty, he can recover from the grantor the consideration-money, with interest, but not, in general, the increased value of the premises, even if caused by improvements made by him on them. If evicted from part of the premises only, he recovers a proportionate part of the consideration. In case of a lessee, however, as the rent is regarded only a fair compensation for the use of the premises, and as it ceases on eviction, he can as a general rule recover only the expenses of defending his possession. When a lessee is evicted in part by one having a superior title, the rent is apportioned.

**Evidence** [Lat. *evidentia*, from *e*, "out," implying "clearness," and *video*, to "see"], in law, is the means of establishing an allegation made in a court of justice. In an action the respective parties make written statements of their case of action and defence. The matter thus in dispute between them is called an issue. The object of evidence is to establish or disprove the propositions alleged. The result of the evidence is called proof. Evidence may be considered under a number of divisions: 1. Its nature and the doctrine of presumptions; 2. The rules that govern in the production and exclusion of testimony; 3. Its effect; 4. The instruments of evidence, including witnesses, and the mode of making use of them as well as writings.

1. *Its Nature, etc.*—The object of evidence is to establish a fact. It presupposes a disposition in the mind of a listener to believe upon sufficient grounds. Belief on the part of mankind is instinctive, yet this instinct is modified by the results of observation and reflection. When evidence is offered in a court of justice, it is assumed to be addressed to minds competent to give it such weight as its quality justifies. It may be either direct or circumstantial. It is said to be direct when it is offered simply to establish the fact which it concerns; it is circumstantial when its object is to lead the mind of the hearer to deduce or infer some other fact from it. In the case of circumstantial evidence the minds of the jury or judge, as the case may be, go through a process of reasoning to arrive at the principal fact in dispute. It must be resorted to with caution, in order that the conclusion arrived at may be sound and logical.

Reference may now be made to the subject of presumptions. These are of two kinds—of law and of fact. Presumptions of law are either conclusive or disputable. A

conclusive presumption of law takes place when a legal conclusion is arrived at which no evidence is admissible to rebut. This doctrine is based largely on public policy, and leads to a series of artificial and arbitrary subordinate rules. An illustration is, that a child under seven years of age cannot commit a felonious crime. The doctrine of estoppel is another illustration. When evidence can be offered to rebut a presumption of law, it is said to be disputable. An instance is the ordinary rule in criminal law, that one charged with crime is presumed to be innocent until he is proved to be guilty, or that one having possession of stolen goods immediately after a theft became possessed of them unlawfully. Under this theory, when a state of facts is once established, it is presumed to exist until there is some evidence to the contrary. Thus, a man engaged in trade is assumed to follow the ordinary course of business, or the incumbent of a public office to perform its duties in the usual manner. Life is presumed to continue unless there is evidence of death, or sanity until evidence is offered to establish insanity. A presumption of fact is not a rule of law which can be announced to a jury as binding upon them, but in each case must be found by them as a matter of fact, though the court may direct their attention to the propriety of forming the conclusion. An illustration is the testimony of an accomplice, which is generally deemed to be untrustworthy without corroboration from other and trustworthy sources, and an observation to that effect may be made by the judge. Still, the jury has the legal power to find a verdict upon the uncorroborated testimony of an accomplice.

2. *The Rules which prevail as to the Production of Evidence.*—The leading rules are the following: Rule 1. Certain matters may be judicially taken notice of without proof; Rule 2. Evidence must correspond with the allegations in the pleadings, and be confined to the points in issue; Rule 3. Only the substance of the issue need be proved; Rule 4. The burden of proof is with him who holds the affirmative; Rule 5. The best evidence must be produced of which the nature of the case admits; Rule 6. Hearsay evidence is in general inadmissible; Rule 7. Testimony should in general concern matters of knowledge as distinguished from opinion (though to this rule there are well-established exceptions); Rule 8. Certain evidence, otherwise admissible, is excluded on grounds of public policy; Rule 9. In certain cases, principally by statute law, written evidence must be resorted to rather than oral; Rule 10. Oral contemporaneous evidence is not admissible to vary the terms of a written instrument. These rules require some explanation. It should be premised, however, that on a trial, with or without a jury, it rests with the judge to determine whether the evidence is admissible under these rules. Whichever way he may decide, the opposing party may except, and make his exception the subject of an appeal.

*Rule 1.* There are certain facts of general notoriety in respect to which it is not worth while to take up time to adduce evidence, such as the recurrence of the seasons. The same rule applies to the existence of foreign nations recognized by the executive power of the nation, and to general statutes of the legislature. Of such facts a court is said to take "judicial notice," and, if necessary, may resort for information to books and other sources of knowledge.

*Rule 2.* The second rule excludes all immaterial evidence, and confines the trial to matters in issue. Immaterial allegations in the pleadings cannot be proved. For example, evidence of the intent of a party would not be admissible unless intent was material; and the same remark may be applied to evidence of good or bad character. In an action to recover money loaned, evidence of the bad intent of the debtor in delaying payment, or of the creditor's bad character, would be plainly inadmissible, while in an action for slander the plaintiff's character would be to a certain extent in issue.

*Rule 3.* This rule means that the minor and unimportant allegations relating to the issue need not be established as stated. They are such as the statements respecting the time or place where an event occurred, or the value of an item of property. Still, even allegations in their nature unimportant may become material by the mode in which they are stated, as if they are made descriptive. In such a case a difference between the pleadings and the evidence, called a variance, may be fatal. The effect of this stringent rule has in a number of the States of this country been greatly modified as to civil actions by statutes of amendments. The criminal law is still disfigured by extreme technicality in this respect, and needs the hand of a discreet reformer, who, while he carefully preserves in favor of one accused of crime all necessary safeguards, at the same time subverts the interests of the public by removing all useless impediments to the due administration of justice.

*Rule 4.* Under this rule he who makes an allegation which is disputed, so as to be at issue, must establish it by evi-

dence. The burden of proof is usually with the plaintiff, though in some instances it devolves upon the defendant, as where he admits the plaintiff's case, but seeks to avoid its effect by new allegations—as, for example, infancy. The person who has the burden of proof has the right to open the case and close it. This in jury trials is often deemed to be a matter of much importance, so that each of the respective parties insists on an adjudication that the burden of proof belongs to him.

**Rule 5.** Under this rule evidence is divided into primary and secondary. If the primary evidence is accessible, it must in general be produced; if it be lost or destroyed, resort may be had to that which is secondary. Thus, where the law requires a contract to be reduced to writing, or where the parties have written out a contract which might have been oral, the written instrument must itself be produced if it can be obtained. The rule is relaxed in certain cases where public convenience may require it. For this reason a public record may be proved by an authorized copy, without the production of the record itself.

**Rule 6.** The word "hearsay" is infelicitous, including not only what is said, but what is written, or even acted. The rule means that evidence must be given in by one who is personally cognizant of the fact to be proved, and not by one who may have gained his knowledge at second hand, from the act or narration of another. Bentham distinguished between a "perceiving" and a "narrating" witness with the same general view. The reasons for excluding "hearsay" evidence are so obvious that it is unnecessary to refer to them. Great care must be taken in distinguishing between hearsay evidence and that which is original. Thus, when the very subject of inquiry is whether a certain thing was or was not said by a person, evidence that it was said is clearly admissible. So when a statement forms a part of a transaction, or, in technical language, *res gestæ*, evidence of it is not hearsay. Where the testimony is clearly hearsay, there are certain exceptional instances in which it is admissible, as in matters of public or general interest, or of ancient possessions, or of dying declarations in cases of homicide. It should be added that the admissions or confessions, when voluntary, of a party to an action are received in evidence against him on mixed grounds, partly as a substitute for more regular methods of proof, and partly as a branch of the law of *res gestæ*.

**Rule 7.** Under this rule a witness must in general testify only to facts of which he is personally cognizant, without giving his opinions as to their effect. There is a class of witnesses, termed "experts," who are allowed to give their opinions upon facts of which they have no personal knowledge. For example, the testimony of persons acquainted with the facts may be read over to the expert, and his opinion asked as to the conclusion which should be drawn from it; or a hypothetical question, embracing the facts assumed to be established, may be put to him. An "expert" is one skilled in a particular trade, art, or profession. An instance is a superintendent of an insane asylum as to matters connected with the subject of insanity. There are a few instances in which persons who are not experts are from the necessity of the case, or by a special rule of law, allowed to testify as to their opinions.

**Rule 8.** This rule shuts out evidence in a number of cases where strong reasons of a public nature demand that it should be excluded. A leading instance is that of confidential communications between an attorney and client, and similar communications between husband and wife. It also prevents a judicial inquiry into "secrets of state," and, to a certain extent, into the deliberations of judges in forming a judgment or of juries in arriving at a verdict.

**Rule 9.** There is a great statute in the English law, termed the "statute of frauds," requiring certain transactions to be evidenced by writing, such as conveyances or leases of land, wills of land, and some executory contracts, as, for example, contracts to convey land or to be answerable for the debt of another. These are but instances of a more extended class of cases. Without the writing as evidence these contracts or transactions cannot be established. It should, however, be added, that if such contracts, etc. have once been written and cannot be produced, their contents may be proved by oral evidence.

**Rule 10.** This is an inflexible rule, applicable to contracts, wills, etc. Even if a contract need not have been written, yet if the parties choose to have it so, no contemporaneous oral evidence can be offered to show different or additional terms. There is a conclusive presumption of law that the parties intended to merge all anterior and contemporaneous propositions in the writing. That is the sole repository of their intention; the rule, from the nature of the case, does not preclude oral proof of a subsequent modification of the contract, nor does it prevent the introduction of oral evidence to explain the writing. Thus, the meaning of technical words may be shown by the testimony of

experts, and oral evidence may be used to show the circumstances surrounding the transaction, so as to place the court in the position of the parties. This is a rule of interpretation. It assumes that the instrument is valid. When the validity of the instrument itself comes in question the rule has no application. Oral evidence may accordingly be offered to show that the instrument is void. So if a clause has been omitted or inserted by mistake, a court of equity will, on sufficient oral evidence, rectify the instrument, or, in technical language, "re-form" it, and give it the form intended by the parties.

**3. The Effect of Evidence.**—In general, evidence is to be weighed by the jury or judge, as the case may be, and a decision to be rendered in view of all the circumstances of the case. In some instances its effect is governed by technical rules. This remark is particularly applicable to matters embraced under the head of estoppel. (See *ESTOPPEL*.) The evidence in this class of cases is conclusive. The most important instance of the application of this principle is that of a judgment recovered in a court of justice. Judgments are of two general classes—in *rem* or *in personam*. In the one case the action or proceeding is instituted against a "thing," such as a ship or article of merchandise, to fix its ownership, or to establish the *status* of a person, as to have an adjudication that he is a lunatic. The judgment itself accomplishes the result declared. The person in the case supposed becomes, in legal view, a lunatic, whether he be so in fact or not. So the ownership of the property is in the same way established, as in the case of the adjudication of prizes in time of war. The effect of the judgment is accordingly conclusive. By a fiction of law all persons are supposed to be parties to such a proceeding, and to be bound by it. An action *in personam* is brought against a person to obtain a judicial declaration or sentence concerning his duty or obligation. The sentence does not of itself accomplish the required result, but a mandate to an executive officer is necessary, in the nature of an execution. (See *EXECUTION*.) It is illustrated by an ordinary judgment for a sum of money. The sheriff proceeds to sell the debtor's property, and thus obtains the money. A judgment in this class of cases is only conclusive evidence upon the same subject matter between the parties to the action and those claiming under such parties, such as heirs and administrators. There must also have been an adjudication upon the merits of the case. Thus, if an action be dismissed because it is prematurely brought—e. g., before a claim is due—a new action can be instituted. It is a further remark that the judgment is only conclusive upon matters really in issue, and therefore not upon such as were incidentally considered, nor upon matters that could be inferred by argument from the judgment. There is an admirable statement of the rule in all its branches by Lord Chief Justice de Grey in the famous case of the Duchess of Kingston (20 Howell's State Trials, 538).

It should be added that in some cases the law gives to certain acts the force of *prima facie* evidence, which, as the phrase implies, is liable to be rebutted. Thus, a promissory note is presumptively made upon a valuable consideration. Statute law frequently declares that a particular transaction shall have this force. The rules of evidence are under the control of the legislature so long as they do not impair vested rights or violate in any manner constitutional law in its letter or spirit.

**4. The Instruments of Evidence.**—These are either witnesses or writings. (1.) *Witnesses.*—A witness, when within the jurisdiction of the court, must in general attend in person. He can be compelled to attend by a writ termed a subpoena, and in the same way to bring writings which are required. When beyond the jurisdiction, his testimony is taken under a commission issuing from the court in which the case is pending. This matter is in some respects governed by statute, though in some of the courts, as in equity and admiralty, there is an inherent power to issue commissions. The testimony, when taken in the foreign country, is returned to the court, subject to any objections which may properly be taken to it. Certain classes of persons are excluded from testifying. The rules upon this subject are to some extent arbitrary. They have been modified in recent times by statute. Thus, parties to the action were at one time wholly excluded in the courts of common law. They are now by statutes generally admitted. The same remarks may be made as to persons having a pecuniary interest in the event of the litigation. Persons are still incompetent who have a defect of understanding, or who are supposed to be insensible to the obligations of an oath. Thus, persons convicted of an infamous crime are excluded from testifying in the courts of the State where the conviction took place. The tendency of modern law is to allow as wide a range as possible, and to permit objections to witnesses which were formerly grounds of exclusion to be only urged as affecting the value of their testimony. In technical language the

objection does not go "to the competency, but to the credibility of the witness." The examination of witnesses is governed by rules which are to some extent discretionary, and in other respects absolutely binding. The principal rules are these: *a.* Leading questions are not, in general, to be asked on the direct examination. *b.* The party calling the witness cannot attack his character, though he may show by independent testimony that his version of the facts is not correct. *c.* The range of cross-examination is much wider than the direct, and leading questions are permissible. A witness cannot on cross-examination be asked a collateral question for the purpose of contradicting him in case his answer should be untrue. He may, however, be asked, under proper limitations, with a view to contradiction and the discredit of his testimony, if he has not given out of court a different version of the facts from that to which he now testifies, and in the same way as to expressions of hostility towards the party against whom the testimony is given. *d.* A witness is privileged from answering a question if such answer would tend to convict him of a crime or to subject him to a penalty or a forfeiture, though this rule would not extend to the case where he might simply be made liable in a civil action for a debt, etc. How far he can refuse to answer a question which if answered would tend to degrade him in the estimation of his fellows, is not fully settled. *e.* The character of a witness may be attacked by the opposing party, either by direct evidence of his bad character, or rather reputation, or by showing that he has from time to time given different versions of the facts. *f.* A cross-examination is to be confined to the matters brought out on the direct examination, and the same remark is applicable to the re-direct and subsequent examinations. (2.)

*Writings* for the purposes of the law of evidence are either public or private. Public writings are either judicial or not judicial. The law provides compulsory modes of producing public writings for the purposes of testimony. Copies are in general resorted to, on grounds of public convenience. The officer having the document in custody has, in general, the power to give a certified copy, which is admissible in evidence. Copies of judicial records are of three varieties: exemplified (a copy either under the great seal of state or under the seal of the court), office (certified by the clerk or other custodian), or sworn. A sworn copy is authenticated by the testimony of a witness who has compared the original with the copy. An act of Congress, authorized by the U. S. Constitution, provides a convenient mode of authenticating a judgment or decree of the courts of record of one State to be used in the courts of another State. Should a record be destroyed, its contents may be proved by oral evidence. A private writing is proved by the production of the writing itself, and its existence established by the testimony of a witness. Where the writing cannot be produced, secondary evidence of its contents may be given. In the special case where it is in the possession of the opposite party reasonable notice should be given to him to produce it at the trial. If he fails to produce it, secondary evidence may be given as before. When a private writing is executed in the presence of a witness subscribing his name at the request of the maker of it, this witness, called a "subscribing witness," is the proper person to prove it. If he be dead, or for any sufficient reason cannot be produced, his handwriting may be proved, with some evidence to identify the party to the action as being the person who executed the instrument. When there is no subscribing witness, the proper course is to call a witness acquainted with the handwriting of the maker of the instrument to testify that in his opinion the instrument or the signature is in the handwriting of the party. Though this is matter of opinion, it is admitted from the necessity of the case. Knowledge of the handwriting may be acquired in various modes, usually by seeing the person write or by having transactions or correspondence with him. The testimony of experts as to handwriting is in some cases admitted, though the law as to the extent to which they may be examined varies in the different States. In some of the States there are convenient statutory modes of proving private writings. A single instance may be cited from the law of New York, which allows nearly every contract, if acknowledged by the maker before an authorized officer, such as a notary public, to be put in evidence without other testimony by way of authentication.

The final remark may be made, that the rules of evidence, though positive and in some respects arbitrary, are largely based upon public convenience, and are adapted to the wants and habits of the community.

T. W. DWIGHT.

**Evidences of Christianity, The.** The Evidences of Christianity, by the very fact of their existence, afford a strong presumption in its favor. They place it before the world as at least claiming to be founded in truth and suited to the reason of man. Had it made its way by mere force and policy, or did it now require assent without

testimony and argument, there would be no need even to investigate its merits. It might be classed at once with the false religions which are confessedly without reasonable evidence, if not beneath discussion. But in distinction from all other systems it possesses a recognized body of proof which has been accumulating for eighteen centuries under the most varied and searching criticism, and which, when examined, is found to be all that the case admits or that an intelligent inquirer could demand. Such an inquirer may therefore be challenged at the threshold to acquaint himself with the history of the Christian evidences before he proceeds to judge them in detail.

*History of the Christian Evidences.*—The history of Christianity is, in one view, but the history of its evidences. Externally, at least, its course through the world has been marked by successive crises, when it encountered various forms of incredulity which it became necessary to repel with suitable evidence; and out of every such conflict it has emerged with a triumphant vindication of its claims and a fresh contribution of proof to after generations.

Its first conflict was with Judaism. On its native soil and at its very origin it excited the bitter unbelief of the Jewish rulers and people, who repudiated it as an impious caricature of their own ancient religion, stigmatized its author as an impostor or false Messiah, and at length compelled him by the death of the cross to become the first great martyr to its truth. Judaism, as a distinct system, from that moment declined into a mere dead tradition, and has since, by its own predicted fate, served but as an unwilling witness for that Christianity which has been spreading over the globe and becoming the common heritage of all nations and races. The life and death of our Lord, including his discourses, parables, and miracles, as recorded in the four Gospels, constitute the evidences of Christianity afforded at its origin.

Its next conflict was with Paganism. No sooner had it been proclaimed outside of Judæa as a gospel to the nations than it encountered the decaying religions of Greece and Rome, which desperately rallied against it as a common enemy. But its course from city to city was marked with crowds of converts, as well as with persecutions and conflicts, everywhere accelerating the decline of those old mythologies, which now figure only in the classic literature made tributary to its own defence and illustration. The planting and training of the Church, as narrated in the Acts and Epistles of the apostles, together with the Apologies of Justin, Tatian, Athenagoras, and Theophilus, yield the evidences belonging to this period.

Its next conflict was with Philosophy. So long as it was contending with mere Jewish and heathen superstitions the learned class could treat it with disdainful silence, such great writers as Plutarch, Seneca, and Tacitus alluding to it only in the most distant manner; but as its exclusive claims gradually became known, its advance was met by an infidel wing of the Neo-Platonic school, led by Celsus, Porphyry, and Hierocles, who assailed it as a vulgar imposture, and at length provoked the series of bloody persecutions which filled the cities of the empire with Christian martyrs. Its apparent defeat, however, was followed by a victory almost ruinous. It had already won from the very ranks of Plato its first great apologist, Justin Martyr, and it now wrested so much of philosophy itself as could be wrought into its own theology; and at length appeared upon the throne of Constantine as the visible head of a new Christian civilization. Besides these worldly trophies, its direct evidences for this period are to be found in the testimony of the martyrs and the apologetical writings of Tertullian, Clement, Origen, Eusebius, Cyril, Arnobius, Lactantius, and Augustine.

Its next conflict was with Barbarism. In the Dark Ages following the barbarian conquest and the wreck of the Roman empire, though it was now deprived of all earthly aid, it subdued the rude religions of the North as it had already vanquished the classic mythologies of the South, and treasured up from the civilization of the past all that was valuable for that of the future. While contending with such savage foes it could have no other evidences than such as appeared practically in the Germanic missions and in the great Christian schools of the Middle Ages.

Its next conflict was with Mohammedanism. The Saracens were invading its domains with the sword and the Koran from the East to the shores of Spain; but the fierce Goths whom it had trained into Christian knights now by successive crusades battled for the tomb of the Saviour, until Europe was delivered from the infidel. Its evidences for this epoch were all that could be expected—the exploits of Christian chivalry, the prizes wrested from Arabian learning, and the apologetical writings of the Schoolmen against the Jews and Mohammedans in Moorish Spain.

Its next conflict was with modern Rationalism. Divided at the Reformation into Catholicism and Protestantism, it encountered a treacherous foe which for several centuries past, under various guises, has been subjecting its divine revelations to the test of mere human reason. But hitherto the strength of its evidences has only been proved by each successive assault. The Italian naturalists of the sixteenth century, such as Pomponatius, Cæsalpin, and Cremoninus, who held Aristotelian opinions subversive of revealed religion at the very court of Rome and under feigned respect to the Church, wrought their own defeat by their shameless hypocrisy and vice. The English deists of the seventeenth century (such as Herbert, Hobbes, and Toland), and of the eighteenth century (such as Collins, Tyn-dal, and Bolingbroke), who professed mere natural religion as essential Christianity, were so completely repulsed by the great apologists, Cudworth, Bentley, Berkeley, and Butler, that their very works have become obsolete or linger only as brilliant names in literature. The French atheists of the last century, such as Helvetius, Diderot, and D'Holbach, who assailed Christian morality itself with a sensual fatalism, only precipitated that terrible Revolution which has made them infamous as enemies of civilization, no less than of religion. The German pantheists of the present century, such as Strauss, Bauer, and Feuerbach, who have been striving to resolve Christianity into mere mythology, were routed upon their own ground and with their own weapons by such learned and acute writers as Neander, Ebrard, and Ullmann. And it is safe to predict that the socialists of our own day, who are opposing it with science falsely so called, are but ensuring a like failure and defeat.

But the still remaining and perhaps final conflict is to be with modern Heathenism. Having developed for itself in the western nations of Europe and America during the last eighteen hundred years a civilization the highest the world has yet ever seen, it would be strange if it could not now cope with those eastern nations of Asia and Africa which meanwhile have remained stationary or relapsed to a savage state. And accordingly, for the last half century it has been slowly enveloping the globe with a network of missions, which, in connection with advancing science, commerce, and diplomacy, already betokens the ultimate triumph of Christian civilization over heathen barbarism throughout the earth.

*Classification of the Christian Evidences.*—On reviewing now the evidences which have thus been accumulating during this exciting history, we at once become embarrassed by their richness and fulness. Much ingenuity has, in fact, been exercised in digesting and arranging them, but the most common and serviceable classification is that by which they are divided as *external* and *internal*, with suitable subdivisions.

The external evidences are such as relate to the fact or existence of Christianity, rather than to its nature or system—the mere credentials of revelation as distinguished from its contents. They will naturally distribute themselves into the following groups: 1st, *Prophecies*, which have been fulfilled in the course of ancient empires, in the coming of Messiah, in the fortunes and fate of the Jews, and in the progress of the Christian Church; 2d, *Miracles*, which were wrought by prophets and apostles in attestation of their divine commission as teachers, disclosed in the life and death of Christ, the Son of God, and confirmed by the supernatural success of Christianity in the first age; 3d, *Historical Testimonies* to the authenticity and genuineness of the sacred writings, afforded not only by undesigned coincidences among them, but by contemporaneous heathen literature and by modern antiquarian research. Collections of the first kind of evidence may be found in the works of Newton and Keith; of the second, in those of Watson, Sherlock, Lesley, and Campbell in reply to Gibbon, Hume, and Paine; and of the third, in those of Lardner, Paley, Norton, Greenleaf, and Rawlinson.

The internal evidences are such as appear in Christianity itself, in the purport of the revelation which has been so miraculously attested. An argument for its divine excellence may be traced in all that distinguishes it from other mere human systems: 1st, in its *doctrines*, transcending the highest philosophy, such as the existence, perfections, and policy of the Creator, the origin of the world, the scheme of redemption, the state and destiny of man; 2d, in its *precepts*, surpassing the purest ethics, such as the Ten Commandments, the Sermon on the Mount, the counsels of the apostles; 3d, in its *examples*, unapproached by worldly heroes, such as those of evangelists, saints, and martyrs, and, above all, the immaculate Jesus himself; 4th, in its *effects*, not only upon the welfare of individuals, but upon the interests of society, as seen in works of charity and philanthropy, in the arts of peace, in humane laws and free institutions, and in the entire civilization which for centuries it has been unfolding. Specimens of such arguments

may be found in the treatises of Jenyns and Warburton, of Archibald Alexander, Hopkins, and McIlvaine, and of Luthardt and Delitsch.

Still further classes of evidence are of a mixed nature, being partly external and partly internal, and serving to show the connection and consistency of Christianity with other facts and truths. They also may be indicated under several heads: 1st, *Experimental* evidences, acquired by those who have personally tested in their own faith and practice the doctrines, precepts, and promises of the gospel, and thus offer new and original testimony; 2d, *Scientific* evidences, collected from the sciences which illustrate the existence and attributes of the Deity, and confirm the incidental allusions of Scripture to physical, mental, and moral phenomena; 3d, *Philosophical* evidences, derived from right reason and large experience as to the probable existence of a Divine government, a future state, a supernatural revelation, and a scheme of redemption, such as are found in the Scriptures, and also from the view of religion and nature as but consistent parts of one system, having the same Author. Examples of such high orders of evidence may be seen in the works of Locke, Browne, Butler, Paley, the Bridge-water Treatises, and the recent Bampton Lectures.

These various classes of evidence, when grouped together in one view, tend to produce a conviction which has been well likened by Bishop Butler to what is called the *effect* in architecture or other works of art. Examined separately, they may excite as little emotion as scattered stones upon a plain, but when combined, as they have been by this great architectonic genius, in one compact, cumulative argument, their resulting impression is like that of the same materials after they have been chiselled and fashioned into a magnificent building. But we already trench upon the next topic.

*Logic of the Christian Evidences.*—A far more important question than the mere classification of these evidences is that of their logical nature and value. Viewed from this point, they must ever take rank as the highest branch of applied logic, as well for the difficult problems which they involve as for the kinds of reasoning employed. And the practical bearing of the inquiry is shown by the fact that different apologists, in treating of the evidences, have more or less consciously exaggerated one class of them at the expense of the other, until, like a divided army wrangling in the face of an enemy, they have allowed infidels to involve both of them in doubt and suspicion. Of the two evidential schools which have thus taken opposite grounds, the one would render Christianity reasonable, the other present it as simply credible; the one would claim for it demonstrative evidence carrying full conviction, the other seek only probable evidence accumulating towards certainty; the one would dwell upon the internal philosophical proof, the other upon the external historical testimony; and at length the one ends in testing the whole content of revelation by mere reason, whilst the other virtually destroys all rational conditions of faith. The former method has been successively pursued to its extreme by Descartes, Clarke, and Wolf, and the latter by Butler, Chalmers, and Mansel.

It is enough here to assert the validity of both methods within the limits they impose upon each other. Each has had its value at different times and for different minds. The primitive apologists needed the external evidence for the Jews, who required a sign, as well as the internal evidence for the Greeks, who sought wisdom. And from that day till the present there have been infidels who were won by the doctrine and example of Jesus before they could admit his miracles, as there have been believers who ceased to find difficulties in Scripture after they had accepted it as an attested revelation. The simple truth is, that neither kind of proof can be spared from the high argument, and that both must be ultimately combined in order to ensure full conviction.

At this point the logical question we are considering begins to involve an ethical or moral element. It should be carefully observed that the apparent deficiency in the Christian evidences neither necessitates unbelief nor releases from obligation. On the contrary, the inquirer simply becomes accountable in proportion to the evidence perceived and the interests at stake. He is still to be tested and judged by the light which he has. Moreover, his ineredulity may be his own fault. It is certain that the Christian evidences have hitherto proved sufficient for the greatest minds of the race. Are they now on the wane or on the increase? This is the remaining question.

*Progress of the Christian Evidences.*—A distinguished mathematician of the seventeenth century, John Craig, professed to calculate, on the hypothesis that the suspicions against historical evidence increase with the square of the time, that the evidence of Christianity will become extinct about the year 3150, when the Son of man will come and no longer find faith on the earth. And a school of



modern skeptics, including poets as well as philosophers, is already sighing over the decay of Christianity as but the last of the world's mythologies, destined to be superseded by the perfect religion of the future. If all that is meant by such writers is the decay of their own Christian faith, it need not be denied that many restless, speculative minds are breaking away from their moorings in false creeds and corrupt systems claiming to be Christian; but if the apprehension is that Christianity itself is dying out or losing its hold upon the world, such forebodings are to be no more seriously treated than the outcries of men losing their anchorage who fancy it is the immovable shore and not their own little vessel that is drifting away. Christianity has in fact lost nothing of the evidence which it has been accumulating since the time when first its miracles were wrought and its prophecies spoken. Not only does the testimony to those miracles remain unimpeached, not only is the fulfillment of those prophecies still passing before our eyes, but the human sciences since then unfolded are yielding it a new class of evidences, affording it fresh confirmation and illustration, and commending it to the highest intellect and culture of the time; and the reasonable presumption is that, one after another, they will yet corroborate all revealed facts and doctrines, until everywhere there shall be an intelligible triumph of the Divine through the human reason over all earthly error and sin.

That such an increase of evidence in this quarter is probable may be argued from the very nature of science and revelation as complementary factors of knowledge. It is inconceivable that the word of God should contradict his works, or that human reason could supersede a divine revelation; and when any discrepancies appear between Nature and Scripture, we must simply assume that there has been some wrong induction from either or both of them, and that ultimately, after the whole truth is known, they will confirm and illustrate each other. This has, in fact, been the result of past conflicts between the scientific and religious parties. Geography, in the early Church, repudiated the idea of an inhabited globe as contrary to the Scriptures, but ships now carry the same Scriptures to the antipodes. Astronomy, during the Middle Ages, described the heavens as huge crystal spheres revolving about our earth, but the very same heavens, as devoutly interpreted by Kepler, Newton, and Herschel, still declare the glory of God. Geology, of late years, has seemed inconsistent with the long-received interpretation of Genesis, but the story of the earth itself, as read by Miller, Hitchcock, and Guyot, still tells how it was made in six days. Anthropology, at the present moment, is full of conflicting theories, some of which menace the Scripture doctrine of the first Adam, but he must simply prejudice the whole question against all precedent who asserts that man was not made in the image of God. And in the region of the mental, moral, and social sciences, where the need and fact of a revelation are so much more obvious, the likelihood increases that there will hereafter be still higher and grander illustrations of Christian doctrine.

It is an encouraging sign of progress in the evidences of Christianity that so many organized efforts are on foot for their promotion, and some of them in the interest of true science as well as of religion. The Royal Society itself was founded by philosophers and divines who vindicated the consistency of natural with supernatural knowledge. Other institutions have followed, expressly designed for the defence of the Christian religion, such as the Boyle Lectures, the Bampton Sermons, the Bridgewater Treatises, the Burnet Essays in Great Britain, and the Lowell, Graham, and Ely Lectures in this country, together with more permanent educational appliances, such as chairs of Christian apologetics in divinity schools and of science and religion in our colleges. And the literature which has grown up in connection with these institutions, and by other independent efforts, is already of surprising extent and richness. Notices of this literature may be found in the appendix to Farrar's "Critical History of Free Thought," and the Abbé Migne has published a series of twenty volumes, 4to, entitled "Demonstrations Évangéliques," containing a full collection of the principal evidential treatises, of all schools in all ages, chronologically arranged, as a work equally important to the infidel, to the skeptic, and to the believer.

CHARLES W. SHIELDS.

**E'vil**, the total or partial absence or negation of good, and the presence of imperfection, suffering, or sin. The question of the origin of evil has in every age attracted the attention of thoughtful minds. The Zoroastrians and Gnostics tried to solve it by the dualistic theory of the opposition of a good and an evil principle. Others have maintained that evil is a necessary part of the Divine economy, and that under the superintendence of Infinite Wisdom evil will result in the highest possible good. It seems certain that moral freedom itself implies at least the possibility

of an evil choice, so that evil must potentially exist where goodness exists. The solution of such questions is, however, beyond the power of any finite mind.

**Evil Eye**, the mysterious power of injury which in former ages was generally ascribed to the look of a malevolent person. The Greek and Roman classics contain numerous references to this belief, which was also very common in the Middle Ages in Europe. In Mohammedan and uncivilized countries this superstition is still almost universal, and it is by no means extinct among the peasantry of more civilized lands. It especially prevails in Western Africa. It is perhaps based upon the supposed powers of fascination possessed by serpents, of which much exaggerated stories were told and believed. Charms were much worn to prevent the mischief which it was believed could be done by the evil eye, which was considered especially dangerous to young children.

**Ev'olute** [for etymology see **EVOLUTION**], literally, "something unfolded or unwrapped," in mathematics, is a curve, plane or otherwise, around which, if a flexible and inextensible string be wrapped, and then unwrapped under tension, there result other parallel curves called *involute*s, one of which is described by every point of the tense string in unwinding. Every plane curve has its plane evolute, besides an infinite number of helical evolutes lying in the curved surface of the solid generated by the motion of the given plane curve parallel to itself. The common cycloid, the epicycloids, and the hypocycloids have plane evolutes exactly similar to themselves, but inverted in position. The logarithmic spiral is the only curve having all its evolutes similar to itself.

**Evolution** [Lat. *evolu'tio*, from *e*, "out," and *vol'vo*, *volu'tum*, to "roll," whence *evol'vo*, to "unfold" or "evolve"], the act of unfolding, development; in algebra and arithmetic, the extraction of roots; in other words, the inverse operation to involution. The object of evolution, therefore, is to ascertain the quantity which multiplied by itself a stated number of times yields a given result. In a wider sense, evolution may be regarded as synonymous with the solution of a binomial equation, for it is obvious that the  $n^{\text{th}}$  root of any number  $a$  satisfies or is a root of the equation  $x^n - a = 0$ . This root is indicated by the symbol  $\sqrt[n]{a}$  or  $a^{\frac{1}{n}}$ .

**Evolution, Hypothesis of**; also called **The Theory of Development**. According to this, in its simplest form, the universe as it now exists is the result of "an immense series of changes," related to and dependent upon each other, as successive steps, or rather growths, constituting a progress; analogous to the unfolding or evolving of the parts of a growing organism. Evolution is defined by Herbert Spencer as consisting in a progress from the homogeneous to the heterogeneous, from general to special, from the simple to the complex; and this process is considered to be traceable in the formation of the worlds in space, in the multiplication of the types and species of plants and animals on the globe, in the origination and diversity of languages, literature, arts, and sciences, and in all the changes of human institutions and society.

**History.**—Faint gleams only of the idea of evolution appeared among the ancients. An old Egyptian cosmological myth was that of a chaotic or mundane egg, from which all things successively emerged; with the belief, also, that repeated creations and destructions of the world have occurred. Thales taught that in the beginning all matter was in a fluid state. Anaxagoras held that all consisted at first of atoms, infinitely numerous and eternal; among which orderly arrangement was produced by a shaping *Nous* or intelligent Power, infinite and self-existent. Opposed to this conception was that of Democritus and Epicurus, as represented in the poem of Lucretius, "De Rerum Naturâ," according to which *chance*, not intelligence, wrought, in infinite time, out of numberless atoms, all existing things. Not far removed from this was the notion of Empedocles, mentioned by Aristotle (*Phys.* ii. 8), that many monsters were formed by the spontaneous efforts of nature before man appeared. More clear seems the reference to creative development in the words of David (Psalm cxxxix.): "My substance was not hid from thee, when I was made in secret, and curiously wrought in the lowest parts of the earth. Thine eyes did see my substance, yet being unperfected; and in thy book all my members were written, which in continuance were fashioned, when as yet there was none of them."

Leibnitz, in modern times, first definitely proposed the opinion that the world was once in a fluid condition (*Protogwa*, 1693). De Maillet (who died in 1738) and Wright of Durham, as well as, perhaps, Lambert, preceded Kant in expanding this thought. But Kant, in his "Theory of the Heavens" (1755), originated the nebular hypothesis.

Laplace (*Système du Monde*, 1796, and *Mécanique Céleste*, 1799–1825) elaborated this into a theory of the solar system; while Sir William Herschel (*Proc. Royal Society*, 1811) gave it a nearer approach to perfection in its general cosmic relations as a theory of the stellar universe. Sir John Herschel's hypothesis of "sidereal aggregation" presents a further modification of this. (See NEBULAR HYPOTHESIS.)

In biology, Buffon (*Histoire Naturelle*, 1749–88) is credited with distinctly advocating the transmutation of species. The most important beginning, however, of those inductions which have made possible the science of embryology, and have contributed most largely to the general theory of development, was that of Wolff (*Epigenesis*, 1759; *Theoria Generationis*, 1764). He first discerned the importance of the transmutations of structure and form which the parts of plants and animals undergo, by means of which, from almost formless seeds or eggs, come their diverse and complex organisms. Goethe (*Metamorphose der Pflanzen*, 1790) apprehended, independently, the same truth. Oken (*History of the Development of the Intestinal Canal*, 1803), Pander (1817), and, still more important, Von Baer (from 1819), carried out this idea as an extensive generalization, supported by numberless facts. Many other laborers have since worked in the same field.

In like direction have tended the results of inquiries into the ultimate elementary forms and proximate materials of animal and vegetable tissues: Schleiden and Schwann (1838) showing the *cell-form* to be common to both kingdoms in all their classes and orders; and Von Mohl and Max Schultze (1850–61), that a *protoplasmic* material, similar but not identical, is found in them all. (See CELLS and PROTOPLASM.)

In regard to the transmutation of *species*, Lord Monboddo in 1774 suggested the possible origin of man from the ape. With more scientific ability and knowledge, Lamarck (*Philosophie Zoologique*, 1809) proposed the hypothesis of organic development, which is chiefly associated with his name. One of his leading conceptions was that of the elevation of an animal (e. g. ape) to a higher range of faculties and appropriate organs by the prolonged and repeated efforts made by it to attain to conditions and advantages just within, or, at first, beyond, its reach. Dr. Erasmus Darwin (author of "Phytologia," "Zoonomia," etc.) about 1794–95 published speculative views containing at least the germ of the "Darwinism" of to-day. Dr. W. C. Wells proposed the application of natural selection to the natural history of man in 1813. W. Herbert in 1822 asserted the probable transmutation of species in plants. Prof. R. E. Grant advocated the same opinion about 1826.

Immediately connected with this progress of investigation were some important inquiries concerning the *correlation of forces* in nature, and the conservation or "persistence of force." First in the order of generalization or logical discovery on this subject are to be named B. Thompson (Count Rumford), 1798–1806, and Oersted, 1812–20; next to these, Seguin of France, Grove and Joule of England, Mayer of Germany, and Colding of Denmark; all of whom about 1842 announced, independently of each other, the idea of the essential unity of force, as involved in the mutual convertibility of the "modes of motion," observed by us as mechanical movement, heat, light, and electricity, into each other, under changed conditions. Since that time the correlations of the physical forces have been studied especially by Helmholtz, Faraday, Henry, and Tyndall. Vital force has been regarded as belonging to the same series of correlations in the writings of Liebig, Carpenter, Hinton, Waters, Barker, and others; and even mind-force is so included by Morell, Laycock, and Maudsley, as well as by Moleschott, Büchner, and other materialists.

Returning to the path of biological inquiry, we find that Geoffroy St.-Hilaire contended against Cuvier, in the early part of the present century, in favor of the transmutation of species. Popular interest in this subject was awakened by the publication, in 1844, of the "Vestiges of Creation," an anonymous work showing great ingenuity, but only a moderate acquaintance with the facts of science. Alexander Humboldt also, in 1844, declared his conviction that species are not immutable. Richard Owen, in 1850, referred to the struggle for existence as a cause of destruction of types least fitted for the conditions around them, and proposed about the same time the theory of the origin of species by "derivation" in a pre-ordained succession. Naudin, a French botanist, and Prof. Asa Gray of Cambridge, Mass., as early as 1856, drew somewhat similar inferences from their observations. More prominently, however, than any other since 1852, has the name of Herbert Spencer been connected with the theory of development, both in cosmology and biology. His "First Principles of Philosophy," "Illustrations of Universal Progress," and "Principles of Biology" have, with much labor both of synthesis and analysis, and great adroitness of reasoning and clearness of expression, wrought out what may be called a philosophy of evolution. Baden

Powell of Oxford, England, in an able work on the "Unity of Worlds," in 1855, argued forcibly for the probable continuity of the process of creation throughout time. Alfred R. Wallace and Charles Darwin, in 1858, separately proposed the hypothesis of the origin of species by spontaneous variation, and the survival of the fittest through natural selection and the struggle for existence. In 1859 appeared Darwin's treatise on the "Origin of Species." (See DARWINISM.)

Strenuous opponents as well as advocates of the views above referred to have not been wanting. B. Peirce, R. Proctor, and others among astronomers have found serious difficulties in the way of adopting the nebular hypothesis as a finality. Organic evolution, including the transmutation of species, has been opposed by De Blainville, Milne Edwards, Sedgwick, Brewster, Balfour, Agassiz, Barrande, Dana, and Dawson. Besides those already named, it has been accepted in some form (not always that of Darwin) by Huxley, Vogt, Fritz Müller, Hæckel, Gegenbaur, Mivart, Hooker, Lubbock, and others in Europe, and by Clark, Cope, Hyatt, Hayden, and other naturalists in America. Among its ablest defenders has been Prof. E. L. Youmans. (See an "Exposition of the Development Hypothesis" by this author, and an admirable "Criticism" of the same, in "Johnson's Natural History," by Julius H. Seelye, D. D.) A majority of the scientists of the present day are on the side of the general theory of evolution. "Scarcely a single competent general naturalist," wrote in 1873 Prof. Wyville Thomson of Edinburgh, "fails to accept it, in some form or other." In the words of Prof. Youmans (*Popular Science Monthly*, Nov., 1872), "Darwin may be in error, Huxley may be wrong, Mivart may be wide of the mark, Hæckel may be mistaken, Cope may misjudge, and Spencer may be at fault; but, in common with a large and increasing body of scientific men, they are all agreed as to one thing, that evolution is a great and established fact—a wide and valid induction from the observed order of nature, the complete elucidation of which is the grand scientific task of the future."

The application of the idea of development to sociology and history has been made by Herbert Spencer, J. W. Draper, and Bagehot, although earlier suggested by Herder (*Ideas of the Philosophy of the History of Mankind*) about the beginning of the present century. George Darwin has written recently upon development in dress; and Dr. James Ross upon natural selection in the causation of diseases (*The Graft Theory of Disease*, 1872). In the above list of authors, moreover, we have not mentioned several of eminence who have written especially upon the relation of the theory of development to theology; as Leifchild (*Higher Ministry of Nature*), the Duke of Argyll (*The Reign of Law*), and Dr. McCosh (*Christianity and Positivism*). (See, also, *The Evolution of Life*, by H. C. Chapman, 1872, and *Philosophy of Evolution*, by B. T. Lowne, 1873.)

Without space in this work for an exhaustive discussion of the subject of evolution, its importance requires a brief statement of the main elements of the inquiry.

*Is Progress a Fact in Nature?* Cosmologists and naturalists are all agreed upon this. In the language of the Duke of Argyll, "It is as certain as any fact of science that creation has had a history. It has not been a single act, done and finished once for all, but a long series of acts—a work continuously pursued through an inconceivable lapse of time. It is another fact, equally certain, respecting this work, that as it has been pursued in time, so also it has been pursued by method. There is an observed order of facts in the history of creation, both in the organic and in the inorganic world." Prof. Leconte asserts 390 coincidences in the solar system which are conformable to the nebular hypothesis. Some experimental support for it has also been afforded by the physicist Plateau. Lord Rosse's telescope diminished for a time the strength of the evidence in its favor by resolving many nebulae into star-clusters, and leaving it in doubt whether there were any really consisting of unorganized "star-dust" or "world-stuff." Huggins, however, with the spectroscope, ascertained in 1864 that a nebula in the constellation Draco consists of gaseous matter; and since that time several others have been found to have that character. (See SPECTROSCOPY.) The spiral form of a number of nebulae, and the annular shape of others, agree well with the rotary movement supposed in world-formation according to the nebular hypothesis. Some astronomers also consider that a sudden appearance in  $\tau$  Coronæ, observed in 1868, indicated an alteration in the substance of that star, such as the incandescence of a gaseous material like hydrogen would produce. R. Proctor has written upon "star-drifts," showing a certain orderly arrangement of the bodies in space outside of our solar system. The spectroscope has contributed much towards the theory of cosmic development, by exhibiting

the close correspondence in the material composition of all the worlds. Durocher also (*Essai de Géologie Comparée*, 1857) proved the originally molten condition of our earth's surface by a careful comparative study of the specific gravities and the order of successive deposition of crystalline rocks. In organic nature on the earth, geology, zoology, embryology, and botany unite in asserting progress. (See GEOLOGY.) Prof. Dana, one of the highest authorities in natural science, and an opponent of the development hypothesis, may be quoted to this effect (*Text-Book of Geology*, pp. 250, 255): "Life commenced among plants in seaweeds, and it ended in palms, oaks, elms, the orange, rose, etc. It commenced among animals in Lingulæ (mollusks standing on a stem like a plant) and in crinoids and trilobites, if not earlier in the simple, systemless protozoans" (see Eozoon); "it ended in man. Sea-weeds were followed by ferns and other flowerless plants, and by gymnosperms, the lowest of flowering plants; these finally by the higher flowering species, the palms and angiosperms. Radiates, mollusks, and articulate of the Silurian afterwards had fishes associated with them; later, reptiles; later, birds and inferior mammals; later, higher mammals, as beasts of prey and cattle; lastly, man." "There were higher and lower species created through all the ages, but the successive populations were still, in their general range, of higher and higher grade; and thus the progress was ever upward." "With every new fauna and flora in the passing periods there was a fuller and higher exhibition of the kingdoms of life."

Admitting, then, this universal fact of progress in nature, some further propositions may be laid down as proven:

1. The method of progress has been, on the whole, from generalized types to those more special—i. e. with multiplication of organs and functions, or *differentiation*. Comprehensive types of earlier periods have sometimes been called by palæontologists "prophetic" types, containing elements which become distributed amongst those which succeed them. Examples of these are the following: *Ichthyosaurus*, comprising or combining the types of the fish and the reptile; *Pterodactyl*, *Archæopteryx*, and *Compsognathus*, those of reptile and bird; *Archegosaurus*, of amphibian and true reptile; *Sivatherium*, called in description a "pachydermoid antelope;" *Oreodon*, a "ruminating hog;" *Anomæpus*, an "ornithoid, marsupialoid quadruped." All of these are fossil, and now extinct. Examples of an analogous kind are seen in a few animals of to-day, as *Ornithorhynchus*, a duck-billed quadruped; *Lepidosiren*, which combines some of the characters both of the reptile and the fish, etc. The molluscan group of cephalopods represents, in a manner, all four of the great types of Cuvier. "The beak, complex eye, tongue, ear, crop, gizzard, and cartilages analogous to the spine, point to the vertebrates; sucker-bearing arms and long axis, to radiates; cut off the mouth and its surroundings from the rest of the body, and we have the semblance of the star-fish; while the tentacles lead to the antennæ of the articulate." (Ward, *Descriptive Catalogue of Fossils*, etc.) Among plants, the fossil *Lycopodia* comprehend characters both of ferns and pines; *Cycads*, peculiarities of ferns, pines, and palms, etc.

2. *Unity of plan* pervades all organic nature, as exhibited in the *homology* or correspondence of parts which prevails throughout the animal and vegetable kingdoms. (See ANATOMY, and COMPARATIVE ANATOMY.)

3. Many *gradations* and *transitional forms* intervene between those great groups into which animals and plants are divided or classified. The comprehensive types above mentioned may be regarded as transitional. Such, too, are the *Odontornithes* (birds with teeth) and *Ichthyornithes* (fish-like birds), lately described by Marsh, and the *Eobasilæidæ* and other tertiary forms between proboscideans and ungulates, described by Leidy, Marsh, and Cope. The last-named naturalist (*Evolution and its Consequences*, 1872) enumerates many genera in which, between the so-called species, there are determinable gradations; as of birds, *Corvus*, *Empidonax*, *Buteo*, *Falco*; reptiles, *Entania*, *Anolis*, *Lycodon*, *Naja*, *Caudisoma*, *Elaps*; batrachians, *Rana*, *Hyla*, *Choraphilus*, *Borborocates*, *Amblystoma*, *Spelerpes*; fishes, *Ptychostomus*, *Plecotomus*, *Salmo*, *Perca*, and others. A group of worms receives the name *Gephyræa*, because of its "bridging over" the gap between *Vermes* and *Echinodermata*. *Amphioxus* (lancelet) appears to connect vertebrates with the mollusca. Between *Polycistina* and *Spongia*, as Carpenter shows, comes *Acanthometrina*. Among fungus plants, especially those discerned by aid of the microscope, distinctions of a permanent kind are difficult to establish, and Kützing and Schleiden have asserted that "there are no species, but only forms, of Alge."

4. A very remarkable correspondence prevails amongst animals and plants in three orders of relative succession: a, in geological time; b, in zoological rank; c, in embry-

logical development. No naturalist has done more to establish the generality of this threefold correspondence than Agassiz, who, nevertheless, continues to oppose the hypothesis of evolution by transmutation or modification of specific types. What is meant by the above proposition is, that when one animal is known to be, *geologically*, more recent in its appearance on the globe than another somewhat allied to it, it will (generally) be found also to rank higher than it in the *zoological* scale, as measured by complication of structure, variety of powers, and, in some groups at least, greater intelligence; also, the more recent type passes, in its *embryological* development, through successive stages of change, including those of the less recent allied type, whose *adult* condition represents, more or less nearly, an *immature* or *embryonic* state of the higher and later, more advanced type. Some of the examples of this *parallelism* have long been familiar to naturalists; others have been but lately fully studied, especially by E. D. Cope in *Salamandridæ* (*Origin of Genera*, 1868) and Alpheus Hyatt in *Cephalopoda* (*Fossil Cephalopoda*, etc., 1872). A few instances will answer our purpose. Trilobites, of the palæozoic era, resemble the embryonic state of *Limulus* of to-day. *Labyrinthodon*, of the trias, is like an arrested development of the later saurians. *Anoplotherium* recalls an embryonic stage of ruminants; the extinct dodo has been compared to an incompletely developed duck or goose; the siren manifests a similar relation to the lung-breathing batrachians. "Man presents in his earliest stages of embryonic growth a skeleton of cartilage, like that of the lamprey; also, five origins of the aorta and five slits on the neck, like the lamprey and the shark. Later, he has but four aortic origins, and a heart now divided into two chambers, like bony fishes; the optic lobes of his brain also having a very fish-like predominance in size. Three chambers of the heart and three aortic origins follow, presenting a condition permanent in the Batrachia; then two origins, with enlarged hemispheres of the brain, as in reptiles. Four heart-chambers, and one aortic root on each side, with slight development of the cerebellum, agree with the characters of the crocodiles, and immediately precede the special mammalian conditions—a single aortic root and the full development of the cerebellum. Later comes that of the cerebrum also in its higher mammalian and human traits." In all this succession and parallelism it is important to remember that the human embryo at no time assumes the *exact* or *entire* character of that of any other order of mammals, or that of reptile, bird, or fish. It is only *assimilated* to these lower types, without ever being identified with either of them. Yet this assimilation is a fact of very great importance.

5. *Teleology* is the name given to the study of another class of facts, coextensive with our acquaintance with nature, and especially obvious in the structures of the higher beings—viz., those which display *adaptation* and give evidence of purpose. These are most of all familiar in our own bodies, as the complex formation of the eye as an instrument of vision, with a nerve to convey the impression of light and a brain to perceive it, the hand for prehension, the mouth for speech, the foot for support and locomotion, the stomach for digestion, etc. Natural science furnishes no more beautiful and wonderful instances of such adaptation than those carefully studied and described by Darwin in the formation of many plants, so as to be fertilized by the interposition of insects which visit the flowers for their food. (Darwin on the *Fertilization of Orchids*; Gray, *How Plants Behave*.) Such facts, and thousands of others in nature proving adaptation, are too clear to be ignored, although speculative reasoning has introduced a question in regard to their origin or causation. The simple truth is, that design is to be inferred, as *purpose* adaptation adheres to the facts; *is itself a fact*.

6. *Modification according to surrounding conditions* occurs, to a limited extent, both in animals and plants. Some dependence upon conditions is inevitable. Thus, the earliest consolidation of the surface of the earth made it ready only for the simplest and lowest of plants. The animals of primitive periods were all aquatic. The first land-plants and land animals appeared on the earth in the Devonian age. The soil of the mesozoic period, almost certainly, would not have supported our vegetation, nor any vegetation capable of maintaining the now existing types of animal life. The atmosphere, the oceanic and inland waters, and all other terrene conditions have been different in the succeeding epochs. The mould of the field and forest of our day is the result of an immensely complex series of productions and decompositions going on through all ages since the azoic era. Each time, by its actions and reactions, prepares the way for the next. Man was, probably, necessarily, the last created animal, because the highest and most complicated, and thus requiring the latest and highest elaboration of terrestrial conditions.

But *modification* by changed conditions, acting upon ex-

isting types, appears only within limitations. In organisms of little motility a law may be enunciated—that "extension occurs chiefly in the direction of least resistance, and increase of density in the direction of greatest resistance." It is proper to give some examples to illustrate "conditional action" on individuals and species in nature.

Fungi are said by some botanists to be very variable, according to the places and circumstances of their growth. With higher aquatic plants, some individuals of which may have their leaves out of and others in the water, the air-pores or stomata are often on the under side in the former case, and on the upper side in the latter. Tendrils of climbing plants cease growing when finding nothing to clasp, but grow thick and strong after taking hold of a support. Shells of oysters are thicker on a wave-washed shore than where the water is always tranquil. Tadpoles develop into frogs in a few weeks when exposed to sunlight; in the dark, they may be kept as tadpoles for months. *Cysticercus*, a small animal parasite, when lodged in the liver or brain of a man, ox, or hog, becomes a hydatid surrounded by a watery tumor; in the intestinal canal, a tape-worm ten or twenty feet long. When the queen-bee of a hive is destroyed, the workers will select a neuter larva, and by placing it in a royal cell and feeding it with queen's food, convert it into a queen. Late observations (*Am. Naturalist*, May, 1873) make it appear that the sex of butterflies may be controlled by diminishing or increasing the supply of food to the caterpillars; short allowance promoting a preponderance of the male sex. Wallace found in the Malay Archipelago a marked influence of locality in the characteristics of Papilionidae. Some moles have rudimentary eyes, as if they had lost them gradually by want of use; and the same may be said of blind fish in large caves. (See *AMBYLOPSIS*.) Lewes (*Nature*, Mar. 27, 1873) mentions that, while the young of salamanders usually undergo their transformation in the water, *Salamandra atra*, living high upon mountains, is born completely formed. M. Baray has observed that frogs in the volcanic island of Guadaloupe go through the tadpole changes in the egg. Domestic ducks have the leg-bones heavier; wild ones, those of the wings. Udders of cows in the domestic state are much larger than when wild. The drooping ears of several domestic animals follow the change from the wild condition. The heads of wild hogs, and those of the horses of steppes or pampas, are larger than those of the domesticated animals. Artificial selection and breeding cause great diversities in animals and plants. Of the latter, witness the double flowers and numberless varieties "created" by the horticulturists, and such changes as those from the wild to the cultivated cabbage, broccoli, and cauliflower. Ancon sheep and the Otter breed of cattle are merely extreme instances of the many effects of utilized and directed variations. English greyhounds taken to hunt on a high Mexican plateau, 9000 feet above the level of the ocean, failed for want of breath, but their offspring acquired a capacity to run as well there as elsewhere. Acquired instincts are familiar, yet remarkable; as the fear of man amongst wild birds and animals, those of a newly-visited country being always "tame." Hounds of different breeds, pointers, setters, retrievers, require almost no training to fit them for their parts in hunting, yet no such proclivities belong to the dog in the wild state; they are undoubtedly transmitted by inheritance. While several generations must be required to make a breed or variety with such distinct endowments, yet variations are sometimes quite suddenly established. Darwin mentions this of the black-shouldered peacock, occurring in five distinct cases among those of the ordinary kind, and, in at least one case, to the extinction of the previously existing breed. The same authority (*Animals and Plants under Domestication*, vol. i.) states that "climate directly affects the skin and hair of cattle." Angora goats, of the same original stock as those of Europe, acquire a long silky fleece. Sheep and some other animals are subject to enormous fattening of the tail near the Cape of Good Hope. Other examples might be easily added.

7. Conditions favorable to the support of particular species of plants and animals do not necessitate their existence. Prof. Asa Gray (*On the Derivation of American Plants: Pop. Science Monthly*, Oct., 1872) illustrates this fact as follows: "When we see how Australian eucalyptus trees thrive upon the California coast, and how our redwoods flourish upon another continent; how the so-called wild oat (*Avena sterilis* of the Old World) has taken full possession of California; how that cattle and horses, introduced by the Spaniards, have spread as widely and made themselves as much at home on the plains of La Plata as those of Tartary; . . . when we consider how the indigenous flora of islands generally succumbs to the foreigners that come in the train of man, and that most weeds (i. e. the prepotent plants in open soil) of all temperate climates are not 'to the manor born,' but are self-invited intruders,—we must needs abandon the

notion of any *primordial* and *absolute* adaptation of plants and animals to their habitat which may stand in lieu of explanation." While a few naturalists (as Mivart, and, in regard to races of mankind, Agassiz) have advocated the view that the same species may have originated independently in several localities, the weight of evidence seems to be largely in favor of the opinion that *each species* (if not every greater group or type) *has had but one origin*; all "representative" species, such as those nearly, sometimes quite, identical on the two sides of the Atlantic, or otherwise locally remote from each other, being really the same in stock, only more or less modified after divergence and permanent separation in place and circumstances.

8. *Certain types vary, through long periods, very little, under any circumstances.* Among domestic species the turkey and peacock are examples of considerable stability. Gould asserts of humming-birds that, with many thousands of them passing through his hands, he has "never observed an instance of any variation which would lead to the supposition that it was the result of a union of two species." (*Introduction to Trochilidae*.) Several "persistent types," through extremely long periods, are well known to geologists. *Lingula*, *Discina*, *Rhynchonella*, *Crania* have continued from the Silurian age to the present time. Some palæozoic corals are yet building islands or reefs in the ocean. Genera of carboniferous plants, insects, and Arachnida closely resemble some of those of to-day. The *Aracaria* of the oolite has left cones scarcely distinguishable from those of the same genus now growing. *Pleuracanthus*, a fish of the Devonian and carboniferous eras, was as similar to sharks now existing as they are to one another. Some triassic mammals were equally close in alliance to those of recent times. Carpenter and Wyville Thomson have proved that a cretaceous fauna exists now at the bottom of the ocean. Hence is to be inferred the propriety of the admission of Darwin: "I believe in no law of *necessary development*." Huxley also, who has especially studied these persistent types, emphatically declares that their existence must be recognized in any theory of evolution.

9. While progress has been the rule (as already shown) in the great changes of nature through geological time, evidence also exists of the *decline and extinction of types*. Says Dana: "Five hundred species of trilobites lived in the course of the palæozoic ages; afterwards there were none. Nine hundred species of the ammonite group existed in the mesozoic—not all at once, but, as in the case of the trilobites, in a succession of genera and species; the last then disappeared. There have been 450 species of the nautilus tribe in existence; now there are but two or three, and these are peculiar to the present age. Seven hundred species of ganoids have been found fossil; the tribe is now nearly extinct." Barrande has studied trilobites exhaustively; he remarks (*Trilobites*, par Joachim Barrande, à Prague et à Paris, 1871) upon the notable diminution of their size, as well as of the numbers of their genera and species, after a *maximum* in the second of the three periods of their history; also, that such an order of increase, culmination, and decline was observed in all quarters of the globe alike. The same naturalist has likewise examined in detail the history of ancient cephalopods (*Distribution des Cephalopodes dans les contrées Siluriennes*, 1870), and points out the occurrence of some simple forms, later than others which were more complex. Alpheus Hyatt has given attention to the same succession; and he, with some others, understands the fossil Cephalopoda to exhibit, as it were, the *biography* of a type, closely analogous, in all its changes, to that of an individual cephalopod. Opening with the straight *Orthoceras* of the Silurian, it advanced through the coiled and more complex ammonite of the Jurassic, and declined through half-uncoiled forms of the cretaceous, to end in the straight baculite. Also, the ammonite family itself, beginning with the *Goniatites* of discoidal shape, passed through the compactly coiled and elaborate true ammonites, to decline through the half-coiled *Scaphites*; the last being the old age of the type. Other instances would probably be more familiarly known if the attention of naturalists was generally directed towards this class of facts.

10. *Rudimentary parts* furnish one of the strongest arguments in favor of the hypothesis of a genetic connection among all animals (including man); at least among all those belonging to the same great types. By rudiments, in anatomy, are meant organs or structures imperfectly developed, so as to be almost or entirely without functional use. Each of them represents in germ, as it were, in one animal (or plant) that which is perfect and useful in another type. Examples are as follows: In plants, incomplete petals, stamens, or pistils in a great many instances; notably, undeveloped pistils in the male florets of some Compositæ. Among animals, the minute and useless wings of certain beetles and other insects; teeth in the jaws of foetal whalebone whales, which are toothless

when mature; teeth also in the front part of the upper jaw in the embryos of ruminant quadrupeds (as the ox) and of a few birds; the mammary teats of male mammals; two imperfect udders in cows; imperfect wings of the penguin and apteryx; the splint-bones of the horse; unused hinder toes of several quadrupeds; small limb-bones under the skin of serpents, and similar ones of the pelvis and hinder limbs of whales. Man has a number of clearly marked rudimentary parts. Such are the three small and useless motor muscles of the external ear; the platysma myoides of the neck, homologous with the useful panniculus carnosus of the horse and ox; the little fold or caruncle at the inner margin of the eye, representing the nictitating membrane of birds; the os coecygis at the lower end of the spinal column, in place of the tail of lower animals, and which at one time in the human fetus is longer than the limbs; the vermiform appendix of the large intestine, which in man has no use, but in one marsupial is three times the length of its body. The "lanugo" or hairy covering of the human fetus at the fifth month is supposed by Darwin to be a rudimentary appearance of the first hairy covering of other mammals. Some anatomists regard the whole outer ear in man as a mere rudiment of the movable external ears of quadrupeds. The last molar (wisdom) tooth has the character of incomplete development, especially among civilized races of men. For the existence of any of those which are certainly rudiments no rational "final cause" has ever been proposed. It is intelligible only upon the supposition of their being relics of a long past descent from a common stock with those species, genera, or larger groups which now present the same organs in perfect development and answering a useful purpose. Their gradual disappearance when their utility has ceased is not strange upon such a view. Paget has given an additional reason why that disappearance should not be sudden, in the facts of "complementary nutrition;" that is, as every part, by taking some material from the blood, makes it more exactly fitted to the nutrition of the rest, rudimentary organs may serve this purpose for a while, after their own direct functional action has ceased.

*Different Theories of Evolution.*—It is a popular error that "Darwinism" is a precise synonym of "the theory of development." Several distinct views have been held, agreeing merely as to the one belief, of a genetic relation between the present and the past in all parts of nature; which is what we mean by evolution. Thus, for the origin of diverse species amongst plants and animals there have been (though not altogether mutually exclusive) the following hypotheses: 1. Self-elevation by "appetency," or use and effort: Monbodo, Lamarck, and Cope. 2. Modification by the surrounding conditions of the "medium:" Geoffroy St.-Hilaire, Quatrefages, Draper, and Spencer. 3. Natural selection, under the struggle for existence, with spontaneous variability, causing the "survival of the fittest:" Darwin, Wallace, and Hæckel. 4. Derivation by "pre-ordained succession of organic forms," under an "innate tendency" or "internal force:" Owen and Mivart. 5. Evolution by "unconscious intelligence:" Morell, Laycock, Murphy. 6. Less defined, so far, as a distinct hypothesis, but clearly implied in the writings of Prof. Asa Gray, Dr. McCosh, Baden Powell, the Duke of Argyll, and others, is the view of orderly creation "by law," through the immanent action and direction of Divine Power, working by the purposive collocation and adjustment of natural causes or forces. This is not accurately described as a theory of "supernatural or miraculous interference." It should be designated, rather, as that of *creative evolution*.

Mivart, the Duke of Argyll, and others have abundantly shown that there is no antagonism whatever between the two ideas of creation and evolution. Excluding a very few atheists and positivists, the great controversy has been, of late years, upon the question whether a right interpretation of the facts should lead us to conclude that creative power was exerted *only at the beginning*, all afterwards being only the manifold progressive results of "natural laws" acting without traceable design; or that, instead, the *immanence* of Divine Power is everywhere shown by nature in forms and processes specially exhibiting design, in such a sense that, in the words of David Hume (*Dialogues concerning Natural Religion*, Part iv.), "the whole chorus of nature raises one hymn to the praise of its Creator."

*Descent of Man.*—Darwin gives the following conclusion in his work on this subject (1871): "The most ancient progenitors in the kingdom of the Vertebrata at which we are able to obtain an obscure glance apparently consisted of a group of marine animals resembling the larvæ of existing ascidians. These animals probably gave rise to a group of fishes as lowly organized as the lancelet; and from these the ganoids, and other fishes like the lepidosiren, must have been developed. From such a fish a very small advance would carry us on to the amphibians. We have seen

that birds and reptiles were once intimately connected together; and the Monotremata now, in a slight degree, connect mammals with reptiles. But no one can at present say by what line of descent the three higher and related classes—namely, mammals, birds, and reptiles—were derived from either of the two lower vertebrate classes—namely, amphibians and fishes. In the class of mammals the steps are not difficult to conceive which led from the ancient Monotremata to the ancient marsupials, and from these to the early progenitors of the placental mammals. We may thus ascend to the Lemniridæ; and the interval is not wide from these to the Simiadæ. The Simiadæ then branched off into two great stems, the New World and Old World monkeys; and from the latter, at a remote period, man, the wonder and glory of the universe, proceeded." Wallace (*Essays on Natural Selection*, 1870) furnished, in anticipation of Darwin's work on that subject, what still remains to be the most effective reply to its arguments in favor of the sufficiency of the hypothesis of natural selection to explain the origin of man. Wallace shows that in several important respects the advances from the *simian* to the *human* type of organization are such as cannot be accounted for by any possible fitness for success in the struggle for existence—namely, the superiority of the human larynx for voice and musical expression, of man's foot for progression in the erect posture, of his hand for delicate touch and varied prehension, the greatly increased size and capacity of his brain, and the entire absence of hairy covering from his back and shoulders. Hence Wallace writes (*op. citat.*) as follows: "The inference I would draw from this class of phenomena is, that a *superior Intelligence* has guided the development of man in a definite direction and for a special purpose, just as man guides the development of many animal and vegetable forms." It need scarcely be remarked that this evidence, coming from one of the originators of the hypothesis of natural selection, has still further importance in suggesting that this "intelligent guidance in definite directions for special purposes," so obvious in the nature of man, who is best known to us, will be likely to be equally manifest elsewhere in the organic kingdom when our knowledge of all its parts becomes more complete.

*Sexual selection*, urged by Darwin to supplement his theory, falls short of its purpose in several ways—especially as a *general hypothesis*—because it requires considerable intelligence in all the animals which exercise it as a supposed means of advancement in beauty of form, color, etc.; and yet very remarkable developments of similar traits and endowments appear in invertebrated animals (e. g. butterflies and other brilliantly beautiful insects, and varied and elegant shells of mollusks), and in the high ornamentation of flowers and leaves in many plants. Another cumbersome rather than serviceable speculative addition of Darwin's to his general theory has been that of *pangenesis*. Something very much like it was suggested by Owen in 1849, in his treatise on parthenogenesis, but it is quite as incredible, if not as inconceivable, as the "monadology" of Leibnitz. (See *PANGENESIS*.)

*Evolution of Mind and Consciousness.*—On this topic Darwin (*Descent of Man and Expression in Man and Animals*) has written with much ability; and so, amongst others, also have Cope (*Evolution and its Consequences: Penn Monthly*, Aug., 1872) and Chauncey Wright (*North American Review*, April, 1873, on the "Evolution of Consciousness"). Some success has been undoubtedly reached by these authors in framing a conceivable hypothesis for the transition from the "rudimentary" mental faculties of brutes to those fully developed in the human mind. Consciousness is thus traced back, by Darwin, to a germinal appearance in the higher animals, originated by conflicts between "permanent social instincts and affections" and "more transitory individual instincts and propensities." Yet there is obviously truth in the statement of Huxley, that between the mind of the highest anthropoid apes and that of man there is an "enormous gap"—a distance "practically infinite." Tyndall also is often quoted on this subject (*Address to Physical Section of British Association*, 1868) as follows: "The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. . . . Were our minds and senses so expanded, strengthened, and illuminated as to enable us to see and feel the very molecules of the brain; were we capable of following all their motions, all their groupings, all their electric discharges, if such there be; and were we intimately acquainted with the corresponding states of thought and feeling,—we should be as far as ever from the solution of the problem, 'How are these physical processes connected with the facts of consciousness?' The chasm between the two classes of phenomena would still remain intellectually impassable." Aristotle was impressed with a similar conviction more than two thousand years ago, when he wrote (*De Gen. Anim.* II., iii., 10) that *reason* has



nothing in common with the material elements of the body, but that it alone comes from without, and is divine: "λείπεται δὲ τὸν νοῦν μόνον θύραθεν ἐπεισείναι καὶ θεῖον εἶναι μόνον." It does not need for us to determine here upon a precise theory of the nature of mind to enable us to see how these conclusions bear upon the supposition of the *spontaneous* evolution of mind from matter, as well as somewhat less directly upon that of the spontaneous ascent of the mind of the brutes up to that of man.

The probable method of evolution of instincts in animals, by "accumulated and transmitted experiences" (Darwin, Spencer), or as "lapsed intelligence" (G. H. Lewes), has been well studied of late by the authors quoted, and by Carpenter, Spalding, Wallace, and many others. (See *INSTRICR*.) Here also we have to stop, at last, at the yet unbridged gap between insensitive, unconscious matter and sensitive, impressible nerve-substance, capable at first of reflex automatic action, and then, higher, of intelligence, impulse, and volition.

We are now prepared to approach a conclusion by attempting an answer to the question whether the facts giving strength to the hypothesis of evolution really eliminate the evidence of *design*, of special purposes, in nature; and whether, admitting "creation" in any sense, science compels us to remit it altogether to an inconceivably remote origin of the universe. For the following reasons, principally, we must unite with Carpenter, Dana, Agassiz, Henry, Sir John Herschel, Sir William Thomson, Asa Gray, and many other recent scientists of the highest class in denying absolutely the insufficiency of the proofs of design in nature; and also in refusing to admit the elimination of *special* creative action or direct modification of nature from all periods since the first origination of the universe.

1. As Whewell (*Indications of the Creator*) has pointed out, the nebular hypothesis is null without a creative act to produce the required "inequality of distribution" of cosmic matter in space. Hæckel (*Nat. History of Creation*, Berlin, 1868) admits that the hypothesis is weak on at least two points—the heat of the gaseous nebular mass, and its rotary motion. "Every attempt," he adds, "to explain these facts leads us inevitably to the untenable theory of an absolute beginning." We may avoid the contradiction herein involved by holding simply that what is *inevitable* must be pre-eminently a *tenable* conclusion. Herbert Spencer has also committed himself to a self-destructive process of reasoning in his "First Principles," as has been clearly shown by an American reviewer (*New Englander*, Jan., 1872, and Jan., 1873). The "instability of the homogeneous," on which Spencer builds large consequences, might, as that reviewer observes, account for chaos, but never for a universe. For *action* and *reaction* there must be heterogeneity, a plurality of factors. Traced backward, the principle of "uniformity of force" in physics must necessarily have been powerless to make any *beginning* whatever. Carried forward without designing *will-force* to modify them, natural cosmic forces tend always to *equilibration*, and consequent *dissolution*. The universe must thus become, as it has been said, "its own cemetery." Sir William Thomson asserts (*On Geological Dynamics*) that "as energy is being continually lost from the earth by conduction through the upper strata, the whole quantity of plutonic energy must have been greater in past times than in the present." Yet in organic nature there has been a constantly increasing complexity and exaltation of types—integration of matter with accumulation of force ("bottled sunshine" of some authors); and this under the "struggle for existence" against a steadily increasing resistance. As stated by Prof. Cope (*Method of Creation of Organic Types*, 1871), "While the amount of growth-force potential in adult living animals has varied very irregularly throughout the animal kingdom, there being large and small, simple and complex, in every division, it would seem to have accumulated, on the whole, with the rising scale of animal types." Mivart's special hypothesis of an "internal force" determinative of evolutionary changes in organisms is vague and unsatisfactory while detached from the "will-force" (Wallace) of an immanent Creative Power. The "unconscious intelligence" of Morell, Laycock, and J. J. Murphy is certainly an *unthinkable* phrase, a "pseudo-idea," when proposed as the designation of an active power in nature. The presumption against organic evolution, with *true ascent* of types, being in any sense the result of the action of mere *cosmic* forces, is of the same nature with that against perpetual motion; it contradicts the doctrine of the conservation or persistence of force. As Leifschild puts it (*Higher Ministry of Nature*, pp. 325, 327), the assertion that "No-will has evolved will" is as absurd as "ex nihilo aliquid."

2. Variation is necessary to the Darwinian or any other "non-teleological" theory; and no such theory accounts for variation. Darwin requires also almost *infinite* variability

of plants and animals; but, so far from infinite, observation shows it to be confined within very narrow limits. The *non-fertility of hybrids* of two nearly-allied species is a very important indication of the present fixedness of those limitations. Also, species do not pass, in any case, into each other. Palæontology and recent zoology and botany are declared by Agassiz, Barrande, Dawson, Gould, Balfour, and Thomson to establish this. Thus writes Sir William Thomson (*Nature*, Nov. 9, 1871): "In successive geological formations, although new species are constantly appearing, and there is abundant evidence of progressive change, no single case has yet been observed of one species passing through a series of inappreciable modifications into another." Embryology is regarded by Agassiz as affording concurrent testimony in regard to the essential diversity of types. In a lecture at Cambridge, Mass., Mar. 6, 1873, he used the following language: "No invertebrate animal has any structural relation to man whatever, while every member of his own type has an intimate structural relation with him. You may compare a quadruped in certain phases of its growth with the adult condition of some lower kinds of vertebrates, and be amazed at the resemblance; but you cannot carry the comparison over into the type of articulates, or into any other type of the animal kingdom based upon a different plan. Within each type the development has a character as distinct as the plan on which the type is built. An insect, for instance, can never at any time of its development, after it has passed out of that universal condition of the ovarian egg to which I alluded, be compared to an oyster or a fish, but it passes through phases where it can hardly be distinguished from a worm; that is, in the course of its development it bears a transient likeness to the adult condition of a being standing lower in the type of articulates to which they both belong. In short, every animal belonging to any one of the higher groups, during the transformations by which he reaches the adult state, may pass through modified conditions, in each of which he resembles some being of his own type of the animal kingdom for whom that condition is final."

3. Were variation infinite, without the *regulation* of selective or directive design, a simple calculation of probabilities (see "North British Review," June, 1867) shows that a merely chaotic complication of forms must result, the "struggle for existence" notwithstanding.

4. Infinite time has been proposed as affording a solution of the difficulties of natural selection. But infinite time would not alter the nature of the necessary result of infinite variations, nor would it regulate finite ones. Further, Sir William Thomson, Croll, and Gould have shown, from various *data*, that so far from infinite time, not more than one hundred millions of years can have been the duration of the present relation of our planet to the sun—a period quite too short (were *any* duration of time sufficient) for the genesis of organic nature merely by spontaneous modification and natural selection.

5. Without design (as Mivart has shown) *incipient* structures, which become useful only when completely developed, have no explanation at all. Further *items* of fact unexplained, apart from teleology, are—the opposition of the *sexes* in plants and animals; the *metamorphoses* of insects; the cessation of the individual life; and the renewal of life-progress by parental reproduction. Moreover, as to the origin of a *new species*, whose relation to an earlier allied species is supposed to be similar to the connection between the different stages of the life of one individual, we have the *fact* of individual reproduction exemplified under our knowledge; but what corresponds, in the birth of a *new type*, to the sexual reproduction of a new individual, especially in the case of the *first* created type?

Accepting, then, with Herbert Spencer, the evidence found everywhere of the unity of the "inscrutable universal Power" which is the Cause of nature, there is proof, also, in the multiplicity and adjustment of the manifestations of that Power, that it has the attributes of Intelligence and Will. Every *specialization*, each true *elevation* of type (which is a different thing from modification on the same plane of being), involves new force-expenditure. Certain *factors* have been *added* in the evolution of nature whose origin is a "mystery" as yet quite unsolved by science. It is rational and philosophical, therefore, in the absence of any solution by secondary causation, to refer them, provisionally at least, to the direct creative action (whether sudden or gradual we cannot know) of the First Cause. Such "factors," superadded from time to time in the past history of our globe, have been—1, life; 2, animality, as distinct from vegetative life; 3, mind-force, instinct, intelligence,  $\psi\chi\eta$ ; 4,  $\pi\upsilon\epsilon\upsilon\mu\alpha$  or spirit (see 1 Cor. xv. 46), possessed by man alone of all creatures on the earth. While *Theism* must rest essentially upon evidence other and higher than that of physical science, it would appear that the facts of evolution tend to confirm and strengthen that evidence. "If there

has been an evolution," writes Canon Kingsley, "there must be an Evolver." "Let us hope," says Prof. Gray (*Address before Am. Associa. for Adv. Science*, 1872), "that the religious faith which survived, without a shock, the notion of the fixity of the earth itself, may equally outlast the notion of the absolute fixity of the species which inhabit it—that in the future, even more than in the past, faith in an *order*, which is the basis of science, will not (as it cannot reasonably) be disavowed from faith in an *Ordainer*, which is the basis of religion." We find development in the succession of divine dispensations described in the Old and New Testaments—of the patriarchs, of Moses, the judges, prophets, and kings in the Old, and of Christ in the New Covenant. "The law made nothing perfect, but the bringing in of a better hope did." (Heb. vii. 19.)

*Evolution in Human History*.—Dr. McCosh has referred (*Christianity and Positivism*, 1872) to some phases of the progress of mankind, of which three stages are distinguishable—the era of the *predominance of physical force*, that of *intellectual supremacy*, and that (hardly culminated as yet) of *moral and spiritual power*.

As a question in archæology, it has been often argued whether man was originally savage (Tylor, Lubbock, Darwin), and thence self-elevated into civilization, or was at the beginning (Whately) supernaturally gifted with such knowledge as prepared him for refined life and culture, afterwards, in many places, to be lost and regained, again and again, through the ages. Neither of these alternatives compels our entire or exclusive assent. Probably man was at first infantile or puerile, both in innocence and ignorance. (See "Primeval Man," by the Duke of Argyll.) Normally in communion with his Maker, his destination was to continue morally pure and to advance in mental culture. History shows, instead, barbaric degeneration to have been the rule before the Christian era, with partial renewals and expansions of civilization in certain localities at different times. There is no proven instance of any nation or race having initiated its own advancement out of barbarism, while there are many examples of the deterioration of powerful empires and centres of magnificent culture into the savage or almost savage state. Always a *force from without* has begun the elevation of a race or community. Where history has failed to reach such beginnings, tradition follows its clues towards them, and always with the same indication—Egypt from India, Greece by Cadmus, Rome from Greece, Europe first from Rome, and afterwards from Palestine.

If India and China furnish no clear traces of such foreign origins of their advancement, what does this amount to? In the one instance, an old culture vanishing away; in the other, petrification into a half civilization, ceasing, many centuries since, to make further progress. After Greece and Rome had exemplified and fallen from the very culmination of intellectual and imperial development, the world (it may be believed) would have totally degenerated into a more than mediæval darkness but for the coming of a "force from above" in the advent of Christianity. By it, as now known in Europe and America, has been made possible and actual, for the first time in the world's history, a *continuously progressive civilization*.

We may conclude this article by a brief general statement upon the whole subject of development: "The only idea of creation which is at all conceivable is creation by a process, the steps of which have a succession, which, if known, would be rationally comprehensible." So regarded, evolution or development is the only expression according to which any consistent statement of the facts of nature can be made. But evolution is not a force, cause, or "law." It is a summary term for the general mode of succession of the complex results of *all* natural forces and laws under the Divine government.

HENRY HARTSHORNE.

**Evol'utions, Mil'itary**, the movements by which troops change the order, position, and direction of their primary formation. All such movements as marching, countermarching, changing front, forming line, facing, wheeling, defiling, deploying, etc., come under the general head of evolutions. All evolutions are performed according to a regulated system, which differs in its details in the armies of different nations.

**Ev'ora** (anc. *Ebora* and *Liberalitas Julia*), a town of Portugal, capital of the province of Alentejo, is pleasantly situated about 73 miles by rail E. by S. from Lisbon. It has two ruined forts, a large Gothic cathedral founded in 1186, several convents, and a library of about 50,000 volumes. It has been an archbishop's see since 1541. Here are manufactures of ironware and leather. Ebora was taken by Sertorius about 80 B. C. Here are Roman antiquities which are more interesting than any others in Portugal. Among them are an aqueduct said to have been

built by Sertorius; a temple of Diana with beautiful Corinthian columns; and a brick tower adorned with columns of the Ionic order. Pop. 13,046.

**Évremond** (CHARLES DE SAINT-DÉNIS), seigneur de Saint-Évremond, a French courtier and *littérateur*, born near Coutances, in Normandy, April 1, 1613. He was witty and accomplished, a perfect specimen of an Epicurean of that time, squandering his life in the pursuit of frivolous pleasures, but ready to give it up at any moment for the sake of a bon-mot. He entered the army about 1629, and became a friend of Turenne and the prince of Condé. Having given offence to Louis XIV. by his raillery and sarcastic wit, he took refuge in England in 1662. He gained the favor of Charles II., who granted him a pension of £300, and he never returned to France. He wrote dramas, essays, and letters, of which his "Comédie des Académistes pour la Réformation de la Langue Française" is an exceedingly witty, elegant, and entertaining production. His "Sir Politics," which he made in company with Buckingham, is very weak. Died Sept. 20, 1705.

**Évreux**, *à'vrux'* (anc. *Mediolanum*, afterwards *Eburovices*), a city of France, capital of the department of Eure, is pleasantly situated on the Iton about 67 miles by rail W. N. W. of Paris, with which it is connected by railway. It is a bishop's see, and has a fine old cathedral, an episcopal palace, a theatre, a clock-tower built in 1417, and a botanic garden. Here are manufactures of cotton and woollen fabrics, leather, etc. Évreux has sustained numerous sieges. It was taken and pillaged by Rollo the Norman in 892 A. D., and was burned by Henry I. of England in 1119. Pop. in 1881, 15,847.

**Evron**, a town of France, in the department of Mayenne. Here is an ancient Benedictine abbey. The chief manufacture is table-linen. Pop. 4482.

**Ewald** (JOHANNES), a Danish poet, was born in Copenhagen Nov. 18, 1743. In his early youth he lost his father, who was a minister, and soon after, yielding to the fantastic impulses of his nature, he gave up his studies and enlisted in the Prussian army. He felt very disappointed, however, as people of his character always do when they meet the reality. He deserted and joined the Austrians. But they did not satisfy him either. He deserted a second time, and returned to Copenhagen, where he spent the rest of his life as a literary man. He died in 1781 in utter poverty and degradation: he was a drunkard. In his literary business, however, Ewald was very industrious and conscientious. All his works bear evidence of great study, deep meditation, and untiring labor; there is no rashness, no halfness about them. He did the very best he could. Yet his writings—with the exception of some few genuine pearls among his songs, as "King Christian," which became the national hymn of the Danes, "Liden Gunver," "Rungsted's Lyksalighed," etc., and his essay "On Bachelors," which is a specimen of the most elegant humor—are marked with the same empty enthusiasm and fantastic excitement as was his life. The innermost kernel of his tragedies "Adam and Eve" and "Balder's Death" is vapor. To a sound taste they are tiresome and unpleasant. They are interesting only as historical documents to the scholar who does not consider them from a merely artistic point of view, but looks at them in their connection with the period in which they were produced. Holberg had taught the Danish people how to read. He had made them eager after books. Through his influence it had become as necessary for them to have a literature as to keep an army. But he had not taught them how to write. He had left them as types no models which could be used; and it took two generations before he came who did—Adam Oehlenschläger. Meanwhile, the public arranged itself into two camps—one, "The Norwegian Club," importing French forms and French tastes; and the other, "The Danish Society," importing German ideas and German principles. Klopstock lived at that time at the Danish court, from which he had a pension, and Ewald, who was his admirer, and who in the Danish literature represents the same ideas, though not the same influence as Klopstock in the German, became the hero of "The Danish Society." A fearful battle issued between these two parties—noise and smoke, rattling and booming, as from the fight of two hostile armies. What was said during the evening in the club or in the society became the topic of conversation next day all over the country, from the drawing-room to the barber-shop, and fifty years later old men would still tell with pride how they had been present when this or that epigram was first recited or this or that song first sung. Fearful also was the result of the battle, for in artistic respects it was next to nothing.

Among all which the Danish literature produced between Holberg and Oehlenschläger that which is good can be read in one short hour, and no great harm would be done if it

were forgotten in the next. But by studying the period in its details, it is possible to show how all the mental powers of the nation then awakened, and how they sought and found the same course, until at last, through Oehlenschläger, they broke forth in one broad, glittering stream, useful to the world; and in this study every line of Ewald is interesting and important.

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**Ewald, von** (GEORG HEINRICH AUGUST), a celebrated German Orientalist and biblical critic, born at Göttingen Nov. 16, 1803. He became in 1831 professor of philosophy in the University of Göttingen, and he obtained the chair of Oriental languages in 1835. In 1837 he was removed on account of his liberal political opinions; he and five other professors, among whom were Gervinus and Grimm, solemnly protesting against the abolition of the free constitution which the Hanoverian king had felt himself compelled to give during the revolutionary commotions in 1830. Ewald went to Tübingen as professor in theology in 1838, but his position here was not very pleasant, as he had to defend himself against the attacks and intrigues both of the Roman Catholic party and the Hegelians. He was reinstated in his chair at Göttingen in 1848, and was elected a member of the North German Parliament in 1869. Among his numerous works are a "Hebrew Grammar" (8th ed. 1870), "The Poetical Books of the Old Testament" (4 vols., 1835-37), a "History of the People of Israel until the Advent of Christ" ("Geschichte des Volkes Israel bis auf Christus," 7 vols., 3d ed. 1864-69), "The History of Christ and his Time" (1857), and "The History of the Apostolic Age" (1858). In 1848 he founded at Göttingen "The Year-Book of Biblical Science" ("Jahrbuch der Biblischen Wissenschaft"). Died May 5, 1875.

**Ewbank** (THOMAS), a writer on mechanics, was born in the county of Durham, England, Mar. 11, 1792. He emigrated to New York in his youth, and was appointed commissioner of patents by the President of the U. S. in 1849. He published, besides other works, a "Descriptive and Historical Account of Hydraulic and other Machines, Ancient and Modern" (1842). Died Sept. 16, 1870.

**Ewell** (BENJAMIN S.), LL.D., an American officer and educator, son of Dr. Thomas Ewell and Elizabeth Stoddert, b. in the District of Columbia in 1810, graduated at West Point 1832; served while lieutenant Fourth artillery as assistant professor at the U. S. Military Academy 1832-36; resigned 1836; civil engineer 1836-39; professor mathematics and natural philosophy at Hampden-Sydney College 1839-46; professor mathematics and military science Washington College 1846-48; acting president and professor mathematics, College of William and Mary, 1848-49; professor of mathematics and natural science 1849-61; president 1854-61; served in the Confederate army in command of the Thirty-second regiment Virginia volunteers 1861-62, and as adjutant-general, with the rank of colonel, to Gen. Joseph E. Johnston, while commanding the departments of Tennessee and Mississippi 1862-64; received the degree of LL.D. from Hobart College, N. Y., 1874; elected honorary member of the Royal Historical Society of Great Britain 1880; president and professor, College of William and Mary, from 1865 to the present time (1885).

**Ewell** (RICHARD S.), son of Dr. Thomas Ewell and Elizabeth Stoddert, an American officer, b. 1816 in the District of Columbia, graduated at West Point in 1840; served with distinction on the frontier and in the Mexican war as lieutenant and captain in the First regiment of dragoons 1840-61; resigned and took service in the Confederate army as lieutenant-colonel, colonel, brigadier, major, and lieutenant-general 1861-65, participating in the battles of first and second Manassas, in the latter of which he lost a leg, Front Royal, Cross Keys, Port Republic, and Cedar Mountain; assigned, on the death of Jackson, to the command of his, the Second, corps of Lee's army, which he led at the capture of Winchester, at Gettysburg, Wilderness, and Spotsylvania Court-House; relieved from duty in the field because of physical inability, and ordered to take charge of the department of Richmond; captured, on Lee's retreat, at Fisher's Creek; was one of three brothers in the U. S. army, the youngest of whom, Lieut. Thomas Ewell, was killed while leading his regiment, the mounted rifles, on the summit of Cerro Gordo; moved after the war to Tennessee; d. there in 1872. One of his last injunctions on his death-bed was, that on any monument erected to his memory, nothing derogatory, or disrespectful, to the government of the U. S. or any of its people, should appear.

**Ewer** (FERDINAND C.), born at Nantucket, Mass., May 22, 1826, died during a visit to Montreal, Oct. 7, 1883. He was graduated from Harvard, was ordained a minister in San Francisco, came to New York in 1860 and took charge of the church of St. Ignatius. He was a ritualist, and published "The Failure of Protestantism," etc.

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**Ewing**, Franklin co., Ill. (see map of Illinois, ref. 10-E, for location of county), 8 miles N. E. of Benton, noted for its large woollen factory, and as the seat of Ewing College, a flourishing institution. Pop. in 1880, 170.

**Ewing** (CHARLES), LL.D., born in Burlington co., N. J., July 8, 1780, graduated at Princeton in 1798, was called to the bar in 1802, practised at Trenton, and was chief-justice of New Jersey 1824-32. Died Aug. 5, 1832.

**Ewing** (Rev. FINIS), one of the fathers of the Cumberland Presbyterian Church, was born in Bedford co., Va., July 10, 1773, of Scotch-Irish stock, and is said to have studied for a time in college. He removed to a place near Nashville, Tenn., and in 1823 married a daughter of Gen. William Davidson, joined a Presbyterian church, and soon after removed to Kentucky. Awakened in 1800 to a new religious life, he was licensed to preach, and in 1803 was ordained by the Cumberland Presbytery. His ordination not being recognized by the Kentucky synod, the presbytery being dissolved, and the action of the synod being sustained by the General Assembly, he with two others in 1810 formed the germ of the new Cumberland Presb. Church. In 1820 he removed to Missouri. Died July 4, 1841.

**Ewing** (JOHN), D. D., an American Presb. minister, born in Nottingham, Md., June 22, 1732. He became pastor of the First Presb. church of Philadelphia in 1759, and provost of the Univ. of Pa. in 1779. Died in Sept., 1802.

**Ewing** (THOMAS), LL.D., a statesman, was born in Ohio co., Va., Dec. 28, 1789. In 1792 he removed with his parents to Ohio. In his youth he prepared himself for college by night-study while employed in the Kanawha salt-works. In 1815 he graduated at Ohio University at Athens, receiving the first degree of A. B. ever conferred in that State. He was called to the bar in 1816, and was U. S. Senator from Ohio (1831-37 and 1850-51), U. S. secretary of the treasury (1841) under Harrison, and secretary of the interior under Taylor (1849). He was the father of Gen. Thomas Ewing and father-in-law of Gen. W. T. Sherman. Died Oct. 26, 1871.

**Ewing** (THOMAS, JR.), a son of the foregoing, was born at Lancaster, O., Aug. 7, 1829, was educated at Brown University, was private secretary of President Taylor (1849-50) studied law at Cincinnati, removed in 1856 to Leavenworth, Kan., was chief-justice of Kansas (1861-62), colonel of the Eleventh Kansas Volunteers, 1862, served with distinction in the civil war, chiefly in Missouri and Arkansas, becoming a brigadier-general of volunteers in 1863, and major-general by brevet in 1864. Since the war he has been a lawyer in Washington, D. C.

**Ex'actions** [from Lat. *exactiones, tallice*] was a legal term of ecclesiastical jurisprudence, used in the Middle Ages to denote such duties or contributions, demanded by the clergy of their parishioners, as were extraordinary, either because they were new and against custom, or because their amount was unduly increased. They were illicit, and it was found necessary repeatedly to denounce their unlawfulness. The power of the clergy over their parishioners, or of the bishops over the subordinate clergy, was so great that it was easy for them to make the most outrageous exactions. In 589 the Third Council of Toledo forbade the bishops "exactiones dioecesis vel damna infligere;" and the meaning of this is more exactly defined by Leo IV., who in 853 forbade the bishops to exact from the clergy and ecclesiastical institutions of their dioceses "dationes ultra statuta patrum aut super appositae in angariis." Yet, in 1179, Alexander III. found it necessary to repeat: "Prohibemus ne ab abbatibus, vel episcopis, aliisve praelatis novi census imponentur ecclesiis, nec veteres augeantur, nec partum reddituum suis usibus appropriare præsumant."

**Exarch** [Gr. *ἑξαρχος*, a "leader"] was in ancient Greece the title given to him who conducted the dramatic chorus during the performance, as distinguished from the coryphæus and the choregos; the former of which titles denoted the teacher of the chorus, him who taught them the songs and dances, which office generally was filled by the author of the play; while the latter title, that of choregos, simply was given to some rich citizen who supplied the costs of the outfit of the chorus.

Later on the title was used in the Eastern Church to denote the highest ecclesiastical dignity, and was bestowed on the bishops of Alexandria, Antioch, Ephesus, Cæsarea, and Constantinople, but was soon exchanged in most places for that of patriarch, though it never was wholly abolished. At present it denotes a chancellor or deputy under the patriarch in the Russian Greek Church. He travels as a delegate from the patriarch through the diocese, investigating the discipline of the monasteries and the observance of the canons, and forming a kind of court of appeals in all ecclesiastical cases arising between the clergy and the people.

**Ex'archate**, the title of exarch was, for some time, ap-

plied also to civil dignitaries of the highest rank—to the viceroys who ruled over those border provinces of the Byzantine empire which were most exposed to the danger of being invaded by the barbarians. Thus, an exarchate was established in Africa in 534, and existed till 698, when it was finally overthrown by the Arabian conquest. The most important of these exarchates, however, was that established in Italy in the time of Justinian I. by Narses. In 552, Narses, who originally was a eunuch belonging to the household of Justinian, but who turned out a military commander and statesman of great talent, led an army consisting of Lombards, Huns, Heruli, Armenians, and Persians—which incongruous mass he swayed with indomitable power—along the coasts of the Adriatic, until he, S. of Ravenna, crossed the Apennines and met the Goths at Tagina, where he totally defeated them; their king Totila fell in the battle. Narses now took Rome, and the end of the Ostrogothic empire in Italy was at hand. Teias, the successor of Totila, was defeated and slain in a battle at the banks of the Sarno, near Naples, which lasted two days, and Narses immediately commenced the organization of Italy as a province of the Byzantine empire. He had to fight once more, however. New swarms of barbarians, mostly consisting of Franks and Alemanni, poured down the Alps and spread devastation before them wherever they came. Narses waited for some time, but when he saw that the luxurious and riotous life to which Italy induced them had thoroughly demoralized them, he attacked them at Casilinum in Campania, and hardly 5000 out of 75,000 escaped from the massacre. From this time (554–567) Narses ruled Italy as a province of the Byzantine empire, under the title of exarch, and with full civil, military, and judicial authority. After his death, in 567, followed Flavius Longinus, and the Roman exarchate continued to exist, though with various fortunes, till 752. The exarchs placed *duces* (dukes) at the head of the administration of the different provinces, but the dukes of Venice and Naples soon made themselves independent. So did the bishop of Rome, Gregory II., and the dominion of the exarchs, by degrees, dwindled down to a very limited extension, comprising only a few provinces of Central Italy around the city of Ravenna, which was their residence. The last exarch was Eutychius. In 752, Aistulf, king of the Lombards, conquered Ravenna, but in 755 he had to give most of the possessions of the exarchate to the see of Rome, compelled to do so by Pepin the Little. The title of exarch was used, however, in Western Europe as a civil and military title till the middle of the twelfth century. CLEMENS PETERSEN.

**Exauvilliez** (PHILIPPE-IRÉNÉY BOISTEL D'), a French author, was born at Amiens Dec. 6, 1786. In 1815 he lost the greater part of his fortune, and went to seek some employment. Having failed to secure any, he turned to literature, and wrote a great number of religious and moral sketches and pamphlets, which were not without effect. His essay, "Le Bibliothèque de Saint-Gervais," 1831, gave the first impulse to the establishment of small libraries all over France, which have proved of great benefit to the general elevation of the people. Exceedingly curious is his translation of Walter Scott's novels (1840), from which he blotted out every passage which in any way could be interpreted as telling against the Roman Catholic religion, and also all love-passages as far as possible. He was editor of the "Journal des Personnes pieuses." Died in 1858.

**Excambion** [from the It. *cam'bio*, "exchange"], in Scotland, is the legal name for an exchange of lands, or the contract by which one piece of land is exchanged for another. Heirs possessing under deeds of entail are empowered to exchange or excamb certain portions of the entailed lands.

**Ex Cathedrâ**, a Latin phrase originally applied to decisions given by popes or prelates from their *cathedrâ* (chair), i. e. in a solemn judicial manner. Hence it is applied to every decision pronounced by any one in the exercise of his proper authority, as a judge on the bench, etc.

**Ex'cellency** [Lat. *excellen'tia*, from *excellō*, to "excel"], a title of honor which was borne successively by the mediæval Lombard kings, by several emperors of the West, and by other Italian potentates. It is now given to ambassadors, governors of British colonies, and the governor of Massachusetts. The President of the U. S. and the governors of many of the States have the same title by courtesy.

**Excelmans**, or **Exelmans** (REMI JOSEPH ISIDORE), BARON, a French marshal, born at Bar-le-due Nov. 13, 1775. He entered the army in 1791, and became aide-de-camp to Murat in 1801. He served with distinction at Austerlitz (1805), and gained the rank of general of brigade for his conduct at Eylau (1807). In the Russian campaign (1812) he commanded a division, and gave proof of much skill. He directed a corps at the battle of Water-

loo (1815), after which he passed four years in exile. He was restored to his title as a peer in 1831, and became a marshal of France in 1851. Died July 10, 1852.

**Excel'sior** [the comparative degree of the Lat. *excellens*, "high," "elevated"] signifies "higher." It is the motto of the State of New York.

**Exchange**, in commerce, is a term of various application—to places of rendezvous of merchants, bankers, and tradesmen; to the stock-markets and to markets generally; and to the financial relations existing between different markets, domestic or foreign, as indicated by the difference of value in their respective currencies. "In every department of human affairs," says John Stuart Mill ("Pol. Ec.," vol. i.), "practice long precedes science; systematic inquiry into the modes of action of the powers of nature is the tardy product of a long course of efforts to use those powers for practical ends." Thus, society consists of an immense mass of practice, not yet reduced to scientific order. It is only within a comparatively short period that even the most advanced nations have become sufficiently enlightened to contemplate the possibility of their existence without the necessity of a vast organization of physical forces for mutual defence or assault. Happily, this very necessity has set in motion and developed the more beneficent applications of those forces, and converted the military power itself, measurably, into an auxiliary of commercial interests. And so great has been the energy of the people, so numerous their inventions, and so rapid the growth of society in modern times, that the scientific principles of organization have been, so to speak, clogged by the accumulation of physical affairs under the spur of immediate necessity. The vast increase in the number and variety of transactions in all parts of the civilized world has outstripped the knowledge of law, and its application to the correction of disorders by which the labor of all countries is oppressed, yielding neither to the producer nor to the capitalist a certain and satisfactory reward for his exertions, excepting in solitary instances. The effect of this state of things, in which law ceases to be recognized as having any connection with practical affairs, cannot be otherwise than disastrous; and it is from the very midst of disasters which press from every quarter that the first steps are taken towards scientific organization. It is in strict accordance with these natural principles of development that the commercial exchange or rendezvous of merchants and dealers has been organized in all large cities of active trading countries. Hence, there is a *stock-brokers' exchange*, where, whatever abuses exist, there is a severe inquest maintained concerning the validity of investments and the real value for income of all public and corporate securities in the shape of stocks and bonds. Before any new securities are allowed to be quoted or sold on the exchange they are subjected to rigid examination by a committee. A system of arbitration supersedes all appeals to the law for the settlement of disputes. The general influence of it is favorable to fair and upright dealing. But for the supervision that it maintains over the innumerable shapes of investment which are thrown upon the market there would scarcely be any effective bar to imposition and fraud. What the stock exchange is to financial securities, the *produce exchange* is to the staples of food. It maintains inspection of all articles to prevent adulterations, classifies them, and adopts marks or brands whereby they become known in the markets of all countries. It recognizes superior qualities, establishes grades, and takes cognizance of methods of preparation for export to foreign markets, by which the general facilities of commerce are improved and great economies secured. So advantageous have these inspections and precautions proved that every important branch of business has come to be represented by its exchange. There is a *cotton exchange* in all ports and cities where that staple has its entrepôt. Likewise, there is a *mechanics' exchange* and a *real-estate exchange* in almost every considerable town in the U. S. In some places all branches of business are embraced by the same association, each having its department, with bureaus of record and information, and committees to arbitrate differences, whereby vexatious and expensive litigation is prevented. One of the most commodious and remarkable exchanges in the world is that of Hamburg, Germany. Besides the usual bureaus representing every important branch of business, it has a library of near 50,000 volumes relating to subjects of commercial interest in all parts of the world, and also a valuable collection of maps and charts of all seas and coasts. No traveller stops at Hamburg without visiting the Exchange, to which admission is granted by having his name inscribed on the books through the introduction of a member. The great hall is surrounded by spacious galleries, from which the movements of the crowd on the main floor may be observed. The acoustic properties of

this hall are such as to produce the most extraordinary reverberations of sound, resembling at first, when the members begin to congregate, a noise like that of a small cataract. As the crowd increases it gains depth and volume, until at "high 'change" the roar is an exact counterpart of a stupendous fall and rush of waters, in which all inferior sounds are swallowed up. As there is no distinct source to which the immense reverberation of sound can be traced, the visitor looks about in amazement to discover its origin. Notwithstanding the roar, personal conversation is carried on even in the most moderate tones without the slightest inconvenience.

**Bills of Exchange.**—Exchange as a method of commercial settlement is probably of nearly coincident date with the origin of commerce. De Paw says that bills of exchange were used at Athens, and were known among the Arabs. The Abbé Raynal says they were known in the East Indies when the Portuguese first arrived there. Macpherson says there is no express mention of them in any known record until the beginning of the thirteenth century, when the pope, in the plenitude of his power as sovereign of the world, offered the kingdom of Sicily and Apulia to King Henry III. on the condition that he would drive Manfred out of it. Henry accepted it for his second son, and authorized the pope to carry on the war against Manfred at the expense of England; whereupon the pope took up large sums from the Italian merchants, who were compensated by drawing bills on the English prelates, and sending agents to collect them. Owing to the balance of trade or debt between any two places, either domestic or foreign, there may be a difference of value between a given quantity of gold or silver in such places respectively. This difference is called the exchange, and it is generally expressed by a percentage on the bill that is bought for remittance. The exchange is said to be at *par* when there is no such difference, or "when a given quantity of gold in one country is convertible at the market-price into such an amount of the currency of that country as will purchase a bill of exchange on the other country for such an amount of the currency of that other country as will there be convertible at the market-price into an equal quantity of gold of the same fineness." Exchange is said to be in favor of a country when a given quantity of gold purchased in it is convertible into such an amount of the currency of another country as will there be convertible into a greater quantity of gold of the same fineness; and it is said to be adverse, or against a country, when the proceeds of a bill of exchange will yield in the country to which it is transmitted a smaller quantity of gold of the same fineness. The effective limitation, therefore, to the price of a bill of exchange designed for transmission to another country is the cost of sending gold. The exchange will ordinarily rise to the height of the cost of transmitting gold, which is made up of freight, insurance, interest, and brokerage; but if there is little gold in a country, and if the sources of supply are uncertain, it may greatly exceed that cost, especially if the balance of foreign debt be adverse. The principal circumstance which determines the cost of gold in a country is the state of its foreign account. If its exports are continuously less than its imports, it must transmit gold or silver to pay the difference.

Payments of money to be transmitted from this country to France or Germany are usually made with bills of exchange drawn payable in the standard money of those countries. Remittances of money payable in other foreign countries are commonly made in English bills of exchange drawn on London, the chief monetary centre of the world.

The act of Mar. 3, 1873, provides that the values of the standard coins in circulation of the various nations of the world shall be estimated annually by the director of the mint, and be proclaimed on the first day of January by the secretary of the treasury. (See COINAGE.) It also provides that in all payments by or to the treasury, whether made here or in foreign countries, where it becomes necessary to compute the value of the sovereign or pound sterling, it shall be deemed equal to four dollars eighty-six cents and six and one-half mills; and the same rule shall be applied in appraising merchandise imported, where the value is by invoice in sovereigns or pounds sterling, and in the construction of contracts payable in sovereigns or pounds sterling, and this valuation shall be the par of exchange between Great Britain and the U. S.; and all contracts made after the first day of January, 1874, based on an assumed par or exchange with Great Britain of fifty-four pence to the dollar, or four dollars forty-four and four-ninths cents to the sovereign or pound sterling, shall be null and void.

Soon after the passage of the act, the secretary of the treasury issued a circular, from which the following facts have been obtained. By a usage dating back to an early

period in our colonial history, the dollar has been rated as equivalent to 54 pence sterling; the pound, therefore, at \$4.44 $\frac{2}{3}$ , or £9 = \$40. The dollar, which was the original subject of comparison, was the old Spanish silver dollar, or piece of eight reals, and the computation at the time was approximately true, as compared with the British silver money. In all transactions of exchange involving the dollar and British money the par was, therefore, assumed at 54 pence to the dollar, any differences from this par being represented by premium or discount. The practice thus begun has been continued through all the changes—and they are considerable—which have affected the coins current in this country and in Great Britain during nearly two centuries.

The true par value of the pound sterling is \$4.8665, and the fictitious par, at the assumed rate of 54 pence to the dollar, is \$4.4444. Dealers selling exchange at the true par charge a nominal premium of 9 $\frac{1}{2}$  per cent., since 9 $\frac{1}{2}$  per cent. on \$4.444 gives \$4.866. In appearance, exchange is heavily against this country, when, in truth, there is neither premium nor discount. Thus, through a pure fiction, retained by usage only, and not by any law, exchange with Great Britain appears permanently *against* the U. S., while our bonds are quoted at a fixed discount of nearly 8 $\frac{1}{2}$  per cent. below their real value. The remedy for such anomalies is the abandonment of the false par or valuation of the moneys of the U. S. in British money, and it is to this object that the law referred to is directed. In quoting exchange on foreign countries it has never been the practice, except in dealings with Great Britain, to assume a par upon which a percentage is rated. The universal rule, except in this case, is to quote the money of our country against the money of other countries. Thus, on France and the franc countries, exchange is quoted in francs and centimes to the dollar; on Prussia, cents to the thaler; on Frankfort, cents to the florin; and so on. In reforming our practice with Great Britain, it will be judicious to adopt the same method, quoting exchange either in dollars and cents to the pound sterling, or in pence and fractions to the dollar.

The act referred to went into effect in this country soon after its passage, but the change made in the quotation of U. S. securities on the London Stock Exchange did not conform to the valuation fixed by the act. The change, according to the report of the director of the mint, for 1874, was from the fictitious valuation of the dollar at 54 pence to a new valuation of 48 pence, which is \$5 per pound. Estimating by the standard of the coins (pound sterling and dollar), the pound is \$4.86656. The Stock Exchange basis is, therefore, an overvaluation of the pound—say 13 cents, or about 2 $\frac{1}{2}$  per cent. On such a basis, a U. S. security sold at true par must be quoted at 2 $\frac{1}{2}$  per cent. premium, since \$4.8665 plus 2 $\frac{1}{2}$  per cent. (\$.01335) gives \$5, the assumed par.

During the last twenty years there has been a great reform in domestic exchange. Previous to the organization of the present national banking system, the rate of exchange on New York varied from one-eighth of one per cent. upon the bank-circulation of the New England States, and one-fourth of one per cent. upon the circulation of the New York State banks, to five, and even ten, per cent. on the circulation of other remote States, the average rate of such exchange between New York and the Southern and Western States having been from five to ten, and in some instances one hundred, times the rate now prevailing. The usual rate between the large commercial cities and New York at the present time is frequently less, and does not often exceed one-tenth of one per cent., and at the remotest points rarely exceeds one-quarter of one per cent.

REVISED BY JOHN JAY KNOX.

#### Exchange, Bill of. See BILL OF EXCHANGE.

**Exchequer** [It. *scacco*, a "chessboard;," Ger. *Schatz*, a "treasure"], a British court of record which takes cognizance of all matters relating to the customs, excise, and revenue affairs generally: also, one of the courts of common law in England. "The court of exchequer was originally the court wherein all matters relating to the royal revenues were adjudicated upon." The receipts of the British treasury from the ordinary sources of taxation have ranged within the last thirty years from 250 to 425 millions of dollars annually. The mode of collecting and disbursing this vast sum of money may greatly enhance or diminish the burden of the taxpayers, and in a corresponding degree affect the interests of the receivers. The withdrawal of any considerable portion of the revenue from the pockets of the people and placing it in the treasury as a hoard in waiting to meet the liabilities of expenditure would very seriously affect the movements of business. The policy of the exchequer-bill system very happily obviates such disturbance of the money movement of the



country. The investments in these bills are almost entirely drawn from the inactive capital of business people. For such service the exchequer-bills are admirably adapted. They vary but a trifle, and when they can be had are always in demand; they never enter into the currency circulation, and almost never appear in the reports of the English money market. They are issued in denominations of 100-, 200-, 500-, and 1000-pound bills. They are used as reserves of the English banks and bankers. The rate of interest which they bear is usually about 2½ per cent. per annum. They were first brought into use by Chancellor Montague, earl of Halifax, at the time of the great financial difficulties attendant upon the recoinage and the overissue of the Bank of England to the government in the earliest years of its existence. From that time to the present, through two centuries, they have been so useful as to have become a prominent feature of the British fiscal system. Their normal function is to anticipate the income of those taxes which are payable only at such periods as are too distant from each other to meet the daily drafts upon the treasury. The taxes of this class amount to about the half of the annual revenue of the kingdom, and in that proportion require an artificial adjustment as to the times of answering to their current disbursement. The bills are usually made redeemable about the time the incoming taxes shall reach the treasury. One of their excellent adaptations to service is in the circumstance that they furnish the funds to the common currency by the price at which they are sold to capitalists in advance of the equivalent demand made upon the taxpayers, providing the government, at a small rate of expense, with the avails of the internal taxes, and at the same time providing beforehand the currency for payment without affecting the general volume in the service of the business community.

In the U. S. we have never had anything in our fiscal system that nearly corresponds to the British exchequer-bills policy. Some very useful systems of the economy of the federal treasury equivalent to that of England have been proposed, but never adopted. Money troubles do not hurt either the American administration or the people as they do in Europe. We take the pinches that come in the natural way; we are young and strong and can rough it through the tight places. If England had no such means of paying as she goes as the exchequer-bill system provides, the exchequer might suspend payment on demand every other week, or else meet the exigencies at prodigious cost and great disturbances of the monetary movements of the business community. WILLIAM ELDER.

**Exchequer Chamber, Court of**, in England, was originally a court of all the judges in England, assembled for the decision of matters of law. By 1 Will. IV. c. 70, this court is constituted the proper tribunal for the trial of writs of error from the three superior courts of common law. The judges of two of these courts always form the court of appeal, which reviews the decisions of the third. (See COURTS, by GEORGE CHASE, LL.B.)

**Exchequer, Chancellor of the**, is the title of the highest finance minister of the British government. This office is from its nature necessarily entrusted to a commoner. When the prime minister is a member of the House of Commons, he sometimes holds the office of chancellor of the exchequer.

**Exchequer, Court of**, in England, is one of the supreme courts of common law. It was originally established for the recovery of the king's debts and ordinary revenues of the Crown. The judges of this court consisted originally of the lord treasurer, the chancellor of the exchequer, and three puisne judges, which last were called barons of the exchequer. In its modern shape it is, in fact, a combination of eight distinct ancient courts. It acquired concurrent jurisdiction with the other two superior courts in all personal actions by the fiction of the plaintiff being a debtor to the king—a fiction which is now removed. It has exclusive jurisdiction in cases in which the royal revenue is concerned. It had formerly also an equitable jurisdiction, which was abolished by 5 Vict. c. 5, and transferred to the court of chancery. The court now consists of five judges—viz., the chief baron and four barons of exchequer. From this court an appeal lies in error to the court of EXCHEQUER CHAMBER (which see; also COURTS).

Ireland has a court of exchequer, consisting of a lord chief-baron, three barons, and a master, with the necessary clerks and other inferior officers. Scotland had anciently an exchequer court which decided questions relating to revenues and customs, and to honors, estates, forfeitures, and penalties arising to the Crown. This court has been lately abolished, but there is still a lord ordinary in exchequer for Scotland.

**Exchequer Tallies**. The English exchequer formerly checked its accounts by means of wooden tallies, as

follows: Seasoned wands of hazel, ash, or willow were inscribed on one side with the sum for which the tally was an acknowledgment, and on the other with the Roman characters indicative of the same sum, with the date and payer's name. Notches of varied appearance stood for various amounts. The deputy chancellor then split the stick with knife and mallet in such a way that each check was divided; and when the payer presented his tally for payment, it was first matched with its corresponding tally in the exchequer office. This ancient and clumsy device was nevertheless an almost perfect protection against forged applications for money. The use of the tally was a very ancient device, and was not abolished in England until 1783. The old tallies were stored in the Parliament House, and their presence in 1834 is believed to have caused the destruction of that building by fire.

**Excipient** [Lat. *excipiens*, pres. part. of the verb *excipio*, to "receive"], or **Vehicle**, in pharmacy, is an inert substance used to give form and consistence to solid preparations, such as pills and dragées, or to give palatability and the necessary qualities for administration to any medicine. The various conserves, also honey, treacle, simple syrups, glycerine, white of egg, and mucilage of acacia, are among the most useful excipients.

**Excise** [Lat. *excido*, *excisus*, to "cut off"], originally an English tax imposed chiefly upon goods of home produce destined for home consumption. It was the first ameliorated form of collecting inland revenues after the exactions of the feudal period. The impossibility of taxing people equitably according to their revenue by any system of capitation suggested the plan of levying an impost on particular commodities. But that impost might not fall equitably between the seller and the consumer. The starting idea of the excise was therefore to tax *expenses*. A consumer would buy the necessities of life, but he would not be likely to buy more than he wanted; and consequently his expenses were fixed upon as the most accurate measure of his consumption. The tax on specific articles was intended to be an indirect tax on his expenses. The raising of revenue by this method was further commended because it afforded less facility for cheating the government than the smuggling of foreign goods. In the U. S. the term excise is applied exclusively to the tax on fermented and spirituous liquors, and the receipts are classed under the head of internal revenue. The following list embraces the sources from which this branch of the revenue was derived in the years 1873 and 1883, with the total for each year (for details see the report of the commissioner): spirits, distilled, fiscal year 1873, \$52,099,372; fiscal year 1883, \$74,368,775. Fermented liquors, fiscal year 1873, \$9,324,323; fiscal year 1883, \$16,900,616. In the U. S. the distinction between the excise taxes and the duties on imports, which include all the revenue of the government derived from imposts, is that of *direct* and *indirect*. (See INTERNAL REVENUE AND TAXATION.) The history of the operation of the old excise laws in England throws much light on this subject. It was not so much the amount of the impost, but its interference with the free course of manufactures, inventions, and the introduction of machinery that led to serious industrial evils. The laws of excise, says Sir Morton Peto, "compelled every manufacturer to manage his trade, not according to the teachings of his own experience, but by act of Parliament, which imposed upon him restrictive regulations, and taught him nothing except how to pay a tax." The result was, according to the same authority, "inferiority in the quality of the articles produced, which inferiority lost us [England] no inconsiderable proportion of the market of the world." The repeal of the old excise duties was begun in 1844 by Sir Robert Peel, and was first applied to glass. The consumption of this article was less in England in 1830 than it was in 1794. The removal of the tax gave new life to the manufacture. From the many uses of economy, comfort, and health to which it is subservient may be inferred the deprivations suffered for the want of it. The houses of the mass of the people, comparatively with the present day, were scarcely habitable. Even hospitals were without sufficiency of light and protection from the moist, cold atmosphere of the country. The residences of the common people were abodes of discomfort and sickness. The success of the manufacture carried with it the most beneficial ameliorations. England had been obliged to import all her glass for optical instruments. "If the excise duties had not been repealed in 1845," says Sir Morton Peto, "the Crystal Palace of 1851 could scarcely have been constructed." The excise on bricks prevented the growth of towns, and added permanently to the rent of houses. The tax on soap was not removed till 1853. A sensible improvement followed in sanitary conditions, as it was impossible without soap to maintain the cleanliness necessary to health. The repeal of the excise on paper resulted in immensely increased con-

sumption of the article in wrappers for goods, paper collars and cuffs, the cost of which is less than that of washing linen, and paper napkins, half a dozen of these costing less than the washing of a single one of linen. Before the repeal of this tax in England merchants had their letter envelopes made of such thin paper that the postage-stamp frequently outweighed the envelope itself, and there was great insecurity in commercial remittances. Up to 1833 the taxes on pipes and tiles prevented the drainage of land, repressed the agricultural capabilities of the soil, and both increased the cost of living and reduced the quality of food. It is from such experience as this that statesmen are enlightened as to the methods of administering the power of levying imposts on the labor and industry of a nation. While no sophistry can convert taxation into anything but what it is—a burden, and often a curse—its oppressions may be lightened, and the stimulus of necessity may often be made auxiliary to the development of recuperative powers, by which the burden and the curse may be overcome by blessings. (See Peto's work on taxation, and the budget speeches of Mr. GLADSTONE (1st vol., London.) For information concerning excise taxes in the U. S., see the reports of the commissioner of internal revenue.

REVISED BY A. R. SPOFFORD.

**Ex'cito-mo'tor Action**, in physiology, is that variety of reflex action which, arising from impressions made at the periphery (internal or external), is first transmitted by afferent nerve-filaments to a nerve-centre, and thence reflected without volition along motor (deferent) nerve-filaments to a muscle, which is thereby aroused to action. For example, a sudden impression of light causes the pupil of the eye to contract; the presence of a particle of food in the glottis causes intense involuntary coughing. (See REFLEX ACTION.) Excito-motor action is peculiarly active in very young children and in many of the lower animals. In some diseases (tetanus, hydrophobia, strychnia poisoning) it is immensely increased. Chloral, belladonna, curari poison, and especially the alkaloid curaria, all appear powerfully to reduce action of this kind.

**Exclu'sion Bill**, in English history, a bill which was designed to exclude the duke of York (King James II.) from the throne, because he was a Roman Catholic. It was adopted by the House of Commons in 1679, but was rejected by the House of Lords.

**Excommunication** [Lat. *excommunicatio*, from *ex*, "out" or "out from," and *communio*, *communicatio*, to "share," to "partake;" the act of putting one out from, so that he has no share in, the privileges and protection of the Church], the formal expulsion of a person from privileges religious or social, inflicted by church authority upon persons accused of misconduct or heresy. The ancient Israelites excommunicated offenders by exclusion from the camp, by "cutting off from the people," and in later times by "putting out of the synagogue." This punishment, in extreme cases at least, was a social interdiction of the severest kind. Excommunication in the Christian Church was established by Christ's teachings, and by the precept and example of the apostles, and was necessary both for the self-preservation of the Church and for the spiritual and moral good of the offender. In early times—as also in the Roman Catholic and in several Protestant churches at present—there was a lesser and a greater excommunication; the former a virtual suspension from church privileges, the latter a formal expulsion. The greater excommunication in the Latin Church is less severe than the anathema. Excommunication was not unfrequently employed by the popes in former times as a punishment for refractory monarchs, and even for whole nations, but in later times it has not been so employed, the so-called excommunication of Victor Emmanuel in 1860 being merely a statement of the ecclesiastical penalties which the pope might inflict upon the invaders of the pontifical domains. In Prussia and Switzerland the excommunication of the Old Catholic priests by the Catholic bishops has recently brought on severe conflicts between the State and the Church.

**Exe** (anc. *Isaca*), a river of England, rises in Exmoor, in Somersetshire, flows generally southward through Devonshire, and after a course of 54 miles enters the English Channel at Exmouth. The chief towns on its banks are Tiverton and Exeter.

**Execu'tion** [Lat. *execu'tio*, from *ex*, "out," and *se'quor*, *secu'tus*, to "follow;" literally, a "following or carrying out" of some design or of a legal sentence], the infliction of the death-penalty by the proper civil, military, or naval authorities. In the U. S. this act is performed by the county sheriff in the precincts of a jail or prison, in presence of certain officials and other witnesses, and hanging is the only method employed. Military executions are performed by a provost-marshal and his guard, either by shooting with small-arms or by hanging. Naval executions are

generally by hanging at the yard-arm. In Western Europe hanging is the more common method in civil cases, except in France, where the guillotine is employed, and in Spain the garrote takes its place. Burning, drowning, stoning, and a great variety of methods have been practised in former times. In the Indian mutiny of 1857 many of the captured Sepoys were blown from the cannon's mouth.

**Execution**, the formality of signing, sealing, and delivering a deed, or of signing and publishing a will; in criminal law, the carrying into effect the sentence of the law by putting the criminal to death; in civil actions, the carrying out the final judgment of the court, or, more strictly, the writ directing the sheriff, coroner, or marshal to carry such judgment into effect.

Under the law of England, there were three writs in constant use to enforce a judgment for the payment of money: 1st, a writ of *feri facias*, commonly called a *fi. fa.*, directing the officer to cause to be made the amount of the judgment out of the goods and chattels of the debtor; 2d, a writ of *elegit*, given by statute of 13 Edw. II., directing the officer to deliver the goods and chattels of the debtor to the creditor at an appraised value, in satisfaction of the judgment, and, if these are insufficient, to put him in possession of one-half the debtor's land till the rents and profits satisfy the judgment; 3d, a writ of *capias ad satisfaciendum*, commonly called a *ca. sa.*, directing the officer to arrest the debtor and keep him in confinement till he satisfies the judgment.

The English practice has been somewhat changed in the State of New York. There are two writs of execution—one against the property, and one against the person, of the debtor. The former, which resembles the *fi. fa.*, directs the sheriff to satisfy the judgment out of the personal property of the debtor within the county, and, if sufficient cannot be found, then out of his real property, and to return the writ within sixty days. The latter, like the *ca. sa.*, directs the officer to arrest the debtor and keep him in jail till he pays the judgment or is discharged according to law. Since the act of 1831 abolishing imprisonment for debt, this writ is allowed in comparatively few cases, as when the debt was contracted in fraud, or the debtor has attempted to remove his property, or has violated his duty in some trust relation. Under the execution against the property the sheriff sells at public auction the real and personal property of the debtor, though a variety of articles necessary for the prosecution of a business and support of a family are exempted, as also a homestead to the value of one thousand dollars, subject to certain conditions. If the judgment is for the recovery of specific real or personal property, the execution directs the sheriff to deliver such property to the plaintiff. Many of the other States have closely followed the New York practice.

Although these proceedings are instituted by the party in whose favor the judgment is rendered, they are considered as the acts of the law, and the officer entrusted with their performance is responsible to the party aggrieved for any misconduct or neglect of duty.

**Executive Department, The**, in the U. S. government, is that branch of the public service which attends to the execution of the laws of the general government. This department is under the direct control of the President, who is the principal executive officer. The duties of the executive department are the most extensive of all. It makes all civil, naval, and military appointments, and manages the army and navy, collects customs and internal revenue, sells public lands, and pays all appropriations authorized by Congress. Each of the secretaries of inferior departments, including the postmaster-general and attorney-general, take rank next the President as officers of the executive department. They together constitute the so-called "Cabinet," which, by usage, has become a consulting or advisory council to the President. These officers are the secretary of state, of the treasury, of the interior, of war, of the navy, and the postmaster-general and the attorney-general. (See UNITED STATES.)

**Exec'utor** [from the Lat. *ex*, "out," and *sequor*, *secutus*, to "follow"], one to whom a testator commits the execution of his last will. The will is the source of the executor's title, and the probate (or proof) of the will is merely evidence of it. As a general rule, any one capable of making a contract can be an executor. By the law of England, an infant can act as executor after the age of seventeen. In many of the U. S. it is provided by statute that no person under twenty-one is competent to act as executor. The chief duties of an executor are to bury the deceased in a manner suitable to the estate which he leaves, to prove the will, make an inventory of his goods, collect the assets, and pay the debts and legacies. An executor has general control over the personal estate, and possesses the same property in it as the testator had when living, and the same remedies to recover it. He has no power over the real

estate, unless it is given to him by the will, or unless the local law gives it to him when the personal property is insufficient to pay the debts. When he has authority given to him in a will to control the real estate, he is not deemed to act as an executor, but either as a trustee or the grantee of a power, according to the nature of the authority conferred upon him.

An executor *de son tort* is one who interferes with the goods of a deceased person without lawful authority. He has the trouble of an executor without the advantages. He may be sued as executor if any assets have come into his hands, but cannot bring an action as executor.

In some States, executors are required to give bonds for the faithful discharge of their duties, and in others the probate court has a right to require them to furnish security if there is any doubt of their solvency.

**Exegesis, or Exegetical Theology** [Gr. *ἐξήγησις*, from *ἐξηγέομαι*, to "lead," also to "teach," to "expound" (from *ἐξ* for *ἐκ*, "out," also "intensive," and *ἡγέομαι*, to "lead," to "guide," to "point out the way"); *ἐξηγητής*, originally, among the Athenians, the interpreter of the oracles of Delphi, the signs of heaven, and sacred rites; among Christians, the interpreter of the Holy Scriptures], is the first and most important part of theological science, and covers the whole field of biblical literature, or all that pertains to the learned explanation of the Old and New Testaments. It originated among the Jewish rabbis, but was afterwards far more extensively cultivated among the Christian Fathers, the Reformers, and the divines of all ages. It is taught as a science and practised as an art in all theological institutions, and its results are applied from every pulpit throughout the Christian world. No knowledge is more useful and indispensable to a clergyman than the knowledge of the Bible, which he has to explain from Sunday to Sunday, and which among Protestants is the only infallible source and rule of faith and morals and all that pertains to the eternal interests of men.

I. *Kind of Exegesis*.—(1) *Philological or grammatical* exegesis is the basis on which all other interpretation and application must rest. It aims simply at the meaning of the writer according to the recognized laws of language and the *usus loquendi* at the time of composition, and according to the historical situation of the writer, irrespective of any doctrinal or sectarian bias. It implies a thorough knowledge of Greek and Hebrew, and familiarity with contemporary literature. (2) *Theological* exegesis develops the doctrinal and ethical ideas of the writer in organic connection with the whole teaching of the Scriptures and according to the analogy of faith. (3) *Homiletical or practical* exegesis is the application of the well-ascertained results of grammatical and theological interpretation to the wants of the Christian congregation, and belongs properly to the pulpit.

II. *Auxiliary and Supplementary Branches*.—(1) *Sacred Philology*, the science of the languages in which the Bible was originally written—viz., the Hebrew in the Old Testament (with a few sections in the cognate Semitic dialect called Chaldean or East Aramaic), and the Greek in the New Testament. The latter is not the classical Greek, but the Macedonian or Alexandrian dialect, with a strong Hebrew coloring (hence called the Hellenistic, because spoken by the Hellenists, i. e. the Greek Jews) and the infusion of the spirit of Christianity, which created new words or inspired a deeper meaning into old words. The New Testament Greek requires, therefore, a particular study, special grammars (i. e. Winer, Buttmann, Jr.), and special dictionaries (Wahl, Bretschneider, Wilke, Grimm, Cremer, Robinson).

(2) *Biblical Archaeology or Antiquities*—i. e. a systematic description of the external and internal condition of the nations among which, and the countries in which, the Bible was composed. This includes, again, the geography and natural history of Palestine and adjacent countries, the topography of Jerusalem, an account of the domestic habits, social institutions, agriculture, arts and science, religious rites, and ceremonies of the Hebrews. The material of Jewish antiquities is derived mostly from the Bible itself, but also from Philo and Josephus, the "Talmud," the monumental remains of Egypt, Assyria, Babylon, and the accounts of modern explorers down to the labors of the English and American Palestine Exploration Societies now in progress. Dr. Robinson of New York (died 1863) broke the way for truly independent critical research of the localities of Jerusalem above the surface, while the Palestine Exploration Society of England has begun to make us acquainted with subterranean Jerusalem as it was before the destruction.

(3) *Biblical Criticism* aims at the approximate restoration of the original text of the Bible as it came from the hands of the inspired authors. The autographs being lost, we are confined to the oldest uncial manuscripts, which date from the fourth and fifth centuries. Besides, we have par-

tial and secondary sources of the Greek text in the very numerous Scripture quotations of the Christian Fathers (Origen, Irenaeus, Chrysostom, etc.), and the old translations (especially the Syriac, Peshito, and the Latin Itala and the improved Vulgate of Jerome). Textual criticism includes a discussion of the merits of the received text (*textus receptus*, derived from Erasmus, Stephens, Beza, and Elzevir), the principles for ascertaining the oldest and purest text, the classification of manuscripts and different readings, and a history of the printed text from Erasmus and the Complutensian Polyglot down to Lachmann, Tischendorf, and Tregelles. There is a gradual approach to an agreement among the best critics, and the conviction of the essential integrity of the primitive text has been greatly strengthened by the latest discoveries (e. g. the "Codex Sinaiticus") and investigations.

(4) *Historico-Critical Introduction to the Books of the Old and New Testaments* is a literary history of the Bible, and includes all the introductory information necessary for the proper understanding of its contents, as the question of the genuineness and integrity of the book, the persons addressed, the place and time of composition, the object and aim of the writer. It gives also a history of the canon or collection of the several books of the Bible into one authoritative code, distinct from all other books, and recognized as a rule (*kanon*) of faith and morals by those who receive them. The principal works on introduction are by De Wette, Hug, Reuss, Bleek, Guericke, Horne, Davidson. Compare also the "Bible Dictionaries" of Kitto (3d ed. by William L. Alexander, 3 vols.), William Smith (ed. with improvements by Hackett and Abbot, in 4 vols.), Fairbairn, Winer, Schenkel.

(5) *Biblical Hermeneutics*—i. e. the science of the principles of interpretation, and the necessary qualifications for an expounder of the Scriptures. These qualifications are partly intellectual (familiarity with the general laws of thought and speech, knowledge of the particular languages of the Bible, sound judgment) and partly moral (freedom from prejudice, readiness to do justice to the author, sympathy with his spirit and ideas).

(6) *Biblical Theology of the Old and New Testaments* is a summing up of the results of exegesis in systematic order, and presents a full view of the teaching of the Scriptures, irrespective of the subsequent systems of denominational dogmatics and ethics derived from them. This branch of exegetical theology is of recent growth, and has thus far been mostly cultivated by Continental scholars. There are also special treatises on the theology of Christ, the theology of Paul, John, and Peter. Each of the apostles, as he has his own peculiar style, represents also a special aspect of the Christian system; yet all harmonize and exhibit together the fulness of the gospel. (Compare the works of Schmid and Van Oosterzee on New Testament Theology, recently translated into English; Ewald, Schultz, and Oehler on Old Testament Theology.)

### III. History of Exegesis and Principal Commentaries.—

(1) *Jewish exegesis*, confined to the Old Testament. It began soon after the close of the canon. It was especially devoted to the Law (the Torah), i. e. the Pentateuch, and derived from it minute rules for the individual, social, and ecclesiastical relations. The body of these interpretations is called *Midrash*. The prevailing method of exegesis was the rabbinical or literal; it excluded all foreign ideas, and was subservient to the strict legalism of the Pharisees. But among the Hellenist (Greek-speaking) Jews, especially in Alexandria, the allegorizing method obtained favor, especially through Philo (died about 40 A. D.), who endeavored to combine the Mosaic religion with Platonic philosophy, and prepared the way for the allegorizing exegesis of Clement and Origen of Alexandria. The Jewish rabbins of the Middle Ages cultivated grammatical exegesis at a time when the knowledge of Hebrew had died out in the Christian Church. The most distinguished among them are Ibn Ezra (died 1167), R. Sal. Isaac or Raschi (died 1105), David Kimchi (died 1190), Moses Maimonides (died 1204). Their commentaries are printed separately, and also in the so-called Rabbinical Bibles (e. g. of Buxtorf, Bale, 1618, 3 vols. fol.).

(2) *Patristic Exegesis*. The first use made of the Bible in the Church was practical and homiletical. It was to the early Christians what it still is to the great mass of believers, and will be to the end of time—a book of life, of spiritual instruction and edification, of hope and comfort. Scientific or learned exegesis began when the Bible was perverted by heretics and made to serve all sorts of errors. The Greek Church took the lead. Origen (180–254), the greatest scholar of his age, a man of genius and iron industry, is the father of critical exegesis. He is full of suggestive ideas, but far from being sound. His theory of hermeneutics is untenable, and opens the way for the most fanciful and arbitrary expositions or impositions. He distinguishes three senses in the Bible, corresponding to the

three parts of man: (a) a literal or bodily sense; (b) a moral or psychic sense; (c) an allegorical or mystic, spiritual sense. Where the literal sense is offensive, he escaped the difficulty by adopting a purely spiritual sense. The greatest commentators of the Greek Church are Chrysostom (died 407), who in his "Homilies" explained the principal books of the Old and New Testaments, Theodore of Mopsuestia (died 429), Theodore of Cyros (died 457). Among the Latin Fathers, Augustine (died 430) is the profoundest and most spiritual, Jerome (died 419) the most learned expounder. The latter achieved the highest merit by his improved Latin version of the Bible (the Vulgate), which remains to this day the standard version of the Roman Church. The Council of Trent forbade the interpretation of Scriptures except according to "the unanimous consent of the Fathers." But this rule would prevent all progress in theology; and besides, such a "unanimous consent" does not exist except in the most fundamental doctrines.

(3) *Medieval exegesis* was purely traditional, and consisted of brief glosses (*glossaria*) or of extracts from the Fathers (called *catene Patrum*). The original languages of the Bible were unknown in the West, and even the first among the scholastics had to depend upon Jerome's version for their knowledge of God's word. The prevailing method distinguished four senses of the Scriptures: (a) the literal or historical; (b) the spiritual or mystic, corresponding to faith, teaching what to believe (*credenda*); (c) the moral or tropological, which corresponds to love or charity, and teaches what to do (*agenda*); (d) the analogical, which refers to hope (*speranda*). The principal patristic compilations are (a) in the Greek Church, those of Eusebius (died 990), Theophylactus (died 1007), Enthymais Zigabenus (died 1118), and Nicephorus (fourteenth century); (b) in the Latin Church, Wallafried Strabo (died 849), Thomas Aquinas (died 1274). The *Catena aurea in Evangelia* of Aquinas has been recently reproduced in an English translation by Pusey, Keble, and Newman. Among the more independent biblical scholars of the Middle Ages who prepared the way for the Reformation must be mentioned Nicolaus à Lyra (died 1340: "Si Lyra non lyrasset, Lutherus non saltasset"), and Laurentius Valla (died 1465).

(4) The exegesis of the *Protestant Reformers* of the sixteenth century marks a new epoch. It is full of enthusiasm for the word of God in the Bible as the only rule of Christian faith and practice, and free from the slavery of ecclesiastical tradition. It went directly to the original Greek and Hebrew Scriptures, and furnished the best translations for the benefit of the people, while Romanism regards the Bible as a book for the priesthood, and discourages or prohibits efforts for its general circulation without note or comments. All the Reformers wrote commentaries more or less extensive on various books of the Bible—Luther (died 1546), Melancthon (died 1560), Zwingli (died 1531), Oecolampadius (died 1531)—but the ablest of them are Calvin (died 1564) and his pupil Beza (died 1603). Calvin combines almost all the qualifications of an expounder in rare harmony, and his commentaries on Genesis, the Psalms, the Prophets, and all the books of the New Testament (except Revelation) are valuable to this day.

(5) Protestant commentaries of the seventeenth and eighteenth centuries by Hugo Grotius (died 1645, Arminian), Vitringa (died 1722, Dutch Calvinist), Hammond (died 1660, Church of England), Mathew Poole (Presbyterian, died 1679, "Annotations upon the Whole Bible," an English synopsis from his Latin synopsis), Matthew Henry (Independent, died 1714, the best homiletical commentator of England), John Gill (Baptist, died 1771), Philip Doddridge (Independent, died 1751, author of "Family Expositor"), Calovius (Lutheran, died 1686, "Biblia Illustrata" versus Grotius), J. A. Bengel (Lutheran, died 1752, author of the "Gnomon of the New Testament," in Latin, twice translated into English, an admirable specimen of *multum in parvo*). Collective works: "Critici Sacri," London, 1660, 9 tom.; Amsterdam, 1698-1732, in 13 vols. (compiled from the principal commentators as an appendix to Walton's "Polyglot," under the direction of Bishop Pearson and others); Poole's "Synopsis Criticorum aliorumque S. Scripturæ interpretum," London, 1669-76, 4 vols. in 5 fol. (a very useful abridgment from the "Critici Sacri" and other commentators).

(6) Modern commentaries, chiefly German, English, and American: (a) On the whole Bible: LANGE'S "Bibelwerk," Bielefeld and Leipsic, 1857 seq. (a threefold commentary, critical, doctrinal, and homiletical, prepared by a number of Continental, mostly German, divines, and to be completed in about 30 parts, chiefly for the use of ministers and students); the same in English, with large improvements and additions by more than forty American scholars of all denominations, under the editorial care of Philip Schaff, New York and Edinburgh, 1864-80, in 24 vols.,

new ed. 1884 *seq.*; "The Speaker's Commentary," suggested by the Speaker of the House of Commons, ed. by Canon F. C. Cook, aided by a number of bishops and presbyters of the Church of England, London and New York, 1871-82, in 10 vols. (b) On the New Testament: Olshausen, De Wette, and especially Meyer (the first philological commentator; died 1874), among the Germans, Alford and Wordsworth among the English, all for critical students. Of popular commentaries of the New Testament, Barnes has had by far the widest circulation in America and England, but is now replaced by others edited by Bishop Elliott, Dr. Schaff, etc. The present century has also produced a large number of exegetical works of the first order on separate books of the Bible, which it would be impossible here to enumerate. Among recent commentators on one or more books of the Old Testament, Gesenius, Ewald, Hupfeld, Hitzig, Hengstenberg, Delitzsch, Dillmann, Schlottmann, Moses Stuart, Joseph A. Alexander, occupy the first rank. Of New Testament commentators must be mentioned Winer, Fritzsche, Tholuck, Lücke, Bleek, Harless, Godet, Stuart, Hodge, Stanley, Jowett, Elliott, Westcott, Milligan, Brown, Beet, and Lightfoot. Among these, again, Tholuck on Romans and the Sermon on the Mount, Lücke on the Writings of St. John, Harless on Ephesians, Hodge on Romans, Elliott on Galatians, Ephesians, Thessalonians, and Pastoral Epistles (republished in Andover), Lightfoot on Galatians, Philipians, and Colossians, Westcott on the Epistles of John, Godet on Luke, John, and Romans, are mostly useful for the critical study of the Greek Testament.

PHILIP SCHAFF.

**Ex'eter** [Lat. *Iscæ* or *Ezonia*], a city and seaport of England, the capital of Devonshire and a separate county, is on the river Exe, about 10 miles from the sea, and 170 miles W. S. W. of London, with which it is connected by railway. It is pleasantly situated on the sides and summit of an acclivity, and is well built, well paved, and liberally supplied with water. It was the *Iscæ Damnoniorum* of the Romans, and the coins, pottery, sepulchral urns, etc. which have been found there show that it was a place of some importance. At the time of the Saxon conquest it was not deserted by the British. When Athelstan arrived there, in 926, he found it occupied by Britons and Saxons in common. William the Conqueror appeared before the city in 1068; he founded the castle of Rougemont. Exeter is the see of a bishop, and has a magnificent cathedral, which was commenced in 1280; it is 408 feet long, and has two Norman towers 145 feet high. The W. front is richly decorated, and presents a façade which is one of the most beautiful in England. In one of the towers is the Great Tom of Exeter, or Peter's Bell, which weighs 12,500 pounds. Exeter contains a theatre, twenty-four Episcopal churches and chapels, and a lunatic asylum. It returns two members to Parliament. Vessels of 400 tons can ascend the Exe to this place, from which dairy produce, fruits, and other articles are exported. Exeter was at one time the centre of a very considerable woollen trade. In the middle of last century the value of its annual export of woollen goods amounted to half a million dollars, and was exceeded only by that of Leeds. Its trade, though still flourishing, is now of a miscellaneous description. Here are several large nurseries. Pop. of municipal borough in 1881, 37,665.

**Exeter**, one of the capitals of Rockingham co., N. H. (see map of New Hampshire, ref. 10-G, for location of county), on the Squamscott River and the Boston and Maine R. R., 50 miles N. of Boston. It has Phillips Academy, a richly-endowed institution founded in 1781, Robinson's Female Seminary, a high school, a large cotton-mill and machine-shop, railroad round-house, and manufactures of lumber, castings, and carriages. Pop. of Exeter township in 1870, 3437; in 1880, 3569, including 1526 in village.

**Exeter Hall**, a building in the Strand, London, erected in 1831, and remodelled in 1850. It is celebrated as the place of assembly of many of the religious and philanthropic societies of England. "Exeter Hall philanthropy" is a term applied to public efforts in behalf of the poor and degraded, implying (often with injustice) that such efforts are ostentatious and ineffectual.

**Ex'ile**. This word is used of the person who, either voluntarily or by penal sentence, leaves his own country in order to escape the consequences to life, liberty, or property that residence at home would bring with it. It also denotes the state of such an exile, as we say to go *into exile*. It thus answers to two Latin words, *exsul* or *exul*, and *exilium*, which stand related like *consul* and *consilium*, and are derived from *ex*, and the root of *solum*, "soil," "ground," as the Latins said of an exile, *qui solum vertit*, "he who changes his soil" or "dwelling-place." It differs from *banishment* (derived from *ban*, "edict," "proclamation"), in

that the latter strictly implies a penalty or act of the supreme authority, driving a person away from his home and country, while *exile* has no such necessary sense. It differs from *captivity* in a foreign land, in that a captive is not a free person, but under the enemy's power. The Greeks in their usages and legislation were familiar with voluntary exile on account of involuntary homicide, with ostracism, a political contrivance, especially at Athens, in order to get rid of a powerful party-leader, and with exile especially for life. In the two former cases a man retained his property, and return to his native land was allowed; in the last, besides lifelong absence, he suffered the ills of confiscation of his goods. At Rome, while the republic lasted, a person, before sentence for crime, could go to a foreign country; and there were even treaties with certain states by virtue of which a Roman, and *vice versa* a citizen of such a state, had a liberty of living in exile in each other's country conceded to them. Verres and Milo, with many others, thus left the Roman dominions to escape a sentence. Exile was also a penalty for certain crimes, or, as in the case of Cicero, was decreed by vote of the comitia. It was called *agere et ignis interdictio*—i. e. prohibition from the use of fire and water within certain limits. Under the empire the forms of exile in use went by the names of *relegatio* and *deportatio*. Relegation either excluded the person affected by it from a particular place or territory, or it required him to reside at a particular place or within a particular country, without depriving him of property, citizenship, or a father's power, and did not necessarily prevent his return. Deportation, called also *deportatio* to an island, was introduced under the emperors, and involved loss of citizenship and of property. The poet Ovid was relegated, under Augustus and by an edict, to Tomi in Lower Mœsia, where he died after ten years of exile.

Exile is as a punishment unknown to English law, unless it be in the form of transportation by act of Parliament, or as a condition of pardon by the executive for a capital or other severe punishment.

Free countries, unless overawed by superior power, have generally given refuge to political exiles, and seldom have they delivered them up on demand from the exile's country. This was the boast of Athens, which Demosthenes calls the common place of refuge for Greece; who also pronounces it to be the common usage of all men to give shelter to an exile. The connection of the exile with his native land of course ceases. The jurisdiction over him depends on the laws of the land where he is domiciled. If, as sometimes happens, he engages in plots with accomplices in his native country, he is amenable to the law of his domicile for any criminal acts he may commit within its jurisdiction. Such a person is sometimes demanded by the authorities of his original home, in order to be proceeded against by its laws and modes of trial. But a free country will refuse to surrender its territorial rights in such cases. T. D. WOOLSEY.

**Ex'ira**, on R. R., Audubon co., Ia. (see map of Iowa, ref. 5-E, for location of county), beautifully situated on the Nishnabotna River, 70 miles W. of Des Moines, in a fertile, well-timbered region abounding in lignite, peat, potter's clay, and chalybeate mineral springs. It has a public square and a fine school-house. Pop. in 1870, 161; in 1880, 604.

**Ex'moor For'est**, England, partly in Devonshire and partly in Somersetshire, is mostly uncultivated, and is occupied by dark ranges of hills and lonely valleys. The surface-rocks are Devonian slate and new red sandstone. The highest point of the hills is 1668 feet. Exmoor is partly covered with heath, and contains considerable meadow-land. It gave name to a breed of sheep, now nearly extinct. Area, 19,270 acres. Ponies are bred extensively, and iron is mined.

**Ex'mouth**, a town and watering-place of England, in Devonshire, is on the English Channel at the mouth of the Exe, 10 miles S. E. of Exeter. The mildness of the climate and the beauty of its scenery render it a favorite place of resort. The fisheries and lace-making are the principal industries. Here Sueno the Dane landed in 1003. Pop. with surroundings, 7338.

**Ex'mouth** (EDWARD PELLEW), VISCOUNT, an English admiral, born at Dover April 19, 1757. He served with distinction at the battle of Lake Champlain in Oct., 1776, and became a post-captain in 1782. In 1804 he obtained the rank of rear-admiral, and in 1808 that of vice-admiral of the blue. He was created Baron Exmouth in 1814, and was raised to the rank of admiral. He commanded a fleet which in 1816 was sent to enforce a treaty which the dey of Algiers had violated. This fleet, aided by a Dutch fleet, bombarded Algiers in August of that year, and reduced the dey to submission. He received the title of viscount in Dec., 1816. Died Jan. 23, 1833. The title is still extant, and in the Pellew family.

**Ex'ner** (FRANZ), a German philosopher, born in 1802, became in 1831 professor of philosophy in the University of Prague, and was appointed counsellor in the Austrian ministry of public education in 1848. Died in 1853. He wrote, among other works, "Die Psychologie der Hegelschen Schule" (1842-44), and "Über die Lehre von der Einheit des Denkens und Seins" (1845).

**Exodus** [Gr. Ἔξοδος, "a going forth"]. The migration, whether by compulsion or otherwise, of any considerable body of people, as of the Moors from Spain in 1492, of the Huguenots from France after the Revocation of the Edict of Nantes in 1685, or of the Irish to the U. S. since 1847, may be called an *exodus*, but the term is commonly applied almost exclusively to the departure of the Israelites from Egypt under the leadership of Moses. From the biblical narrative it is not quite clear how long they had been in Egypt—whether a little more than four centuries, or only a little more than two. In Exodus xii. 40, we read: "Now the sojourning of the children of Israel, who dwelt in Egypt, was four hundred and thirty years." But the Septuagint and the Samaritan Pentateuch agree in making the four hundred and thirty years cover also the previous residence in Canaan. And this appears to have been the chronology of Paul (see Gal. iii. 17). Josephus sometimes (*Ant.*, 2, 9, 1; *Jew. W.*, 5, 9, 4) says 400 years, but in *Ant.*, 2, 15, 2, he says that "the Israelites left Egypt 430 years after the entrance of Abraham into Canaan, and 215 years after Jacob's coming into Egypt." The great increase in population, from the nomadic family of seventy persons to the agricultural nation of two and a half millions, would seem to require the longer period, unless we assume the incorporation by circumcision of a large body of dependants into the original stock. From the genealogical tables in the first book of Chronicles, and elsewhere, it is evident that unless the time was much longer than 215 years, the generations followed one another with great rapidity; for although only four generations are named of the family to which Moses belonged, Bezaleel, the artificer, was in the seventh generation from Judah (1 Chron. ii. 3-20), the five daughters of Zelophehad in the seventh generation from Joseph, through Manasseh (*Num.* xxvi. 28-33), and Joshua in the eleventh generation from Joseph, through Ephraim (1 Chron. vii. 22-27). And what proof have we that in any case the links are all given? Malthus says: "It has been constantly remarked that all new colonies, settled in healthy countries, where room and food were abundant, have constantly made a rapid progress in population." Egypt, it is well known, was famous amongst the nations of antiquity not only for its animal fecundity, but also for the fertility of its human occupants. And yet the rapid increase of the Israelites in Egypt is emphasized in the history, and referred to afterwards (*Ps.* cv. 23, 24), as something extraordinary. It is consequently impossible for us to say whether the biblical narrative requires 430 or only 215 years.

As to the points of contact between Egyptian and Hebrew history, the time has not yet come for final conclusions. Egyptian history itself is undergoing reconstruction. But the best biblical scholars now incline to the opinion that the Israelites entered Egypt under the twelfth dynasty (Abraham under one of its earlier, and Jacob under one of its later, kings), and came out under the nineteenth, but the exact chronology has not yet been determined. They dwelt probably in the Delta, and took their departure by the Wady-t-Tumeylat, which is about halfway between the Mediterranean and the present head of the Red Sea. The point at which they crossed this sea is generally supposed to have been not far from where Suez now stands. From this point to Sinai the distance is about 150 miles. Their route to Sinai was probably through the Wady Feiran. And if the Exodus occurred in the time of Thotmes II., the fifth king of the eighteenth dynasty, the way was entirely open to them, for it has been recently ascertained that the copper-mines of the Sinaitic peninsula, which they had to pass, were not worked by the Egyptians from the reign of Thotmes I. to the seventeenth year of Thotmes III. Kadesh Barnea, the point at which they first touched the borders of Palestine, and to which, after thirty-eight years of penal wandering, they returned, has not been certainly identified, Robinson finding it on the E. side, and Palmer on the W. side, of the desert. If the Israelites were to be civilized by contact with another people, no better place could have been found, and on the whole no safer, than Egypt. The miracles by which they were delivered, and which attended them all the way through the desert until they were finally planted in their former home, made a profound impression upon the national character.

R. D. HIRSCOCK.

**Exodus, The Book of**, was so named by the Alexandrian translators of the Old Testament. The Hebrews



of Palestine designated it by its opening words, *Elleh She-moth*, "these are the words." It consists of two distinct portions; the former (chaps. i.-xix.) describing the deliverance of the Israelites from Egypt; the latter (chaps. xx.-xl.) describing the giving of the Law. Its Mosaic authorship, though denied by some, is generally conceded. Its date depends, of course, upon that of Moses himself.

**Exo'genous Plants, or Ex'ogens** [from the Gr. *ἐξω*, "without," and *γενω*, to "be born," to "grow"], the first or most highly developed of the two primary classes of phænogamous or flowering plants. They are called exogens because their stems grow by successive external additions, and are sometimes termed *dicotyledonous*, because the seed has usually two cotyledons. This class is characterized by net-veined (reticulated) leaves, and by stems which present distinct formations of bark, wood, and pith, the wood forming a zone between the other two, and increasing, when the stem continues from year to year, by the annual addition of a new layer to the outside. The flowers are usually formed on a quinary, more rarely on a quaternary, type. The bark is very distinct from the woody or fibro-vascular part which it surrounds. A transverse section of the stem exhibits a central cellular substance (*pith*), an external cellular and fibrous ring or bark, and an intermediate woody mass traversed by *medullary rays*, which radiate from the pith to the bark. A viscid secretion called *cambium* is formed between the bark and the *alburnum* (sap-wood) in the spring, and is supposed to be the matter out of which new wood is made. The age of exogenous trees can often be computed by the concentric rings annually produced. More than 1200 rings or layers have been counted on a stump. All trees of cold or temperate climates, and most trees of tropical regions, are exogenous. The total number of exogenous plants is much greater than that of the endogens. The medullary rays are thin plates of cellular tissue, which on a cross section appear like fine lines, but in wood cut lengthwise, parallel to them, they present an appearance called *silver grain*, and their faces show as glimmering plates.

**Ex'orcism** [Gr. *ἐξορκισμός*, from *ἐξ* (for *ἐκ*), "out," and *ὀρκίζω*, to "adjure" (from *ὅρκος*, an "oath")], a ceremony designed to expel dæmons or evil spirits from persons, places, or things. Exorcisms of various kinds have been practised from remote antiquity in nearly all nations and races. The ancient Jews, as we learn from Josephus, the Talmud, and the New Testament, had a class of persons professing to be skilled in casting out devils. Miracles of this kind are recorded as having been performed by Christ and his apostles, and in the early ages of the Church a separate class of exorcists arose who claimed special powers of controlling evil spirits. Many ceremonies were instituted by them, and their powers were exerted not only over those possessed by the devil, but over all candidates for baptism, over the baptismal water, and other sacred things and places. At present in the Church of Rome there is a special order of exorcists, one of the four orders of the minor clergy. All persons in superior orders must pass through this degree. In the Greek Church a similar order exists. Exorcism is now obsolete in all Protestant denominations, though formerly recognized in several.

**Exosome.** See ENDOSMOSE.

**Exoteric.** See ESOTERIC.

**Exosto'sis** [Gr. *ἐξόστωσις* (from the Gr. *ἐξ*, "without," and *ὀστέον*, a "bone")], a bony tumor, a circumscribed, non-malignant mass of bone, usually an abnormal outgrowth from one of the bones of the skeleton. In man the disease especially seats itself upon the femur or on some of the bones of the skull. In the latter case it sometimes assumes a peculiar ivory-like character (eburnized exostosis), from the presence of an excess of calcium phosphate. It is usually developed from an inflammation-exudate, and is ordinarily formed with the exact structure of true bone. The disease is commonly painless. Some classes arise from a syphilitic taint, others from a rheumatic or gouty diathesis, others from no known cause.

Some writers include all bony outgrowths, malignant and other, under this head, but the best pathologists restrict the name to the one disease. Discutient remedies, mercurials and iodides, have been recommended for this disease, but ordinarily the only cure is in ablation, which, however, is liable to be followed by erysipelas.

**Expan'sion** [Lat. *expansio*, from *ex*, "out," and *pando*, *pansum*, to "open," to "spread"], an increase in the bulk of solid, liquid, or gaseous matter, due to the increase of heat. Heat is believed to consist of a very rapid molecular vibration, and the addition of this motion to a collection of particles must obviously tend to separate them and enlarge the mass. Expansion accordingly takes place in nearly all solids on the addition of heat up to the point

of fusion; and in most substances expansion continues through the process of fusion, and beyond it; but ice, bismuth, antimony, paraffin, and a few other substances contract in fusing, but go on expanding if heat be added after fusion.

Iodide of silver contracts uniformly under heat; and it is certain that some crystals expand in some directions and contract in others, the general result being an expansion. Non-crystalline bodies usually expand uniformly in every direction, provided heat be uniformly applied. Liquids, like solids, expand at an increasing rate with the increase of heat. Gases expand almost uniformly  $\frac{1}{273}$  of their volume at 32° (F.) for 1° Fahrenheit.

Allowance is always made for expansion and contraction in large iron bridges, buildings, etc.; for if no play were allowed at the joints, hot and cold weather would distort or destroy such structures; and it must especially be remembered that superficial expansion is twice as great, and cubical expansion three times as great, as the linear.

**Ex Parte**, a Latin legal phrase signifying "of one party." A commission *ex parte* in chancery is that which is taken out and executed by one side or party alone, the other party neglecting or refusing to join.

**Expatriation** [from the Lat. *ex*, "out," and *patria*, "one's native land"], the voluntary abandonment of one's native country with the intention of becoming a citizen of another state. The right of a person to throw off the obligation of allegiance has been denied by eminent writers and some governments. The true view would seem to be that the power to determine when the allegiance of the citizen may cease belongs to the state of which he is a member, rather than to himself. At the same time, the freedom of intercourse between nations in modern times and the interests of civilization require that the various nations should provide liberal rules by which at proper times the relation of the citizen to the state may cease, and the individual, freed from the ties of burdensome allegiance, may assume another citizenship if he so desire. In this spirit may now be found statutory declarations by leading states on this subject, as well as treaty stipulations. By the act of Congress of July 27, 1868, § 1, it is recited that the act of expatriation is a natural and inherent right of all people, and it is enacted that any declaration or instruction or decision of any officer of the government which denies, restricts, or questions the right of expatriation is inconsistent with the fundamental principle of the government. In England, by 33 Vict. ch. 14, § 6, British subjects in general cease to be such upon becoming naturalized in a foreign state. The laws of the various states upon this subject are collected under the direction of the U. S. government in a publication entitled "Opinions of the Principal Officers of the Executive Departments, and other papers, relating to Expatriation, Naturalization, and Change of Allegiance," Washington, 1873.

If the right of expatriation be admitted except in certain cases, such as where the person holds a public trust, or is liable to do military service, or is charged with crime, a question of practical difficulty remains as to the mode in which his election to abandon his citizenship shall be evidenced. In some countries—*e. g.* France and Prussia—it may be shown by the fact that the person has taken his domicile in a foreign country in such a sense that he has abandoned all intent to return to his former home. This rule is not very satisfactory, as questions of domicile are frequently very difficult of solution, as they depend upon a judicial inquiry into the intent of the party, and this in turn depends upon an examination into a great variety of circumstances, and often ranging over many years. A much more convenient test is that of the English statute already cited. This provides that naturalization in a foreign country shall be evidence of an intent to renounce English citizenship. Should the former subject wish at any time to resume his relations with England, he can be naturalized under the laws of that country. The whole subject is not so important in the domain of private law as it was formerly, when aliens were subject to serious disabilities, particularly in respect to the acquisition of land. In a political aspect it is, however, of much consequence, and it is quite desirable that Congress should pass a comprehensive statute setting forth upon what terms expatriation may take place, the evidence by which it may be properly established, and how citizenship may be resumed. The general declaration in the law of July 27, 1868, that expatriation is a natural right, etc., is of but little practical value in settling the questions that from time to time arise upon this intricate subject. There is a special point of considerable moment as to the *status* of naturalized citizens of the U. S. becoming again domiciled in their native country, as to whom other considerations are presented from those which prevail in the case of such a domicile by one

who was born an American citizen. (For further information, consult *INTERNATIONAL LAW*, and text-books upon that subject; also *CITIZEN*.) T. W. DWIGHT.

**Expectorant** [from the Lat. *ex*, "out," and *pectus* (gen. *pectoris*), the "breast"], a medicine which facilitates or causes the discharge of mucous secretions from the air-passages within the chest. Many balms, gums, and nauseating medicines, as well as demulcents and other drugs, are reputed to have expectorant properties. Some medicines not usually considered expectorant appear to stimulate the secretion of mucus in the air-passages, as the ammonium chloride (sal-ammoniac) and the potassium hypophosphite. Among the most useful expectorants are ipecac, squill, lobelia, and blood-root. These are also emetics, sedatives, and diaphoretics.

**Expiration** [Lat. *expiratio*, from *ex*, "out," and *spiro*, *spiratum*, to "breathe"], in physiology, the operation or movement by which the air that has been changed by the respiratory process is expelled from the lungs. This movement is effected partly by the elastic contraction of the lungs and the walls of the chest, which were dilated by the act of inspiration, but the resiliency of the chest-walls is greatly assisted by the action of numerous muscles, especially in forcible expiration.

**Exploitation** [from *exploiter*, to "improve," to "work"], a French term signifying the improvement of lands, the working of a mine; in general, the act of using anything as a source of profit or rendering it profitable.

**Exploits, River of**, traverses nearly the whole breadth of Newfoundland from S. W. to N. E. It is navigable for steamers 12 miles to the rapids, and above these small boats can go to within 50 miles of the S. W. coast. Its valley is level, well timbered, and abounds in game and fish, but has few inhabitants. This valley is recommended for colonization by the provincial government, and is believed to contain nearly all the habitable land in the interior of that large island.

**Explosion** [Lat. *explo'sio*, from *explo'do*, *explo'sum*, to "explode," "hiss off the stage or drive out"], a bursting with a loud report; in natural philosophy, the sudden and violent expansion of the parts of a body, caused by heat or chemical affinity. Explosions are often caused by the elastic force of steam confined in boilers, etc. The explosion of gunpowder is the result of the sudden formation and expansion of gases, into which the powder is converted by chemical agency. This term is also applied to the violent eruption or discharge of a volcano. Humboldt heard the explosion of Cotopaxi at the distance of 130 miles.

**Explosives** [from the Lat. *ex*, "out," and *plaudo*, to "make a burst of sound"]. Under this head will be considered the compounds practically available in war, in mining, and in general use for the sudden development of immense force. They comprise gunpowder; guncotton; Schultze powder; nitro-glycerine, with its compounds known as dynamite, or giant powder, glyoxiline, lithofracteur, and dulin; admixtures of potassium chlorate with readily oxidizable substances; and the pierate compounds. The various fulminates of mercury, silver, copper, etc., although very powerful agents, are too liable to accidental explosion for practical use, except in very small quantities, as primings for percussion-caps, fuses, etc., and they are therefore excluded from consideration.

**Gunpowder**, which was first employed in war about the year 1350, is the oldest and most generally useful of these agents. It is a mechanical mixture of potassium nitrate, carbon, and sulphur, in proportions usually varying but little from 75, 13, and 12 respectively. Purity is essential to excellence. The manipulations of manufacture consist, in general terms, in very finely pulverizing the ingredients, thoroughly incorporating them, compressing them into a cake, granulating it, separating the different sizes of grain by sieves, glazing, drying, and finally removing all dust by the use of fine sieves.

In the storage of gunpowder special precautions against fire and moisture are needed. A spark, friction between hard bodies, or a temperature raised suddenly to 572 degrees Fahrenheit, determines an explosion; while slight moisture, which may readily be absorbed from damp air, produces caking and deterioration. A wetting is permanently destructive to the compound. Frost produces no injurious effects, either temporary or permanent.

Being a simple mechanical mixture, the properties of gunpowder may readily be varied to suit the requirements of a quick-burning or a slow-burning explosive. Its expansive power is due to two distinct causes—the sudden transformation from a solid to a gaseous form of vastly greater volume, and the heat developed by the chemical change, which induces enormous tension. It is apparent, therefore, that a variation in the relative proportions and condition of the ingredients, by changing the chemical

products of the explosion, must affect the expansive force; and also that a similar result may be obtained by mechanical means directed to modifying the duration of the time required for combustion.

It is to a skillful application of the last method that the recent improvements in gunpowder designed for heavy ordnance are due. General Rodman, of the U. S. army, inaugurated a series of experiments directed to this end in 1856, and from the results of his labors this country was provided in advance of European nations with an explosive suited to modern cannon. His mammoth and perforated-cake powders—the former consisting of large irregular grains, tested by two standard sieves of six-tenths and nine-tenths of an inch respectively, and the latter of hexagonal or cylindrical cakes perforated by holes—have been copied in the English pebble and pellet, and the Russian prismatic powders; by the aid of which the recent improvements in their artillery have been rendered possible. Pebble powder is simply pressed cake, broken into large irregular pieces and glazed. Pellet powder consists of meal powder compressed into small blocks, of regular and sometimes indented forms, and of dimensions varying for different calibres. Prismatic powder consists of meal powder compressed into flat, perforated cakes of hexagonal form, about an inch thick and an inch and a half on the longest diameter. This subject is still undergoing investigation; the facts having been developed that the time of burning, and hence the strain upon the gun for a given initial velocity in the projectile, may be modified by varying the size and form of the grains, their density and hardness, and the mechanical condition of the exterior.

By replacing a part of the carbon with uncarbonized peat, Mr. Oliver now manufactures a variety of gunpowder which, when well rammed, is claimed to give a higher initial velocity with a less recoil and less smoke than the ordinary grades. This advantage is attributed to slow burning.

The maximum pressure of exploded gunpowder, unrelied by expansion, has been investigated by various parties, whose results range from 7 tons to 662 tons to the square inch, the latest authorities indicating about 40 tons.

The difficulty of obtaining saltpetre in large quantities, and hence its cost, has induced many attempts to replace it by other nitrates, such as those of sodium, lead, and barium; but although good blasting powders have been thus prepared, none suited to propelling purposes have been obtained.

**Guncotton**.—In 1832, Braconnet discovered that by dissolving starch in nitric acid, and adding water, a white explosive substance was precipitated, to which the name xyloidin was given. Shortly after, Pelouse obtained a similar compound by treating paper, or cotton or linen fabrics, with nitric acid, and named it pyroxilin. These were the precursors of guncotton, which was discovered by Schönbein in 1846, and at once excited much attention as a possible substitute for gunpowder. Adverse official reports, however, were soon made in France, the U. S., Germany, England, and Austria, and the explosive fell into general disfavor on account of its liability to spontaneous explosion, its corroding residua, and its excessively violent and irregular character, all of which unfitted it for most military uses. Baron von Lenk, a member of the Austrian commission, was not so readily discouraged. He continued a series of experiments for several years, which ultimately led to so great improvements in manufacture that in 1853 he was able to construct a successful twelve-pounder battery employing guncotton. This led to its temporary introduction into the Austrian military service, and again attracted the attention of foreign nations to the new explosive.

Baron von Lenk's system consisted in cleansing the long-staple variety of raw cotton in an alkaline wash, followed by one in pure water; thoroughly drying it; steeping it for forty-eight hours in a cold mixture of strong nitric and sulphuric acids—one part of the former to three parts of the latter by weight; freeing the resulting tri-nitro-cellulose from the acids by a centrifugal machine, by thorough rinsing, and finally by the action of running water for a period of six or eight weeks, alternated with a boiling potash bath and hand washing; air-drying it; rinsing it in a hot solution of potassium silicate to retard the rapidity of combustion; and, lastly, again washing and thoroughly drying it. He partially regulated the suddenness of explosion by twisting the guncotton into ropes or weaving it into cloth to secure a more uniform density. Musket cartridges were formed by wrapping the thread around wooden plugs, to prevent unequal ramming. An admixture of a certain proportion of ordinary cotton was also employed to reduce the violence of action.

In 1863, Mr. Abel, as a member of a committee appointed

by the British war office, undertook an experimental investigation into the merits of this system, and succeeded in materially improving it. Instead of the costly long-staple cotton, he employs ordinary cotton waste, which is treated with the mixed acids, one part of nitric to three of sulphuric by weight, without any preliminary process except careful drying. It is then rinsed in a large volume of water, and dried by a centrifugal apparatus three or four times. Next, it is placed in a pulping engine, like those commonly used in the manufacture of paper, and reduced to a state of fine subdivision. It is then transferred, in quantities of at least ten hundredweight, to a poaching engine, where it is beaten for about forty-eight hours until it remains uniformly suspended in a large volume of warm water, continually renewed, and finally rendered slightly alkaline. It is then dried in a centrifugal machine, and moulded into disks of the desired form and dimensions, which receive a pressure ranging from four to six tons per square inch. Up to this point the guncotton has been in a damp, and consequently entirely safe, state, and if desired it may be so stored for an indefinite period of time without losing its peculiar properties. To prepare it for use it is dried upon hot plates, freely open on every side to the air. This system of manufacture is the best now known, and yields a product so uniform and safe as to be employed in England almost to the exclusion of all the other modern explosives.

In appearance, Abel guncotton consists of regular cylinders, of dimensions varying with the use proposed. It is white in color, hard to the touch, and sinks readily in water. Ignited, unconfined, by a flame, it burns with a strong blaze. Fired by a detonating fuse, or raised to a temperature of about 340° Fahrenheit in a strong case, it explodes with great violence—a single ounce being sufficient to indent a plate of iron or disrupt a thin slab of stone upon which it is loosely laid. The character of the detonation varies with the fulminate employed, being most sudden with fulminating mercury. Even in a damp state—containing twenty per cent. of moisture—it may be exploded without much loss of power by a disk of dry guncotton in contact. It is believed, upon good grounds, to be free from danger of spontaneous explosion. The English government has adopted it as the explosive best suited to submarine warfare, and has accumulated large quantities in store.

Guncotton produces little smoke, and leaves a very small residuum of solid matter, the chief products of combustion being carbonic oxide, carbonic acid, water, and nitrogen. It is unalterable in water, no matter how long submerged. It contains about 2 per cent. of moisture in its normal condition, and even when exposed to ordinary damp air it absorbs but little more—a property which gives it a great advantage over gunpowder. Chemically, the purest guncotton may be regarded as cellulose, in which three atoms of hydrogen are replaced by three molecules of peroxide of nitrogen. Thus constituted, it is insoluble in mixtures of ether and alcohol. If, however, great care has not been observed in the manufacture, less simple compounds are formed, which may readily be dissolved in these mixtures, forming collodion, so much used in photography and the arts.

Quite recently, Punshon has succeeded in so reducing the quickness of action of guncotton by mixing with it nitre and crystals of cane-sugar as to make it well suited for use in small-arms. Indeed, the present subject for investigation in connection with guncotton appears to be the admixture with it of some oxidizing agent, such as potassium or sodium nitrate; experiments have indicated that an increase of power may thus be gained.

**Schultze Powder.**—The conversion of lignin or wood-fibre into an explosive similar to guncotton was attempted soon after the discovery of that compound, especially by Captain Schultze, acting for the Prussian government. His method consisted in soaking the wood—preferably alder—in water, to give it toughness; cutting it by fine saws into a kind of cross-grained veneering; and subsequently punching it into small cubes, of which the size varied with the use for which the powder was designed. The grains thus produced were boiled in a solution of soda, and afterwards alternately exposed to steam and washed in a solution of chlorine to free them from resins, etc. They were next treated for several hours with mixed nitric and sulphuric acids, kept cool by constant stirring, and afterwards were thoroughly washed and dried. In this state the powder is but slightly explosive, and it may be kept in store indefinitely. For use, the grains must be submerged for about twenty minutes in a solution of nitrate of potassa and baryta, and then carefully dried and sifted. The necessary oxygen having been now supplied, the powder has a high explosive power. It burns with but little solid residuum or smoke, and is said to be both cheaper and stronger than common gunpowder, weight for weight. It, however, readily attracts moisture, is liable to form dust by attrition, and is more bulky than gunpowder, in the proportion of 3 to 1.

**Nitro-glycerine or glonoin oil** was discovered in 1847 by Ascagne Sobrero, but remained unapplied to practical uses until 1864, when Alfred Nobel, a Swedish engineer, began to develop its industrial value. Since then it has been largely employed upon the continents of Europe and America. It is prepared by the action of a mixture of concentrated nitric and sulphuric acids upon glycerine introduced drop by drop. At ordinary temperatures it is an oily liquid, usually colorless if made from good glycerine, but sometimes discolored by causes not well understood. It has no odor, and is of a sweet and slightly pungent taste. It is highly poisonous, even short contact with the skin being sufficient to produce severe headaches. Its specific gravity is 1.6. When first made it has a milky appearance, which ultimately disappears. Nitro-glycerine incompletely freed from the acids undergoes spontaneous decomposition, is dangerous to handle, and ultimately may lose its explosive properties. When pure it congeals at from 40° to 45° Fahrenheit, and is then nearly or quite incapable of explosion. At 212° Fahrenheit it begins to decompose; at 365° Fahrenheit it throws off yellow or reddish fumes; at 423° Fahrenheit it deflagrates violently. When uncongealed, nitro-glycerine may readily be exploded by concussion, which renders it quite unfit for transportation in that state. In store it should be kept in a cool place, under pure water, in open vessels, and, if practicable, in a frozen condition. For use, it should be thawed very gradually, by placing the can in warm water raised to a temperature not exceeding blood heat. Any leakage should be carefully avoided at all times, and emptied cans should be destroyed. Flame applied to small quantities of nitro-glycerine causes it to burn with difficulty like ordinary oil, but a fulminate exploded in contact with it produces a tremendous detonation. To develop its full effect, fulminating mercury, in quantities not less than fifteen Troy grains, and confined in a strong copper capsule, is recommended. Its advantages as an explosive consist in its instantaneous development of force, due to the fact that, pound for pound, it produces at least three and a half times as much gas, and twice as much heat, as gunpowder; its high specific gravity, which permits the use of small drill holes; its admitting of water, or loose clay, or even air, tamping; and finally, the facility with which it can be made upon the spot for immediate use. Its disadvantages are the severe headaches it causes to those not habituated to its use, its liability to spontaneous explosion, the dangers sure to attend its careless handling, and, especially for military uses, its unfitness for being kept long on hand, unless prepared and treated with a degree of care not readily to be secured. To these may be added the fact that its rate of explosion is not under control, which restricts its economical use to blasting in hard rock or under water. In soft rock or clay its power at equal cost is inferior to that of common gunpowder, because its action is akin to a sudden blow, rather than to a continued push.

**Dynamite**, called in the United States "giant powder," was invented in 1866-67 by Nobel; it consists of nitro-glycerine absorbed by some porous inert solid. The percentage of the former is of course limited by the capacity of the absorbent. The best material is a silicious infusorial earth found in Hanover, and known as *kieselguhr*. It is when dried a white, impalpable powder, showing under the microscope a cellular structure. It will absorb and safely retain three times its weight of nitro-glycerine. Many experiments were made in Paris during the late siege to discover the most suitable substitute there available. Finally, a residue from the gas-works was adopted, which would take up and retain a little more than its own weight of nitro-glycerine.

Dynamite made from *kieselguhr* has the appearance and consistence of heavy brown sugar. It possesses most of the virtues of the parent nitro-glycerine, with some peculiar to itself; of which the chief are, exemption from liability to spontaneous explosion and to detonation from moderate shocks, both of which result from the exceedingly fine granulation of the nitro-glycerine. It has been very largely used in this country, especially in California, and these important advantages are now generally admitted. Dynamite possesses another decided advantage over nitro-glycerine. If kept in the state of loose powder without compression into cartridges, it may be exposed to any natural temperature without losing its explosive properties when subjected to the action of a primer charged with fifteen grains of fulminating mercury; and this too without becoming more sensitive to ordinary shocks and handling. In the form of compressed cartridges it is as in explosive when thoroughly frozen as nitro-glycerine itself. Saturated with water, it loses only a very small percentage of its explosive power, but requires a primer much more powerful than those ordinarily used. Ignited by a flame, and unconfined, it burns quietly without detonation. Experiment indicates that its explosive force is not quite so instantaneous as that of pure

nitro-glycerine; hence, in certain kinds of resisting media, where a sustained pressure is required, the mechanical work performed by three-quarters of a pound of nitro-glycerine in the form of dynamite may largely exceed that produced by a full pound of the unabsorbed material. This apparent paradox actually occurs in submarine mines, usually called torpedoes. For rock-blasting, dynamite should be pressed firmly home and tamped with sand.

Dynamite possesses another merit. By combining its ingredients in judicious percentages, a certain control can be exerted over the quickness of its action, and a classification similar to that of the different grades of gunpowder, but much more restricted in range, may be made.

Various have been the attempts to improve upon dynamite by replacing its inert base with different explosive materials. Of such compounds, glyoxiline, lithofracteur, and dualin are the best known; but none of them are believed to be improvements for rock-blasting, chiefly for the reason that the bulk is increased in a higher ratio than the power, and hence, as the cost is largely dependent upon the size of the drill-holes, no real economic gain is made.

*Glyoxiline* was invented by Abel shortly after the introduction of dynamite. It consisted of a mixture of gun-cotton pulp and potassium nitrate, saturated with nitro-glycerine, and was made both in a granular and a cake form. It proved to be less troublesome in handling, owing to the granules being coated with an impermeable material which reduced the tendency to produce headache, but it was never largely introduced into practical use.

*Lithofracteur* was devised about the same time by Prof. Engels of Cologne. Its precise composition is not made public, further than that it consists of 525 parts of nitro-glycerine, 225 parts of silica, and 250 parts of mineral bodies; and analyses of different samples have exhibited varying results. One authority (Trauzl) reports 52 parts of nitro-glycerine, 30 parts of kieselguhr, 12 parts of coal, 4 parts of sodium nitrate, and 2 parts of sulphur. Others place the proportion of sodium nitrate as high as 25 per cent.; others add gun-cotton. *Lithofracteur* is a pasty substance of dark color. Like the other compounds of nitro-glycerine, it burns quietly when ignited by a flame, and explodes violently when fired by a detonating fuse. Water dissolves the sodium nitrate, and thus sets free a certain part of the nitro-glycerine—of course a decided disadvantage. The compound exhibits explosive properties similar to dynamite, and offers equal security against concussion. Its use heretofore has been restricted chiefly to Germany and Belgium, although it has been experimentally tried in England, and was employed by the Germans in the late war with France.

*Dualin* was invented by Dittmar shortly after dynamite, and its use has been chiefly restricted to Germany and the U. S. The patent describes it as consisting of "cellulose, nitro-cellulose, nitro-starch, nitro-mannite, and nitro-glycerine, mixed in different combinations, depending on the degree of strength which it is desired the powder should possess in adapting its use to various purposes." A sample supplied by the inventor for trial at the Hoosac Tunnel was found by analysis to consist of 60 per cent. of nitro-glycerine and 40 per cent. of washed sawdust, not treated with nitric and sulphuric acids. Trauzl reports it as consisting of 50 parts of nitro-glycerine, 30 parts of fine sawdust, and 20 parts of potassium nitrate. The best variety now manufactured is believed to be cellulose derived from poplar pulp, treated with nitric and sulphuric acids, and saturated with nitro-glycerine.

Having a less specific gravity than dynamite, dualin is slightly inferior to it, bulk for bulk, in explosive energy. When thoroughly soaked in water, it can only be exploded by a very violent detonation, much exceeding that of the ordinary fuse, and even then it loses more than half its power. It congeals at about 45° Fahrenheit, and in this state readily explodes, becoming so sensitive to friction as to make it dangerous to tamp in cold weather. In other respects its properties resemble those of dynamite.

*The Chlorates.*—The violent action of potassium chlorate upon readily oxidizable substances has given rise to many attempts to employ it in the preparation of substitutes for gunpowder. Under the names of white gunpowder and German gunpowder a mixture of this salt with potassium ferro and ferri-cyanide and sugar has long been known. Mixed with nut-galls, resins, and other vegetable substances, it has been repeatedly introduced to temporary use as Horsley's powder, Ehrhardt's powder, etc. The form best known in this country consists of potassium chlorate, potassium nitrate, and crude gamboge, which, under the name of Oriental powder, or safety compound of the Oriental Powder Company, was at one time considerably employed in the oil-wells of Pennsylvania and for other blasting purposes. Its dangerous sensibility to friction, and the consolidating effect of heat upon the gum,

have prevented its general use. With some of these chlorate compounds sulphur enters as an ingredient, which intensifies the chief objection against them—their liability to explode from slight friction or percussion. As a class, they have many times the explosive intensity of gunpowder, but are also more dangerous to handle. For special purposes they are extremely useful—for instance, a mixture of potassium chlorate and sulphur, formed into a paste, and dried to fit small cartridge-cases of lead, has been found to be terribly effective as a charge for explosive bullets. They may be fired with safety from a musket, but explode with great violence, even in penetrating flesh.

*The Picrates.*—Picric acid was discovered in 1788 by Haussman while treating indigo with concentrated nitric acid. Within a few years chemists have derived it from other substances, especially from carbolic acid. It has been called *amer d'indigo*, *amer de Welter*, carbo-nitric acid, nitro-picric acid, carbazotic acid, and tri-nitro-carbolic acid. It is a crystalline body of a brilliant golden yellow, very bitter to the taste, and is largely used as a dye. When heated to 600° Fahrenheit it detonates with violence.

The salts obtained by treating many of the bases with picric acid possess its characteristic properties; that best known is the potassium picrate. This forms golden crystals having a metallic reflection. Insoluble in alcohol, and but slightly soluble in water, it detonates violently at 600° Fahrenheit. Its action is akin to that of the fulminates in suddenness; and to regulate this property, Designolle has mixed it with charcoal and potassium nitrate, thus forming a compound similar to, but more powerful than, ordinary gunpowder. To obtain the maximum explosive energy, he employs equal parts of potassium nitrate and potassium picrate. For use in rifles from 12 to 20 per cent. of potassium picrate is used, with a small amount of charcoal. For cannon only from 8 to 12 per cent. of potassium picrate is employed. Under the name of *poudre Designolle* this compound has been considerably manufactured in France for military purposes, both for large guns and for torpedoes.

*Brugière powder* consists of an admixture of ammonium picrate and saltpetre. It is comparatively a slow powder, less liable to attract moisture than ordinary gunpowder, and yielding but little smoke. In England, Abel has experimented with a similar compound, to which he has given the name of picric powder, and which he considers especially suited for use in shells, because, although little liable to explode from concussion or friction—the great objection to the potassium picrate compounds—its effects when strongly confined are more violent than those of gunpowder.

H. L. ABBOT.

**Expo'nent** [Lat. *expo'nens*, from *ex*, "out," "forth," and *pono*, to "put," to "set"], literally "setting forth" or indicating; hence an index or representative; in algebra, a number or symbol representing a number which, when written above and at the right hand of any symbol of quantity, indicates a corresponding power of that quantity. Thus  $a^3$  denotes the *third power* of  $a$ , and 3 is said to be the *exponent* or *index* of that power; usually, though less correctly, it is called the exponent of  $a$ . Thus  $a^3$  is merely an abbreviation of  $aaa$ , and from the definition of an exponent it follows at once that  $a^m + n = a^{m+n}$ . The notation of exponents was introduced by Descartes, and being very convenient was soon extended. The convention on which the extension is based is the general truth of the above equation. Thus, if we ask for the meaning of a negative or fractional exponent, on the hypothesis that the above equation shall hold for all values of  $m$  and  $n$ , we find that since  $a^m = a^m + 0 = a^{m+0}$ ,  $a^0$  must be a symbol for 1, no matter what  $a$  represents.

**Exponent'ial Equa'tion** is one involving terms wherein the unknown quantity is an exponent or constituent of an exponent. The simplest form of such an equation is  $a^x = b$ ; one of its solutions is the logarithm of  $b$  to the base  $a$ , or, what is the same thing, the ratio of the logarithm of  $b$  to that of  $a$ , the bases being the same, but arbitrary. This is one solution only; the equation has many other imaginary roots, and is consequently transcendental. A curve in whose equation the co-ordinates appear as exponents is also called an exponential curve. The logarithmic curve is an example.

**Exports.** See COMMERCE, by A. R. SPOFFORD, LL.D.

**Exposition, Internat'ional and Univer'sal**, a name applied to the great public exhibitions which have been held, within the last twenty-five years, in various countries, of the products of the industry and of the evidences of culture, intellectual and æsthetic, of all nations; notably, to those of London in 1851 and 1862; to those of Paris in 1855 and 1867; and to that of Vienna of the present year (1873). These grand displays may be regarded as the development on the largest scale of an idea which, for the preceding fifty or sixty years, had had many

less imposing manifestations—the idea that, in order to the improvement of the arts of industry, the first requisite and the most effectual incitement is to be found in acquainting a people with the actual state of those arts as they exist. These expositions, therefore, though nominally universal, comprehended in their first conception and in their earliest practical illustrations only what are called the useful arts, in contradistinction to the liberal and the fine arts; and they furthermore omitted from their scheme the evidences of that kind of moral activity among peoples, which aims to ameliorate the condition of the human race by repressing vice and crime, by relieving distress, by diminishing the amount of disease, by the improvement of prison discipline, by softening the horrors of war, and by other means analogous to these; all of which have been kept more or less in view in the later. The early international expositions, moreover, omitted to provide, or at least provided only on a limited scale, for the display of animals useful to man, or of living and growing vegetables, plants and flowers, or for illustrating the operations of the garden, the field, the farm, and the dairy. The later have given to these objects a very large portion of their space.

Public exhibitions of the products of industry were in the first instance held as marts or fairs. (See FAIRS.) The earliest held not for commercial purposes, but strictly for the promotion of improvements in the useful arts, were instituted by the Society of Arts of London. This society has held such exhibitions annually since 1760. The first properly national exhibition of this kind, the first that is to say organized under government direction, took place in France in 1798. Since that time, the French government has given a similar exhibition every four or five years. The effect has been greatly to improve the quality and to enlarge the quantity of production in all the departments of industry throughout France. "The French writers," says Judge Daly (*Address before the Am. Inst.*, 1863), "attribute the wonderful progress of French industry to four causes: 1, the diffusion of knowledge, scientific and practical, among the working classes, through the establishment of free local libraries, museums, drawing-schools, and other means of practical instruction; 2d, inventions and discoveries; 3d, the repeal of restrictive laws; and lastly, the effect of the great industrial exhibitions. The effect of these exhibitions may be briefly stated. They have focalized the industry of the country, by bringing it under view as one spectacle, thus enabling all to know from time to time, the exact state of it. They have afforded means of comparison which did not previously exist, not only to those engaged in a particular pursuit, but also to those employed in those pursuits which act reciprocally upon each other. They have created a mutual interest between the man of science, the manufacturer, the capitalist, and the working classes. The intelligent criticism to which they have given rise in the various industrial journals, not only from scientific men but from manufacturers and workmen, has been of the greatest benefit. Their regular recurrence has kept up a spirit of emulation, in the desire to produce something better and cheaper than before. They have served as a means of advertising new or superior productions, upon a scale the most extensive; and have led to the gradual development of the business theory of large sales with small profits. They have stimulated inventions, by keeping up the constant desire for new discoveries, improved methods, and better machinery; and lastly they have dignified labor by giving it something more to struggle for than mere pecuniary compensation."

In the United States, since early in the present century, exhibitions for the encouragement of agricultural or mechanical industry have been annually held under State and county organizations, with partial aid from the State governments, in some States of the Union, and more recently in many. The Franklin Institute, founded in 1824, in Philadelphia, the American Institute established four years later in New York, and many less conspicuous though perhaps not less useful associations organized for promoting industrial improvement, have relied on public exhibitions as among the most effectual means of accomplishing their objects.

Of international expositions, the first in the series, that of 1851 in London, was undertaken at the suggestion, and successfully carried out through the influence, of Prince Albert, who was at that time the president of the London Society of Arts. A building was erected in Hyde Park for the accommodation of the objects entered for exhibition, upon a design of an entirely novel and original character proposed by Joseph (afterwards Sir Joseph) Paxton, a landscape gardener, at that time in charge of the gardens of the duke of Devonshire at Chatsworth. The materials employed were almost exclusively iron and glass, whence the structure received the name of "the crystal palace," a name which has been applied to other similar constructions since. The

plan was a long rectangle with a transept crossing the centre, the whole covering an area of more than twenty acres of ground. In the contract for the erection of the building it was stipulated that, at the close of the exhibition, it should remain the property of the contractors, which stipulation reduced the cost to the commissioners by £100,000 or half a million of dollars. The total cost for building, maintenance, superintendence, recompenses to exhibitors, legal expenses, etc. etc., was about £293,000. The total receipts from all sources were £506,000, showing that the exhibition, apart from the large and permanent indirect benefits accruing from it, was a direct financial success. This cannot be said of any of those which have succeeded it.

The universal admiration attracted by the exposition of 1851 and its brilliant results, stimulated a similar undertaking, two years later, in New York. The short intervening time allowed for preparation, and the distance of the place of exhibition from the countries most advanced in manufactures and other productive arts, suggested a large reduction in the scale of the display. The location selected was a public square, 445 feet by 455 feet only in dimensions, or about  $4\frac{1}{2}$  acres. Upon this a "crystal palace" was erected octagonal in ground plan, but having above two naves intersecting symmetrically at right angles, each 365 feet 5 inches by 149 feet 5 inches. The intersection was crowned by a hemispherical dome, 100 feet in diameter, the height of the springing line being 70 feet, and the total height to the summit above the crown 123 feet. In order to increase the extent of floor surface for the purposes of the exhibition, spacious galleries were constructed in the arms of the building, the total surface thus secured amounting to 250,000 square feet or  $5\frac{1}{2}$  acres. The cost of the building was about \$200,000, to defray which and to maintain the exhibition, money was raised by an issue of stock, at first at \$300,000, afterwards increased to \$500,000, in shares of \$100 each. These shares soon rose in value, and they were at one time at a premium of 75 per cent. The enterprise nevertheless resulted in loss, the destruction of the building by fire a few years later having finally destroyed all prospect of redeeming its fortunes.

During the same year, 1853, a similar international exhibition was held in Dublin, in a building forming a series of parallel halls. The cost was £80,000; the receipts, £47,000.

The Paris International Exposition of 1855 was in effect a private enterprise, but it was conducted by a commission appointed by the government, who also undertook to secure it against loss. The principal building on this occasion was erected of masonry in the Champs Elysées. The great hall devoted to the exposition was lighted from the roof. This building provided an extent of 1,770,000 square feet of floor surface to the industrial departments not employing machinery in motion. The machinery was established in an "annex" on the bank of the Seine, four thousand feet long. The fine arts were provided for in another building; and the tapestries and carpets of the imperial establishments, as well as the crown jewels, in still another. This exposition cost 11,264,520 francs = \$2,253,000, not including the cost of the main building, which was preserved as the property of the government, under the name of the "Palais de l'Industrie," to be used for annual exhibitions of various kinds and for public ceremonies.

The second London Universal Exposition was held in 1862. For this, the location chosen was upon a ground which had been purchased at South Kensington by the commissioners of the exposition of 1851, with the surplus proceeds of that exposition and some aid from the government. The principal building was nearly rectangular, and covered about seven acres. The whole area covered by roofs was about twenty-three acres. The buildings were subsequently removed, the space occupied by them being required for government purposes, and the principal one was transferred to the north of London, where, under the name of the Alexandra Palace, it was totally destroyed by fire in June, 1873.

The international exposition of 1867 at Paris was the most comprehensive in its plan, the most elaborate in its preparations, and the most colossal in its dimensions, of all which had been held up to that time. The government announced its intention four years in advance. In June, 1865, an imperial decree created a commission to direct the work, under the presidency of Prince Napoleon, who shortly after resigned, and was replaced, in February, 1866, by the Prince Imperial. The place fixed upon for the principal exhibition was the Champ de Mars, the large parade-ground in front of the *Ecole Militaire*, containing about 111 acres. For the exhibition of farm and dairy operations, animals and stock, the island of Billancourt in the Seine, two and a half miles from the Champ de Mars, was chosen, having an area of 74 acres. For the competitive trials of mowers and reapers and other field operations,



portions of the emperor's farms at Fougilleuse near St. Cloud, and of those at Vincennes, were given up as occasion required. The margin of the Seine in front of the Champ de Mars (from which it is separated by the quay D'Orsay) offering an area of about three acres, was devoted to objects connected with navigation, to diving apparatus, and to machinery for raising water. Here also was found a convenient place for a chemical laboratory in which experimental lectures were delivered during the exposition. The principal exposition building was constructed mainly of iron, and was of enormous dimensions. The entire space enclosed within its exterior walls was 36 acres, but there was an open central court of about one acre in the centre. This building occupied the centre of the Champ de Mars. The surrounding area was called the park, and was allotted to the different countries represented in the exposition, for the construction of buildings to accommodate objects or to facilitate operations which could not be allowed in the main building, or to illustrate the characteristic domestic or school architecture of different peoples; or for more imposing structures representing the temples and palaces of pre-historic antiquity. The entire area of the park was about 75 acres; but of this, 12½ acres, in the south-eastern angle, were cut off from the rest by an enclosure, and devoted to a horticultural and botanical exhibition under the name of the Reserved Garden. The park and the garden, as well as the farming and agricultural exhibitions at Billancourt, were new features in these great undertakings; and to many visitors the two former were quite as attractive as the display within the palace, or even more so. The whole area was laid out with much taste, the grassplots, always vividly green, being intersected by winding walks with here and there a limpid stream, the various buildings erected without any obvious order presenting an endless variety of aspects from different points of view. In the reserved garden, an immense structure of glass occupying an artificial eminence protected a magnificent collection of tropical trees and plants, while the shrubbery of all the forests of Europe covered the side slopes. Two huge aquaria also, within this same enclosure, presented specimens of the most remarkable and the most interesting inhabitants of the ocean and of inland waters. The construction of these was such that the spectator as he advanced found himself in a cavern beneath the surface of the water, through the glazed roof of which he saw the animals sporting above his head, while they were at the same time around him on every side.

The principal building, or so called palace, was constructed without any attempt at architectural effect, but with the design to make as conspicuous as possible the method of arrangement with reference to the plan of classification by correlated groups of objects, and by countries; and so to facilitate to the visitor the study of the exhibition and to enable him readily to find any particular object sought. It had the form of an ellipse with flattened sides, or more properly of a parallelogram with circular ends, the extreme length being 490 metres, or 1607.64 feet, and the extreme breadth 380 metres, or 1246.74 feet. The entire cost of the structure, including the necessary excavations and other earthworks, was about 11,785,000 francs = \$2,357,000. During the last six months of 1866, there were employed in the Champ de Mars, principally upon the palace, 1477 workmen.

In plan, the palace was divided into seven concentric halls, or galleries, corresponding to seven of the ten groups in the scheme of classification. The other three groups embracing live stock, agricultural exhibitions, etc., could not be introduced into the building. These halls were intersected by radial lines, forming boundaries between the spaces allotted to the different countries. This plan had the apparent disadvantage of allotting to every country the same proportionate space for the several groups; while in these several groups different countries are differently prolific. This disadvantage, however, was got over by allowing departures when necessary from the regularity of the elliptical divisions, without, however, allowing the elliptical passages, or promenades, to be interfered with. Sixteen of the radial divisions were formed by open passages, the principal entrance, on the main axis, being 15 metres, or 49½ feet wide; the opposite one, at the other extremity of this axis, 10 metres, or 32.81 feet; which latter breadth was also given to the passages corresponding to the minor axis. Besides these, there were 12 other radial passages, 5 metres, or 16.41 feet wide. The gallery of the fine arts, which formed the inner hall, though divided by partitions to mark the countries, afforded, through large open doors, an unobstructed passage around the whole ellipse; and the same was true of the gallery of machinery which was outermost. There were, besides these, three other perfectly free concentric passages, of 5 metres, or 16.41 feet each, making the complete circuit of the building. A verandah roof exterior to the main building surrounded it

entirely, sheltering a "gallery of aliments," or series of restaurants, characteristic of different countries, 10 metres = 32.81 feet broad, and also a colonnade 5 metres = 16.41 feet wide, beyond this. As an afterthought, an additional gallery was introduced into the plan, during the construction of the building, inside the gallery of the fine arts, 8½ metres = 27.9 feet wide, within which still was a sheltered promenade 5.65 metres = 18.55 feet wide, and within that the central court, adorned with fountains and flowers. Finally, in the midst of this court, stood a beautiful pavilion, where there were exhibited the standard weights and measures of all nations, and all their varieties of coins. Surmounting the dome of this pavilion was a large artificial globe, with its axis parallel to the axis of the earth, which, being driven by clockwork, revolved like the earth once in the twenty-four hours.

The park, besides the objects which have been mentioned above, contained "annexes" in which were exhibited objects which might be called the overflow of the palace—the space allowed the exhibitors within the buildings not sufficing for their purposes. Thus, here were seen the most magnificent displays of galvanoplastic work, of photographic enamelling for stained-glass windows, of costly India shawls, etc. etc. Here also were seen objects not enumerated in the original scheme, especially ordnance and the material of war generally; first-class lighthouses of full dimensions; the ambulances and other apparatus of the American Sanitary Commission, and of similar associations in other countries; objects gathered by Christian missions among savage nations, with specimens of the publications of missionary societies in all languages; a complete model in relief of the valley of the Nile; a diorama showing the Suez ship-canal throughout its whole length, with models of the machines employed in its construction, and others illustrating the system of traction, by which vessels are conducted through it from sea to sea. These are only examples of a very numerous and miscellaneous class of exhibitions of high interest, which found their place in the park.

The total expense of the exposition on all accounts, from the beginning to the final liquidation, amounted to 22,983,817.99 francs = \$4,596,764. The total return produced by the exposition was only 14,114,662.09 francs = \$2,822,900; but there was a "subvention" of 6,000,000 by the government, and another of like amount from the city of Paris, making the total receipts 26,114,662.09 francs; giving an excess of 3,130,844.10 francs = \$626,000 above expenditure.

The number of exhibitors, visitors, jurors and awards at each of the four great international expositions as yet held, is presented in the following summary:

Year.	Place.	No. of Exhibitors.	No. of Visitors.	No. of Jurors.	No. of Awards.
1851	London...	15,500	6,039,195	318	5,248
1855	Paris.....	23,954	5,162,330	398	11,073
1862	London.....	28,653	6,225,000	620	13,423
1867	Paris.....	52,200	9,238,967	693	19,776

The awards in every instance include *honorable mentions* as well as the more substantial recompenses. The number of honorable mentions has usually been something less than half the entire total. The number of visitors as given for 1867, embraces only the paying visitors, and includes the subscribers for the season or for various lengths of time from a week upward, 95,688 in all, only once each; whereas the holders of subscription tickets probably used them many times. Moreover, the exhibitors and their assistants, the employés of the administration, the foreign commissioners, the jurors, and the royal and imperial visitors, entered free. From calculations made by the imperial commissioners in their final report, it appears that the actual number of admissions to the exposition during its continuance, including repeated admissions of the same person, was 15,000,000, or upwards, and the average number of admissions daily was nearly 70,000. The total number of exhibitors given above (52,200) includes 381 entries made by different sovereigns and governments, which, not being designed for competition, should be deducted. Curiously enough, the French final report includes these entries "*hors concours*" among the awards. They should be deducted on both sides, when the result will be, exhibitors, 51,819; awards, 19,395, of which the distribution among the principal countries is as follows: France 15,804 exhibitors, 9938 awards; U. S. of America, 536 exhibitors, 291 awards; Holland, 587 exhibitors, 198 awards; Bavaria, 404 exhibitors, 183 awards; Belgium, 1909 exhibitors, 972 awards; Prussia and North Germany, 2447 exhibitors, 1132 awards; Austria, 2018 exhibitors, 1035 awards; Switzerland, 1001 exhibitors, 351 awards; Spain, 2636 exhibitors, 509 awards; Portugal, 1881 exhibitors, 268 awards; Sweden and Norway, 1077 exhibitors, 323 awards; Italy, 4144 exhibitors, 795 awards; Turkey, 4196

exhibitors, 134 awards; Brazil, 1336 exhibitors, 97 awards; Great Britain, 6032 exhibitors, 1702 awards.

The management of a great international exposition is an undertaking which exacts for its success the exercise of administrative and executive ability of the highest order. The difficulties which attend the task are peculiar. A formidable one, which presents itself in the very beginning, is the selection of a suitable site. So vast has been the scale which the more recent exhibitions of this kind have spontaneously taken, as illustrated at Paris, and in the exposition now in progress at Vienna, that no open areas adequate to their purposes can any longer be looked for in the interior of large cities. Yet it is only in presence of large cities that such expositions can exist; for the great multitude of exhibitors and visitors whom they invite must have the accommodations which only such cities can furnish. If not held in cities, therefore, they must be held in the immediate vicinity of cities, and in situations easy of access from them. The site must also lie upon some great line of transportation, or better at the point of convergence of many such lines; and if possible it should be approachable for vessels of burden by water. The next difficulty arises out of the necessity of improvising structures of great magnitude and of very substantial character, for the accommodation of the objects to be exhibited, in very brief time. The preparation of suitable grounds, also, is sometimes a work of almost equal magnitude. In the Champ de Mars, for example, one hundred and twenty acres of arid sand were converted into a lovely landscape garden in a single season. In the preparation of these buildings and grounds, moreover, provision must be made for thorough ventilation, drainage, water supply, and gas lighting, on a scale to meet the wants of fifty thousand people constantly, and the occasional wants of more than twice as many. The hydraulic service must be ample, so as to meet at once and effectually any danger from fire; and it should have a head above the level of the highest buildings. There must furthermore be a watchful and intelligent sanitary service, not only to afford relief in case of accident or sudden illness among the assembled multitudes, but also to guard against the first possible approaches of epidemic. The daily care of the buildings and grounds, for purposes merely of security and cleanliness, requires the employment and constant supervision of an army of inferior employes; and to all these provisions must be added that of an efficient police, subject to the direction of the managers of the exposition. The installation of the objects to be exhibited is another task of immense magnitude, of which the difficulty is enormously enhanced, not only by the brevity of the time allowed in which to accomplish it, but on account of the almost endless multiplicity of details which it involves. Compared with this, to move the material of an army of a hundred thousand men is a work of comparative simplicity; for in that case the material, though cumbersome, is in great homogeneous masses, the masses are limited in variety, and the sources from which supplies are to be drawn are few and generally known. In the case of the exposition, the material to be received and disposed of is almost infinite in variety, and it comes in an endless number of independent parcels. All these parcels, to the extent of many thousands of tons, arriving almost simultaneously, render the regulation of the system of transportation and of installation, a task exceedingly perplexing. Many of the objects, especially the machines, are so cumbersome as to require foundations of masonry to be provided for them; and these require excavations; all which work has to be done for all nations within the space of a few weeks. The arrangements necessary for the supply of motive-power to the machines, it being consistent neither with safety nor with comfort to allow powerful engines with their furnaces and boilers within the building, add another element to the complication; so, that, taking all things into consideration, the punctuality with which the great expositions have been hitherto opened on the days originally appointed, is evidence that they have been ably and efficiently directed; notwithstanding that here and there exhibitors have been caught unprepared. In regard to these accidents, it must be borne in mind that the chief commissioners have no such absolute control over exhibitors as a general has over his troops; and that they cannot always force the laggards who have once secured their places, to complete their arrangements with the promptness demanded.

Since the exposition of 1867, the question has been somewhat discussed whether the advantages secured by displays so ephemeral, on a scale so gigantic, are sufficient to compensate for the great labor, expense, loss of time and temporary locking up of capital, which necessarily attend them. The benefits are undeniably great, but it is just as they are beginning to be really felt, that the whole scene disappears. To study and understand a display of

such magnitude, is a task which may occupy the clearest mind for weeks or months. The opportunity is lost just as the visitor who comes to learn is beginning to profit by it. The imperial commissioners of 1867, therefore, in their final report, express, very decidedly, their opinion, that hereafter, temporary expositions should no more be encouraged; but that permanent museums of industry should be established in large capitals, or in their neighborhood, embodying and even improving upon the best features of those great industrial displays which have gone before; and keeping constantly under the eyes of all mankind everything which may serve in any manner as an indication of the existing state of the world's civilization. Of course, to sustain such permanent museums, the commercial feature must enter in. The commissioners believe that such a modification is practicable, and that it will be advantageous to the industrial interests of the capitals where such museums shall be established. The experience to be acquired at the exposition of the present year (1873) at Vienna, and at the centennial exposition of the U. S. at Philadelphia in 1876, may throw some additional light upon this question. Meantime a company in New York has obtained a charter from the legislature for the establishment of a permanent industrial exposition in that city; and it is possible that an experiment upon such a plan may be there tried.

F. A. P. BARNARD.

**Exposition, The International Universal,** at Vienna, Austria, 1873, was opened on the first day of May and closed on the third day of November. The attention of the Austrian people appears to have been directed towards holding a great exhibition some time before the Paris Exposition of 1867 was projected, but the attempt to realize their wishes in the fullest degree was postponed in favor of the French enterprise. An exhibition of considerable pretensions was, however, held in the year 1866, under the auspices of the government, through the department of agriculture and forestry. The Prater was the locality. It was opened on the 17th of May, and closed on the 14th of June. Its duration appears to have been cut short by the war with Prussia. The first proposition to hold a great international exhibition at Vienna in the year 1873 is said to have proceeded from the Trades' Union of the city, a very wealthy and influential organization, with Baron Wertheimer, a safe-manufacturer, at its head.

It was supposed that it could be so carried out that the receipts would nearly cover the expenditures; at any rate, it was decided that a guarantee-fund of 3,000,000 florins would be sufficient to cover all possible deficiencies, and subscriptions to this amount having been obtained, chiefly among members of the society, the government was induced to take an active part in the matter, and to announce, May 24, 1870, by an imperial and royal decree, "that, under the august patronage of His Imperial and Royal Majesty the emperor, an international exhibition will be held at Vienna in the year 1873, having for its aim to represent the present state of modern civilization and the entire sphere of national economy, and to promote its further development and progress." The enterprise was thus from the outset under the immediate patronage and control of the imperial government. It had not only its sanction, but its heartiest sympathy and support, and it was finally sustained by government appropriations.

An imperial commission was named, consisting of 175 members, selected from the chief officers of the departments of the government, and from the leading men of science, art, and industry in the empire, especially of those who had taken part in former international exhibitions as members of the commissions or as jurors, delegates, or reporters, and who had gained honor and distinction in their respective spheres of duty. The archduke Charles Louis was named as the protector, and the archduke Regnier the president.

By the imperial decree of the 29th Sept., 1871, the whole direction, administration, and carrying out of the exhibition, as also by private imperial letter and decree of Jan. 9 of the same year, were conferred upon the privy counsellor Dr. William Baron von Schwarz-Senborn, as administrator of the exhibition, with the title of the Imperial and Royal General Director. To a high and just appreciation of the functions of great international exhibitions, and of their importance to nations and civilization, the baron added great experience in their organization and management by his official connection with them as commissioner of the Austrian government in London in the years 1851 and 1862, and in Paris in 1867. All the imperial and royal authorities were obliged in their intercourse with the general director to assist him as much and as promptly as possible. A regiment of sappers and miners was detailed for duty in the exhibition grounds, and not only assisted in the construction, but in guarding the buildings after the opening.

The location selected was the famous Prater, the park

and place of resort of the Viennese, lying about one and a half miles from the centre of the city, and between it and the Danube. It was also in the immediate vicinity of the great engineering work undertaken for the regulation of the flow of that river. The surface consisted of the almost level alluvion of the river, and was raised in some portions by the addition of about four feet of gravel dredged from the river-bed.

About 280 acres, or 1,131,235 square metres, were enclosed by a high board fence. The extreme length of the tract, approximately a rectangle in form, extending E. and W., was about 1400 metres, and the width 720 metres. The total length of the fencing was about 4500 metres, or 14,763 feet.

The principal buildings, all of one story and without galleries, were the Industry Palace, Machinery Hall, Art Buildings, and Agricultural Halls, ranged side by side in three zones. The total length of the Industry Palace was about 3000 feet, and its floor-area, exclusive of the courts, 73,328 square metres, or 19.35 acres. It consisted of one main transept, crossed by sixteen galleries, giving thirty-two arms or wings, each 75 metres long by 25 metres wide. Between these galleries there were open courts, most of which were roofed over to gain additional space. The rotunda, rising in the centre of the transept, was the chief architectural feature of the exhibition; it was designed by Mr. Scott Russell, and constructed of wrought iron. It is a flat truncated cone, with a pitch or slope of about 31°; a diameter to the edge of the base of 354 feet 8 inches, and is supported on thirty-two wrought-iron columns 24.4 metres high. The interior height to the base of the large lantern is 158 feet, and to the top of the crown 276 feet. It cost \$500,000. (For dimensions and form, as compared with St. Peter's and other domes, see ROTUNDA.) The plan of the Machinery Hall was a simple rectangle, 2620 feet long and 165 feet wide, covering an area of 9 acres. The Fine Art Gallery afforded 30,800 feet of wall-length, and covered 1½ acres; the three agricultural buildings covered 6 acres; and the building for the amateurs' exhibition and museum, 0.8 of an acre; giving a total floor-area for these chief buildings of nearly 37 acres. This is exclusive of several buildings and of the covered courts.

The official maps and lists of buildings in the three zones of the exhibition-area enumerated no less than 185 separate constructions, many of them of a costly character, erected as types of the architecture of the different nations. Besides these, there were the permanent attractions of the adjoining "Wurstel," or People's Prater, outside of the gates, numbering 103 buildings, chiefly restaurants and places of amusement. To the E. of the chief enclosure of the exhibition there was an almost unlimited space of open ground, where the exhibitions of cattle and horses, and the races, were held.

The façades of the Industry Palace and of the Art Buildings, as well as several smaller constructions, were elegantly decorated by cornices and bas-reliefs of stucco formed of plaster or cement, and colored to resemble stone. The floors of all the buildings were of wood, with narrow spaces left between the planks for the dust to fall through. The main entrances were at the S. and W. The access was chiefly by carriages, horse-railways, and omnibuses, but was not by any means adequate, and was never equal to emergencies, such as storms or special attractions drawing a larger crowd than usual.

The regulations and details of the conduct of the exhibition were early made known to the world by a series of carefully prepared circulars, numbered from 1 to 104, and onward. These were printed in German, English, and French in quarto form, and they give a very complete view of the organization and progress of the undertaking. Among these are several upon special industries or features of the exhibition, giving very comprehensive views of the condition and needs of those industries.

The classification comprised twenty-six groups, with numerous subdivisions. The arrangement of the objects did not follow the sequence of the groups. It was not systematic, and it was unsatisfactory. The space was apportioned "in block" to each country, and the placing or installation of the objects was left to the convenience or caprice of each of the foreign commissions. A geographical order of succession of the countries was adopted, the Eastern nations taking space at the eastern ends of the buildings, and the Western nations at the western ends. Japan took occupied one end, and the U. S. the other end, while Prussia and Austria occupied the central portions.

Regret was very generally expressed, not only by the commissioners and jurors, but by the visitors and exhibitors, that the dual system of arrangement introduced in the Paris Exhibition of 1867 had not been adopted at Vienna. By this system, as is well known, similar objects from different countries are placed together, while at the same time

the grouping by countries is preserved. Such an arrangement greatly facilitates study and comparison, and consequently promotes one great object of exhibitions—education. It saves a great deal of time and confusion, and makes the labors of jurors and experts much more satisfactory. In Vienna it was extremely difficult to find all the objects of any one group or class, and the direct comparison of such objects was impossible. The form of the building rendered such a systematic arrangement impracticable, and the only approximation to it was placing the machinery in one building, the agricultural implements in another, manufactures and products in a third, and fine arts in a fourth.

The display in all departments was very large and costly, and exceeded that in Paris in 1867. The aggregate weight and number of objects, and the outlay for show-cases and decorations, were much greater. The number of exhibitors is stated at 70,000.

The exhibition was particularly rich in the educational appliances and statistics of all countries, special attention to the subject having been requested in the official programmes. The collections so brought together are to remain in a special museum at Vienna. The several departments of government of the Austro-Hungarian monarchy made extensive and instructive exhibitions, particularly in forestry, mining, and commerce. The special exhibitions in Group I. (mining, metallurgy, etc.) by Prussia, Carinthia, and other countries, were remarkable for the thorough representation of those industries in a liberal and costly way. Japan made a very complete and creditable exhibition, giving a better representation of the arts and industries and resources of that empire than has ever before been seen. The machinery and agricultural implements from the U. S. were very creditable, and attracted much attention, but in these and in other departments the representation was by no means commensurate with the extent and resources of the country.

The international jury consisted of about 600 members from all countries, appointed by each commission in the general ratio of one juror for every 100 exhibitors in each group. The officers of the jury were apportioned among the nations by the imperial commission. The jury-work commenced in July, and the announcement of the awards was made in August. These awards were not internationally comparative, but were absolute, and were liberally bestowed. The medals were all of bronze, and of the same size, each seven centimetres in diameter, but of five different kinds, though not in gradation of merit or value; namely, 1, medal for fine arts; 2, medal for good taste; 3, medal for progress; 4, medal for co-operators; 5, medal for merit. The medal for *fine arts* was reserved for distinguished art productions exhibited in Group XXV. The medal for *good taste* was designed for exhibitors of articles of industry, the form and color of which constitute the characteristic features for adjudication. The medal for *progress* was given to exhibitors in Groups I. to XXIII., and in Group XXVI., who, compared with the productions exhibited at previous exhibitions, proved noticeable progress made since then in new inventions, in the introduction of new materials and contrivances, etc. The medal for *co-operators* was designated for persons who, as managers of manufactories, as foremen, designers of patterns, modellers, or as assistants in a general way, were nominated on the part of the exhibitors on account of the leading part they had taken in the features of excellence of the productions or in the increase of their sale. It shows on the reverse side a mechanic examining the parts of a machine which his aspiring assistant has just finished, and for the completion of which, as an acknowledgment, the Genius of Labor presents him with a laurel wreath. The medal for *merit* was awarded to exhibitors who could lay claim to excellence and perfection in material and workmanship, large extent of production, the opening of new markets, the employment of improved tools and machinery, and cheapness of production. There were also diplomas of merit and of honor, the latter having the character of a peculiar distinction for eminent merit in the domain of science and its applications.

A succession of international congresses during the progress of the exhibition was a marked feature, and contributed to its interest and good results. The Medical Congress, the Congress on a Uniform Numbering of Yarn, the Flax Congress, and the International Patent Congress were among the most important. The latter was well attended, and resulted in the formation of a permanent international executive committee under the presidency of Baron Schwarz-Senborn, with power to enroll members and call another meeting in 1876 or before.

From the opening until November 3 there were 7,254,687 visitors or entries recorded by the turnstiles. This number includes all, whether paying or free, and of course does

not represent different persons, each visit of the same person counting one. This number is equivalent to about 20 per cent. of the population of Austria. The visitors in London in 1862 were equal to about 20 per cent. of the population of Great Britain.

There were several concurrent unfavorable conditions tending to prevent a large influx of visitors. In the first place, the exhibition was not fairly ready to receive visitors until after the first of June. The month of May was cold and rainy, and the first impression produced on the public was unfavorable. The press also was in a critical mood, and the vexations and fatigue attending a study of the exhibition disgusted those who arrived with the expectation of being satisfied without effort. Later in the season the presence of cholera to a limited extent sufficed to keep away many tourists who had deferred their visits. The sovereigns of Europe visited the exhibition in succession. Delegations of artisans were sent by Switzerland and other nations. The free list was large, including all the foreign commissioners, jurors, and exhibitors.

The receipts were much less than was expected, being only about 2,600,000 florins (or \$1,300,000) from visitors, as far as ascertained at the closing; but this does not represent all, as the full reports had not been received from the railways. There were in addition certain revenues from the rent of space, each country paying a small sum per square metre, and from the concessions. The buildings are also to be sold. But the gross revenues will probably not exceed \$2,000,000 in round numbers, while the expenditures are reported as equivalent to \$9,850,000, leaving a deficiency of \$7,850,000, already mostly provided for by government appropriations. WM. P. BLAKE.

**Ex post Facto**, a legal term introduced from the civil to the common law. Its literal translation is, "by subsequent matter," or "in consequence of something done afterwards." An *ex post facto* law is a law that operates by after-enactments. By the Constitution of the U. S., neither Congress nor the State legislatures can pass *ex post facto* laws, and the meaning of the term thus used has been often defined and is fully settled by judicial decisions. It refers to criminal and penal statutes only, and not to those which simply affect private property. Chief-Justice Marshall defined an *ex post facto* law to be one which rendered an act punishable in a manner in which it was not punishable when it was committed. The more specific definition usually laid down by the courts is: 1, any law which makes an innocent act, done before its passage, criminal; 2, any law which aggravates a crime, and makes it legally greater than when it was committed; 3, any law which changes the punishment, and inflicts a greater punishment than the law affixed to the crime when it was committed, or perhaps one different in kind; 4, any law that alters the legal rules of evidence applicable to an offence already committed, and to the injury of the offender.

**Express** [from the Lat. *ex*, "out," and *presso*, *pressum*, to "press," to "urge"]. This word, originally applied to a messenger sent on pressing or special service, has by popular usage in the U. S. become confined in its meaning, and is employed to designate the business of taking special charge of packages of any description and forwarding them to their destination. This business has grown directly out of the wants of the community: it stands midway between the post-office system of conveyance and the ordinary method of freightage goods by railroad or steamboat. Compared with the post-office, which carries mail matter at the risk of the owners, the express offers at least equally prompt deliveries, and, further, guarantees them; a company or firm assuming responsibility for the packages entrusted to its care. Hence, the express is employed in preference to carry packages of value. With regard to the comparative cost of transmission, packages exceeding a certain weight (varying chiefly with the distance to which they are to be sent, since that, more than anything else, determines the express charges) cannot be sent as cheaply by post as by express. But for small parcels the postal charge is much less than that of the express, and recent changes in the post-office law have largely extended the classes of packages that can be preferably sent by mail. This feature of the post-office system is, however, offset in some degree by the restrictions on low-rate mail matter, such as requiring it to be sent in wrappers with the ends open. Compared with the ordinary methods of freightage merchandise, the express system affords, aside from advantages of security of carriage and delivery, a more rapid conveyance. Instead of the slow movement by freight-trains on railroads, expresses engage at heavy cost space for the goods entrusted to them on passenger-trains. Between the great cities one or two cars on each passenger-train are solely devoted to this use, and on the less important routes a part of the baggage-car is thus engaged.

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An employé of the express, called an "express agent," invariably goes with the goods on the train. As the express system extends through 60,000 miles of railroads in the U. S., it is estimated that express agents travel 300,000 miles per day, and that individuals among them go over a space equal to the circuit of the globe six times in the year. The early expresses (1833) were established by newspapers to obtain prompt news. In 1839, Wm. F. Harnden first made a special business of carrying parcels between Boston and New York; the next year P. B. Burke and Alvan Adams started a competing express, and W. B. Dinsmore came into the business, which in 1841 extended to Philadelphia. Rapid progress was afterwards made in starting expresses, the first W. of Buffalo being that of Wells, Fargo & Dunning in 1845. The consolidation of many individual concerns into stock-companies began in 1850 with the formation of the American, followed in 1854 by the Adams, and afterwards by the United States, the National, Wells, Fargo & Co.'s, the Southern, and other express companies. The stock of five of these is represented by nearly \$50,000,000 capital. There are 25,000 men wholly, and at least 25,000 more partly, employed in the express business. Its revenues exceed those of the post-office. One of its largest branches is the conveyance of bank-notes, which under the present paper-money system reaches vast dimensions; another is the collection of bills on the delivery of goods, which has created an important division of mercantile business that dispenses with the risks of credit. In Europe the express system is principally confined to the carriage and delivery of parcels in cities. Carriers provided with a badge from the company in whose pay they are, and which is responsible for their good behavior, are stationed at all the principal street-crossings, ready to go to work at fixed prices. (For the legal aspects of the express business see CARRIERS, COMMON.) WILLIAM C. WYCKOFF.

**Extract** [Lat. *extractum*, from *ex*, "out," and *traho*, *tractum*, to "draw"], in pharmacy, is a name given to any solid substance (called simply an extract) or to a liquid substance (fluid extract) made by evaporating solutions containing medicinal principles, chiefly of vegetable origin. These solutions are made (1) by expressing the juices of fresh plants, or of dried ones after maceration, by means of hydraulic or other presses; (2) by means of liquid solvents, as water, alcohol, or ether, from which result "aqueous," "alcoholic," and "ethereal" extracts. These various methods are employed, some extracts being better prepared by one and some by another process. Sometimes the menstruum is allowed slowly to percolate and re-percolate through the powdered drug, the solvent being at last removed by evaporation or distillation. Evaporation is frequently carried on *in vacuo* with great advantage, for a high degree of heat is injurious to many vegetable principles.

**Extract of Meat** [Lat. *extractum carnis*] is a preparation of beef, and sometimes of mutton, or of both combined, in which the muscular fibre, fat, and gelatine are removed, and the highly nitrogenous elements preserved and condensed into a semi-solid mass of about the consistence of ordinary butter. Commercial extract of beef is prepared on a large scale in the Argentine Republic, in Texas, and in other countries. Most of what is sold in Europe and the U. S. comes from Buenos Ayres, where its manufacture was first established under the supervision of the chemist Liebig. One establishment at Fray Bentos slaughters 400 oxen daily. In general, the finely cut beef is allowed to stand for a few hours in cold water; the liquid is then boiled for a time, and afterwards evaporated in a vacuum-pan. In some places the mincemeat is steamed, and the resulting liquids evaporated on rapidly revolving steel plates. In other establishments superheated steam is employed under pressure; the material is then submitted to powerful hydraulic compression, and the expressed liquid partially dried *in vacuo*.

Extract of meat is of variable quality and composition, and at the best but imperfectly represents the beef it was made from. Nevertheless, it is useful in preparing soups, and especially in nourishing those who are sick of low fevers, pyæmia, and other like diseases.

**Extraction of Roots.** See EVOLUTION.

**Extradition** [from the Lat. *ex*, "out," and *trado*, *traditum*, to "convey"], the surrender by one state or nation to another of fugitives from justice. The subject will be considered under two general divisions: 1, the surrender of fugitives from justice from one State of the U. S. to another; 2, the like surrender as between one nation and another.

1. The U. S. Constitution provides that "a person charged in any State with treason, felony, or other crime, who shall flee from justice and be found in another State,

shall, on demand of the executive authority of the State from which he fled, be delivered up to be removed to the State having jurisdiction of the crime." A like clause is found in the Articles of Confederation. The propriety and necessity of such a provision in the case of States bound so closely together as are those of the American Union, and yet exercising independent criminal jurisdiction, will not be questioned. It tends to promote harmony between the States and to repress crime, while it aids in the discharge of a high moral obligation. An act of Congress of 12th Feb., 1793, ch. 7, § 1, carries the constitutional provision into practical effect by declaring that the demand shall be accompanied by a copy of an indictment found against the alleged fugitive, or by an affidavit made before a magistrate of a State, etc., charging the fugitive with having committed a crime. These documents are to be certified as authentic by the governor or chief magistrate of the State whence the demand comes. It is thereupon made the duty of the governor on whom the demand is made to issue his warrant and to cause the fugitive to be arrested and delivered over to the agent of the demanding State. The essential ingredients of the case are—that there must be a charge that an act has been committed which is a crime under the laws of the State where it took place, and that the person so charged has fled from justice. The governor of the State where the fugitive is found is bound to comply with the demand when properly made and authenticated. Still, there are no legal means whereby, in case that he fails to do his duty, he can be compelled to perform it. (*Kentucky against Governor Dennison of Ohio*, 24 Howard's Reports, 66.) If the fugitive is supposed to be arrested on insufficient papers, the regular course to test their validity in his behalf is to apply for a writ of *habeas corpus*. If they turn out to be defective, he will be discharged. When the proceedings are sustained, the effect of them is to return the fugitive to the State whence he came, where he will be entitled to his trial under the ordinary course of judicial proceedings.

2. Extradition as between separate nations. This is a topic belonging to international law, and will be noticed under that general subject. It was at one time supposed that it was the duty of a state under the law of nations to surrender up a fugitive from justice upon demand after the civil magistrate had ascertained the existence of reasonable grounds for subjecting the accused to a criminal trial. Those who maintained this doctrine found much difficulty in drawing the line between the graver crimes to which it was claimed that this rule was applicable and those of a minor character to which it could scarcely be considered that it would extend. (1 Kent's "Commentaries," 37.) The better opinion now is, that whatever obligation may exist in such a case is an imperfect one, and cannot be insisted upon by the demanding nation unless there be a treaty stipulation. It is quite clear that courts have no power in such cases independent of treaties, and it is a matter of grave doubt whether the executive authority can properly exercise it. So a State of the Union cannot assume to make a surrender of an alleged fugitive to a foreign nation, and an act of a State legislature authorizing it is unconstitutional and void. (*People against Curtis*, 50 New York Reports, 321, A. D. 1872.) The U. S. have treaties upon this subject with a large number of foreign nations, including Great Britain, France, Austria, the German empire, Norway, Sweden, Italy, Switzerland, Mexico, etc. The treaties are not precisely identical, though of the same general scope and character. They all include the more heinous crimes, such as murder and piracy, while some of them embrace robbery, burglary, arson, rape, embezzlement, and the fabrication and circulation of counterfeit coin or paper. The words here employed would refer to the offences named as understood in the general jurisprudence of the two nations, and accordingly would not extend to a new statutory crime established by one of the States of this country, and called by a name used in the treaty, such as forgery. This conclusion was reached in England in the case of Winsor, 6 Best & Smith's Reports, 522. On the other hand, it has been considered that the word "piracy," as used in the treaty with England, does not refer to that offence as recognized in the law of nations, as the offender can be tried in the state where he is. Its reference is to piracy under the municipal law of the state making the demand. (*In re Tivnan*, 5 Best & Smith, 645.) The treaties require that the offence should be committed within the "jurisdiction" or within the "territories and jurisdiction" of the demanding nation. An interesting question has recently arisen in this country whether these words would include the case where a nation by statute law made it a crime for one of its own subjects to commit an act like murder beyond its own territory, so that a surrender could be demanded by that nation, though the act were committed within the territory of a nation with which the U. S. had no extradition treaty.

This was the case of Vogt, and though the attorney-general of the U. S. advised against the surrender, the point can scarcely be deemed to be finally settled. In order to carry an extradition treaty into practical effect, domestic legislation is necessary. Under the laws of Congress and the practice of the courts the following points must be observed: (1) There must be a demand from the supreme political authority of the state seeking the return of the fugitive; (2) There should be an authorization or a mandate by the President of the U. S., directed to a judge or U. S. commissioner, to examine into the case; (3) Complaint under oath should be made to the judge or commissioner by a proper person, such as a consul-general of the foreign country, showing the commission of the act on which the demand for the surrender is based; (4) There should be a warrant by the commissioner, etc. for the apprehension of the party charged; (5) The charge should be sustained before the commissioner by suitable evidence, such, for example, as would justify his commitment had the act taken place here; (6) On the certificate of the judge or commissioner that there is a probable ground to believe that the offence has been committed, and such certificate is satisfactory to the President of the U. S., the surrender is made to the agent of the demanding state. If the proceedings are defective, the prisoner may be discharged on a writ of *habeas corpus*. The statutes will be found in 9 U. S. Stat. at Large, 302 (12 Aug., 1848); 12 id., 84 (22 June, 1860); 15 id., 337 (Mar. 3, 1869). Consult also *Matter of Farez*, 7 Blatchford Reports, 345, 491; BRIGHTLY's and ABBOTT's "Digests," title *Extradition*; WHEATON's "International Law," notes of LAWRENCE and DANA; CLARKE "On Extradition," etc.; the recent English statutes, 33 & 34 Vict. ch. 52 (1870); 36 & 37 Vict. ch. 60 (1873).

T. W. DWIGHT.

**Extreme Unction** [Lat. *extrema unctio*, the "last anointing"], the fifth of the seven sacraments of the Roman Catholic Church, consisting of the application, by a priest, of consecrated oil of olives to the eyes, ears, nostrils, lips, hands, feet, and reins of a dying person or of one whose illness is alarming. It is administered after confession and the Eucharist, and is believed to remove the last stains of sin. The Greek and Coptic churches recognize unction (which is by no means always administered in *extremis*) as a sacrament, and the Jacobites and Armenians have a similar practice. Certain ritualists among the Anglicans and Lutherans advocate a return to this ceremony. There is evidence that a superstitious use of consecrated oil in cases of sickness was common among the Christians as early as the fourth century; the oil was stolen from the lamps of the church and applied as a miraculous cure. In the fifth century the superstitious habit began to rise into a sacred rite; in 416, Innocent I. speaks of it in a letter to Decentius, bishop of Eugubium, as a kind of sacrament. From the eighth century the rite is often mentioned in the acts of the synods, though still subject to different opinions concerning its value and dignity. By the Synod of Pavia (850) it was declared to be a sacrament by which sins are forgiven.

**Exudation** [Lat. *exudatio*, from *ex*, "out," and *sudo*, *sudatum*, to "sweat"], the passage of a liquid outward through the walls (or membranes) of the vessel containing it. The term is also applied to certain substances which *exude* or come out of trees, as gum-resin, manna, etc. In pathology, a material product of inflammation; a gaseous, liquid, or solid substance foreign to the tissues, and resulting from disease. These morbid products, when solid, sometimes become organized and capable of growth.

**Exu'ma**, Great and Little, two of the Bahama Islands. The former is about 30 miles long and 3 miles wide, and has one of the best harbors in the Bahamas. Salt is exported from them. Great Exuma is crossed by the Tropic of Cancer. The N. W. point is in lat. 23° 42' N., lon. 76° W.

**Exu'viæ** (plu.), [Lat. for "cast-off clothing"], in natural history, the name for the slough or cast-off skin of reptiles, crustaceans, etc.; the moulted feathers of birds; the hair of quadrupeds, which is shed at a particular season of the year. It is sometimes a general name for fossil organic remains. It was anciently used to designate the personal spoils taken from an enemy in battle, hence it sometimes meant all booty taken in war.

**Eyck, van** (HUBERT and JAN), two brothers, born at Maaseyk, Holland—Hubert in 1366, Jan about four years later. They lived and wrought as artists together. Their chief works were executed in Ghent. The two brothers are considered the founders of the Flemish school of painting. (An account of their labors, with an estimate of their merits and a just assignment of their place in art, may be found in a book on "Early Flemish Painters" by CAVALCASELLE, London, 1856, and in DR. LÜBKE's "History of



Art," translated by F. E. BUNNETT, London, 1868; STANLEY'S "Dutch and Flemish Painters," Bohn's ed.) Jan died July 9, 1440, Hubert Sept. 18, 1426. The former is often called "John of Bruges."

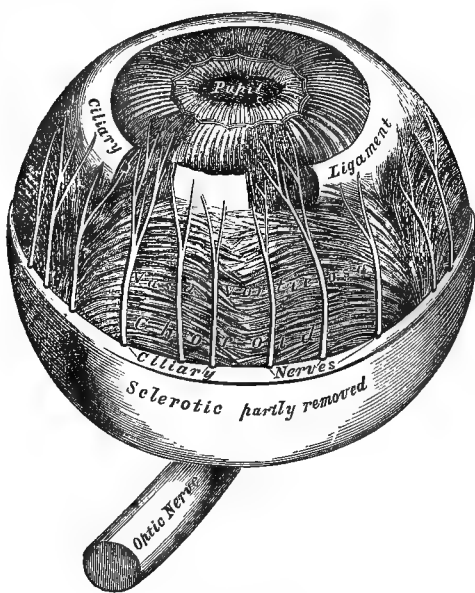
**Eye**, a market-town of England, is in the county of Suffolk, 75 miles N. E. of London. The houses are low, with thatched roofs, and the streets unpaved. Pop. 2296.

**Eye**, the organ of vision in animals. Eyes may be variously developed, and are by no means homogeneous throughout the animal series, but in the vertebrates, when developed, they are two in number, and essentially correspond in all. Among the more notable deviations are the partly double eyes of *Anableps* and the development of the two on one side of the head in flat fishes. Supposititious eyelike organs are in addition developed on trunk in certain fishes.

The human eye is placed in a bony cavity called the orbit, and is further protected by the fatty cushion, within which it rests, as well as by the brows, eyelids, and eyelashes. Other appendages are the tear-gland and the sac and duct connected with it, the numerous muscles which direct its range, and the nerves and blood-vessels which supply it.

The human eye is a globe, with the segment of a smaller globe planted upon its anterior aspect. Its antero-posterior diameter is about 1 inch, its transverse one about eleven-twelfths of an inch. The larger sphere has about five-sixths of the whole surface. The eye is invested by three coats—first, the sclerotic, a white, tough, fibrous substance, the "white of the eye," visible through the delicate conjunctiva which covers its anterior portion and is reflected over the inside of the lids. The muscles are attached to it, and through a sieve-like "cribriform lamina" it transmits the filaments of the optic nerve with the vessels supplying the retina. The anterior sixth of the eye's surface is occupied by the transparent cornea. Its posterior surface is lined by a "pavement" epithelium of polygonal cells.

FIG. 1.



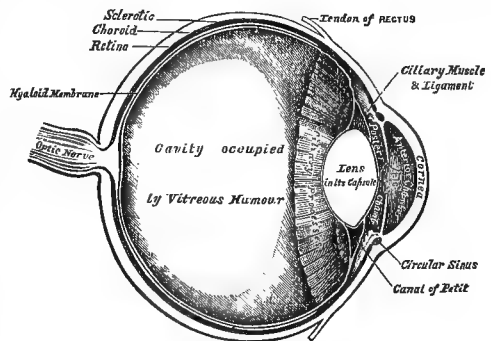
Choroid and Iris.

The second coat of the eye is composed of the choroid tunic, the iris, the ciliary processes, and muscle. The choroid is a vascular, thin, chocolate-colored membrane, lining the sclerotic, and separated from it by the delicate *membrana fusca*. The choroid itself has three layers—an outer, consisting chiefly of blood-vessels (*vasa vorticiosa*) and pigment-cells; a middle layer, of fine capillary vessels (Ruyssch's layer); and an inner layer, of tessellated, hexagonal cells laden with pigmentary matter, except in albinos. The ciliary processes are folds or plaits running forward from the choroid to the suspensory ligament of the crystalline lens. They number about seventy. The iris ("rainbow") takes its name from its various colors in different persons. It is the colored curtain which surrounds the pupil, its central opening. It contains both circular and radiating involuntary muscle-fibres—the circular to contract, the radiating to expand, the pupil. The circular sinus is a canal (Schlemm's) which runs around the eye outside the ciliary body. The ciliary muscle is a

circular band of involuntary muscle-fibre which passes back from the junction of the cornea and sclerotic to the choroid. It is through the action of this muscle on the crystalline lens that the eye is accommodated or adapted to distinct vision at different distances.

The third coat of the eye is the retina. Without is the choroid; within the vitreous humor. The retina has ten layers. The principal of those are the outer, or Jacob's membrane, consisting of columnar rods and bulbous, hol-

FIG. 2.



Vertical Section of the Eye.

low cones filled with fluid; the granular layers, consisting of globular particles, lined inwardly by a hyaline substance; the layer of ganglionic cells and the layer of optic nerve fibres. This latter layer of the retina is an expansion of the optic nerve. It is separated within from the vitreous humor by the exceedingly delicate *membrana limitans* and by the hyaloid membrane, the former regarded as belonging to the retina, the latter to the vitreous humor.

The contents of the eye are the aqueous humor, the crystalline lens, and the vitreous humor. The aqueous humor consists of about 4 or 5 grains of water, with a very small proportion of common salt and other matters in solution. It occupies the space between the cornea in front and the crystalline lens behind. This space is divided into the anterior and the posterior chambers, which the iris separates from each other. (Fig. 2, Vertical section of the eye.) Behind the aqueous humor comes the crystalline lens, suspended in the capsule, an elastic, transparent membrane which is retained in its place by the suspensory ligament. Between this ligament and the hyaloid membrane is the space called the canal of Petit. The lens itself consists, as is seen when it has been boiled or hardened in alcohol, of layers of transparent matter arranged in segments. The vitreous humor occupies four-fifths of the cavity of the eyeball. Like all the contents proper of the eye, it is transparent. It consists of a thin, jelly-like, albuminous fluid. When the aqueous humor has been evacuated by accident or operative interference, it is speedily restored like other serous fluids; but if the vitreous humor is once lost, it is never renewed. (See LIGHT, VISION, and OPHTHALMOLOGY.) M. S. BURNETT.

**Eye, Diseases of.** See AMAUROSIS, GRANULAR LIDS, BLINDNESS, CATARACT, MYOPIA, SQUINTING, OPHTHALMIA, SIGHT, DEFECTS OF, etc.

**Eye-Bolt**, on shipboard, a pointed iron bar with a hole in the thick end. It is intended to be driven into one of the timbers, and then to have a rope passed through the hole.

**Eyebright.** See EUPHRASY.

**Eye-Piece**, the lens or combination of lenses used in microscopes and telescopes to examine the aerial image formed at the focus of the object-glass. The ordinary eye-piece is a combination, and may be either positive or negative. The former consists of two plano-convex lenses, with their convex sides towards each other, and is used for micrometers. The negative consists of similar lenses with the convex sides turned away from the eye. Besides these, there are in use for observations of the sun a diagonal eye-piece, in which a very small percentage of the sun's light and heat is reflected from the first surface of a prism, the rest being transmitted; and Dawes's solar eye-piece, in which the light is reduced by observing only a very minute part of the solar surface.

**Eye-Stones** (*oculi cancerorum*) is the name given to the two semi-circular calcareous concretions which are found in the common European crawfish, in August, shortly before the moulting season, in the space between the inner and outer coats of the stomach. They consist of carbonate and phos-

phate of lime and animal gelatin, and were formerly used in a powdered state in medicine as an antacid. They are sometimes used to remove small particles of dirt from the eyes, a method which is entirely to be condemned. They are collected in brooks in Dauphiny, near Astrakhan, etc., and have also been found in the Mohawk River, near Rome, N. Y.

**Eye, von** (JOHANN LUDOLF AUGUST), a German art-historian, born 1825, wrote many valuable works on ancient and modern art. Among these are "Kunst und Leben der Vorzeit" (1868) and "Leben und Wirken Albrecht Dürer's" (1860). He also wrote philosophical works, the most prominent of which is "Wesen und Werth des Daseins" (1870).

**Eylau, or Eilau, i'law'**, often called **Prussian Eylau**, a small town of Prussia, is in the province of Prussia, on the Pasmar, 22 miles S. of Königsberg. A great battle was fought here Feb. 8, 1807, between Napoleon, who had about 80,000 men, and the allied armies of Russia and Prussia, commanded by Gen. Bennigsen, who had fewer men, but more guns. The battle was opened early in the morning, immediately after daybreak, by a furious attack, made by the French left on the Prussian right and centre. But the attack proved utterly unsuccessful, and the attacking corps was all but completely destroyed. The murderous struggle was repeatedly renewed, and victory alternately seemed to incline now to the one side and now to the other. When night closed, however, the whole allied line was pressing onward and driving the French before it. Nevertheless, the victory is generally claimed by the French, chiefly on the ground that the allied forces, which were unable to recruit their strength, were ordered to retreat from the field on the night of the battle, and to seek shelter behind the fortifications of Königsberg. After the day of Eylau, however, Napoleon spoke with much more respect of the Russians than he had done hitherto. The allies lost about 20,000, and retreated from the field, but the French loss was probably the greater. Pop. 3629.

**Ey'ert** (RUEHLEMANN FRIEDRICH), born at Hamm, Westphalia, April 5, 1770, studied at Halle, and in 1794 began to preach in his native town, became court-preacher at Potsdam in 1806, and in 1817 Prussian superintendent and minister of public instruction. He was at first a moderate rationalist, but became orthodox, and was one of the founders of the national Church of Prussia and of its liturgy. He had great influence with King Frederick William III. Died Feb. 3, 1852, leaving numerous writings, chiefly religious.

**Ey'meric** (NICHOLAS), a famous inquisitor, born at Girona, a town of Catalonia, Spain, became a Dominican friar in 1334, was appointed by Innocent VI. to be inquisitor-general of Aragon (1356), and became chaplain and judge of heresies to Gregory XI. at Avignon (1371). Died at Girona Jan. 4, 1399. As an inquisitor his zeal was so great that he was for some years suspended from his office. He especially pursued the followers of Raymond Lully. His "Directorium Inquisitorum" (1503; 6th ed. 1607) was his principal work.

**Eyo'ta**, R. R. junction, Olmsted co., Minn. (see map of Minnesota, ref. 11-G, for location of county), 37 miles W. of Winona. Pop. of village in 1880, 404.

**Eyre** (Most Rev. CHARLES), archbishop of Anazarba *in partibus*, and apostolic delegate of the Roman Catholic Church for Scotland, was born in 1817 in Yorkshire, England, and was educated at Durham and at Rome. He received his present position in 1869. He has published a "History of Saint Cuthbert" (1849).

**Eyre** (EDWARD JOHN), English explorer, b. Aug., 1815. He emigrated to Australia about 1833, and began in 1840 the exploration of the unknown region between South Australia and Western Australia. In this sterile region he performed a journey of nearly 1000 miles almost alone. He published in 1845 "Discoveries in Central Australia." In 1862 he was appointed governor of Jamaica, where he suppressed an insurrection in Oct., 1865. He was censured and removed from his office for the execution of Gordon by court-martial. John Stuart Mill and others took measures to try him for murder, but failed, Eyre being justified or excused by the British public.

**Eyre** (JOHN), an Anglican clergyman, born at Bodmin, Cornwall, in Jan., 1754, was apprenticed to a clothier, but, having become awakened to a religious life, was driven from his father's house. He went to Lady Huntingdon's college at Trevecca, studied for a time at Oxford, and soon entered the ministry. He was a popular speaker, and was chiefly distinguished for his benevolence and zeal for missions. He was one of the founders of the London Missionary Society and of Hackney Seminary. Died Mar. 28, 1803.

**Eyre** (Sir VINCENT), K. C. S. I., C. B., born about 1810, received a military education in the college of Addiscombe, joined the Bengal artillery in 1828, was badly wounded at Cabul in 1842, while serving in the horse artillery, and was

taken prisoner by the Afghans, but escaped in Sept., 1842. He published "Metallic Boats and Floating Wagons" (1854), "A Fortnight's Tour among French Ambulances" (1870), etc. Died Sept. 22, 1881.

**Eyriès** (JEAN BAPTISTE BENOÎT), a French savant, born in Marseilles, published numerous geographical papers, mostly translations, wrote much for the "Biographie Universelle," and, with John Pinkerton, published an "Abridgment of Modern Geography" (1827), a work of value in its day. He was one of the originators of the Geographical Society. Died in 1846.

**Eys'ter** (MICHAEL), an American Lutheran minister, was born May 16, 1814, in York co., Pa., was educated at Gettysburg, and licensed to preach in 1838. His influence as a pulpit orator was very great. Died Aug. 12, 1853.

**Ey'telwein** (JOHANN ALBERT), an excellent Prussian civil engineer and physicist, born at Frankfort-on-the-Main Dec. 31, 1764, entered the artillery in his youth, where he acquired the foundation of his future eminence. He afterwards held important civil offices, and was employed on a great variety of public works. Died Aug. 18, 1848. He published a "Handbook of Mechanics, of Solids, and of Hydraulics" (1801), "Handbook of the Statics of Solid Bodies" (1808), "Handbook of Perspective" (1810), "Elements of the Higher Analysis" (1824), etc.

**Eze'kiel** (i. e. "God will strengthen"), one of the four greater prophets of the Hebrew Scriptures, the author of a canonical book which bears his name. He was the son of a priest, and was one of those who were carried away in what is known as the second of the four deportations (597 B. C.). He was sent to dwell on the river Chebar or Chaboras, a branch of the Euphrates. From that place he exercised his prophetic calling by pronouncing warnings and rebukes against Jerusalem so long as it stood, and also by denouncing woes upon Judah's heathen neighbors for their attitude towards her in her distress. His activity covered a period of twenty-two years, from the fifth to the twenty-seventh year of the Captivity. The book consists of two parts, the former (chaps. i.-xxiv.) containing predictions delivered before the destruction of Jerusalem in 586 B. C.; the latter (chaps. xxv.-xlvi.), containing predictions delivered after that event. Having formed an ideal of what the restored Israel was to be, he describes the new temple, the reformed ritual, and a re-division of the country into twelve parts, which is set forth in mathematical and geometrical descriptions. These descriptions do not apply to anything which ever existed, either before or after, and this has been a ground of much unfounded anxiety lest here should be an unfulfilled prophecy. It is evident, however, that the prophet had a vision of a restored, perfect, and ideal theocracy, and this is set forth in mathematical and geometrical arrangements which are ideally perfect, and take no note of physical circumstances. In his general tone Ezekiel is independent of Jewish dogmas. He gives fresh and true interpretations and applications of the Mosaic law, which contradict the traditional interpretations. His view of the Gentiles is also free from the severity of the traditional dogma of Israel's election. Fürst finds authority in the "Talmud" for the assertion that, on account of these things, the position of the book of Ezekiel in the canon was uncertain at the time of our Lord.

**E'zion-ge'ber, or Ezion-gaber**, an ancient port on the Elanitic arm of the Red Sea. From this point Solomon sent a fleet to Ophir, and King Jehoshaphat also built ships here for the same destination. It probably stood near Elath, and is thought by many to have been at the north-western extremity of the Gulf of Akabah.

**Ez'ra** [Heb. "help;" Gr. Ἐσδρας], the name of several persons mentioned in the Bible, the most important of whom was the famous priest and scribe who came with some 6000 Hebrew exiles from Babylon to Jerusalem about the year 458 B. C. In no long time, probably, he went back to Babylon, and returned to Jerusalem with Nehemiah in 445 B. C. As he is not mentioned after Nehemiah's return to Babylon in 433 B. C., he had probably died, or gone back to Babylon, before this. His reputed sepulchre is shown at a place on the Tigris, near its junction with the Euphrates.

R. D. HIRSHCOCK.

**Ez'ra, The Book of**, called in the Thirty-nine Articles of the Anglican Church "The First Book of Esdras," following the Vulgate. It narrates the history of the Jewish nation on their return to Jerusalem from the Babylonian captivity, and during the subsequent period of their re-establishment in the land of their fathers. It is a continuation of the books of Chronicles, and is mostly a compilation, probably by Ezra, who, though he put the whole together, himself wrote only the last four chapters. It is written partly in Hebrew and partly in Chaldee, the Chaldee portion beginning at iv. 8 and extending to vi. 18.

## F.

**F**, the sixth letter of our alphabet, is the equivalent of *ph*, and probably of the Greek  $\phi$ . It is a labio-dental mute, and is quite strongly aspirated, but is not truly vocalized. F, as we learn from old Latin writers, differed in power from the Greek  $\phi$ , and in ancient times was doubtless a strong, rough aspirate, like the Greek digamma,  $\varphi$ , from which it took its form, if not its power. In Spanish, *h* takes the place of the Latin *f* very frequently, while *f* often represents the Greek  $\phi$ . F is to some extent interchangeable with the dentals *t*, *d*, and *th*, as well as with the labials *p*, *v*, and *wh*, but less so in English than in some other languages. F in chemistry is the symbol of fluorine.

**F**, in music, the fourth degree in the ascending scale of C, major or minor, being the subdominant in that scale. The bass or F clef is placed on the fourth line of the staff, at the distance of a seventh above gamut G; hence, as a note on that line is called F, the other notes, above and below, take their names accordingly. In German music, F Dur is F major; F Moll, F minor; Fis is F sharp; Fis Dur, F sharp major; and Fis Moll, F sharp minor. The letter F, or *f*, is also used for *forte*, loud; and FF, or *ff*, for *fortissimo*, very loud. WILLIAM STAUNTON.

**Fa'am**, an orchidaceous plant growing in the Mauritius, in Réunion, and in India—the *Angræcum fragrans*, highly prized for its fragrance, and long used there, in the same way as Chinese tea is used, as a beverage. Many residents in the East greatly prefer it to tea. It is aromatic, stimulant, and of very agreeable taste. It is used to some extent in France, and has reputation as an antispasmodic and an expectorant.

**Faba** [Lat., a "bean"], a genus of leguminous plants to which belongs *Faba vulgaris*, or *Vicia Faba*, L., of unknown, probably Oriental, origin, the common bean of Europe, but not the beans ordinarily raised in the U. S., which are of the genus *Phaseolus*.

**Fabaceæ**. See LEGUMINOSÆ.

**Fa'ber** (BASIL), a German Protestant writer and scholar, b. at Sorau 1520, wrote *Theaurus Eruditionis Scholasticæ* (1571), often reprinted, and d. rector of the academy at Erfurt in 1576.

**Faber** (FREDERICK WILLIAM), D. D., an English theologian and poet, a nephew of George Stanley Faber, noticed below, was b. at Durham June 28, 1814, graduated at Oxford in 1836, became vicar of Elton in 1843, went over to the Roman Catholic Church in 1845, founded the Oratory of the brotherhood of St. Philip Neri in London in 1849, and in 1854 removed with it to Brompton, where he d. Sept. 26, 1863. He wrote a considerable number of books, both controversial and devotional, in support of the Church of his adoption, but will be longest remembered as the author of some exquisitely beautiful hymns, equally admired by all communions. The first edition of his hymns, few in number, appeared in 1848, and the 5th ed., containing 150 hymns, in 1862. R. D. HITCHCOCK.

**Faber** (GEORGE STANLEY), D. D., English theologian, b. near Bradford, in Yorkshire, Oct. 25, 1773, graduated at University College, Oxford, in 1803, and was prebendary of the cathedral of Salisbury in 1831, and master of Sherburn Hospital at Durham, 1832; d. there Jan. 27, 1854. Wrote *Horæ Mosaicæ*, or *View of the Mosaic Records* (1801), *Difficulties of Infidelity* (1824), *Difficulties of Romanism* (1826), *Original Expiatory Sacrifice* (1827), *The Vallenses and Albigenes* (1838), etc.

**Faber** (JACOBUS STAPULENSIS), the greatest of the "Reformers before the Reformation" in France, was b. at Etaples about the year 1450, and d. in 1536. His translation of the New Testament appeared in 1523, and of the Old Testament in 1528. He published also several commentaries. R. D. HITCHCOCK.

**Faber** (JOHN), a Dutch mezzotint engraver, who d. at Bristol, England, in May, 1721, was the father of another John Faber, an excellent mezzotint engraver, who produced portraits of the Kit Cat Club and the Hampton Court beauties, and probably d. in 1756 in London.

**Faber** (TANAQUIL). See LE FEVRE.

**Fa'bian** (SAINT), was pope 236 A. D., suffering martyrdom under Decius, Jan. 21, 250 A. D. Nothing else is known about him.

**Fabi'ola**, a Roman matron, of the Fabian gens, who founded the first Christian hospital in Rome. After being

divorced from her worthless husband, she devoted her wealth and her time to the care of the sick. She d. 399 A. D. The procession at her funeral was compared by Jerome (Ep. lxxvii.) to the triumphs of Scipio and Pompey. R. D. HITCHCOCK.

**Fa'bius Max'imus Verruco'sus** (QUINTUS), surnamed CUNCTATOR, was consul for the first time 233 B. C., and dictator in 217. Contending against Hannibal the Carthaginian, he adhered so closely to the policy of defensive warfare that his opponent could gain no advantage, and his successes of this sort, long continued, secured for him his surname. His is one of the most illustrious names in Roman history.

**Fa'bius Pic'tor** (QUINTUS), the earliest Roman historian, was a member of the patrician family of the Fabii, and lived at the time of the Second Punic war (which began B. C. 218), though the dates of his birth and death are unknown. The last distinct notice of him is his being sent as an ambassador to Delphi after the battle of Cannæ, B. C. 216. He wrote a history or annals of Rome (for the name is not given) from the early settlement of the city to his own times, and his work is often quoted by Livy, Dionysius, and Polybius. He has been charged with great carelessness and perversion of the truth, especially in the earlier portions of his work. But both Livy and Dionysius draw freely from him, and frequently commend his fidelity; and Polybius, who is his severest censor, uses his materials in his own account of the Second Punic war (in which Fabius was an actor), though charging him with carelessness and partiality for the Romans. His work was written in Greek, but it is supposed there existed also a Latin translation of it. Among modern writers Fabius has found a defender in the historian Niebuhr in his *Lectures on the History of Rome*. The fragments of Fabius Pictor are collected, and the events of his life given, by KRAUSE, *Hist. Rom. Fragmenta*, Berlin, 1833; by MÜLLER, *Hist. Græc. Fragm.*, vol. iii., pp. 80-92. (See also H. K. WHITTE, Copenhagen, 1832; BAUMGART, Breslau, 1842; NIEBUHR, quoted above; and GERLACH, *Geschichtschreiber der Römer*, Stuttgart, 1855.)

H. DRISLER.

**Fabius River**, of Missouri, rises by several forks, and flows into the Mississippi River nearly opposite Quincy, Ill. The course of the main stream is but short. The North Fabius, the longest fork, rises in Iowa.

**Fa'ble** [Lat. *fabula*, from *for*, *fari*, to "speak;" Fr. *fable*; Ger. *Fabel*], as a peculiar kind of literary composition, means a fictitious story in prose or verse, enacted by animals, without any regard to probability, or even possibility, and illustrative of some moral maxim, which is given in a positive and pointed form after the story, like the title under an engraving. Of all kinds of didactic poetry, the fable is the most pleasant and the most effective. By representing the several features of the human mind—as, for instance, pride, rashness, avarice, shrewdness, etc.—under the picture of individual animals, the fable gives to the imagination a most striking and entertaining portrait of these features, thereby rousing the attention for the story, and inculcating the moral truth which it illustrates in a most impressive manner. Good fables were always highly appreciated, but they are rare. When we look at the whole literature of fables—the Indian by Pilpay, the Arabic by Lokman, the Greek by Æsop (620-564 B. C.?), the Latin by Phædrus, a Greek slave whom Augustus gave his liberty, the French by La Fontaine (1621-95), the English by Gay (1688-1732), and the German by Gellert (1715-69)—we find that quite a number of the stories are common to all the writers, taken from the same source, or transferred from one literature to another: only the scenery, depending on the climate and the age, and the style, depending on the individuality of the writer, are different. The two most original fable-writers are Æsop and La Fontaine. Æsop's fables, however, we do not know in their original form. They were written in prose, and afterwards turned into verse. (See BARRIUS.) But, as far as we can judge, they were very vigorous and pointed, and whenever it is possible to trace the story back to an Oriental source, it is interesting to see how the wild and gorgeous fancies of the Hindoo are reduced by the Greek to clearness and plastic simplicity. La Fontaine is sometimes garrulous, and he does not always hit the nail on the head with the first stroke; but his style is elegant, his sarcasm well bred, his observation acute, and a tone of refined good-humor per-

vades the whole, making his fables an exceedingly pleasant book. CLEMENS PETERSEN.

**Fabliaux** [Fr., plu. of *fabliau*] is the name given in early French literature to the metrical tales composed in the *langue d'oïl*, or northern dialect, by the Trouvères, chiefly in the twelfth and thirteenth centuries. The fabliaux were often satirical, and not unfrequently licentious.

**Fabre** (ANTOINE FRANÇOIS HIPPOLYTE), French medical writer, b. at Marseilles 1797, edited the *Lancette Française*, and had a medal (1833) from the French Institute for a work on cholera, d. in Dec., 1853.

**Fabre** (FRANÇOIS XAVIER PASCAL), French painter, was b. at Montpellier Apr., 1766, and wrought at Rome and Florence. His best works are *The Judgment of Paris*, *The Preaching of John the Baptist*, and a portrait of Alfieri. D. at Montpellier Mar. 12, 1837.

**Fabre** (JEAN RAYMOND AUGUSTE), French poet, b. at Jaujac June 24, 1792, wrote *Calédonie* (1823), *Irene*, tragedy (1825), etc. D. Oct. 23, 1839.

**Fabre** (MARIE JOSEPH VICTORIN), French poet and orator, b. at Jaujac July 19, 1785, wrote an *Eulogy on Corneille*, prose (1808), which was crowned by the French Institute. The *Death of Henry IV.*, poem (1808), *Ode on Tasso*, *Eulogy on Montaigne* (1812), and *Literary History of France in the Eighteenth Century* (1810), are among his works. D. May 29, 1831.

**Fabre de l'Aude** (JEAN PIERRE), French statesman, b. at Carcassonne Dec. 8, 1755, was deputy to the Council of Five Hundred in 1795 and 1797, and commissioner of finance. In 1807 was senator and count of the empire, then chevalier of the grand council of administration of the senate, and d. at Paris July 6, 1832.

**Fabret'ti** (RAFAEL), Italian antiquary, b. at Urbino 1618, was secretary to Pope Alexander VIII., and keeper of archives in the castle of St. Angelo under Innocent XII. Wrote *De Columna Trajani* (1683) and *Inscriptionum Antiquarum Explicatio* (1699). D. at Rome Jan. 7, 1700.

**Fabrizzi** (SEVERINO), Italian author and philanthropist, b. at Spilimbergo Jan. 7, 1792, aided Baraldi in his *Memoirs on Religious Literature*, and wrote biographies, besides instructing the deaf and dumb. D. Apr. 27, 1849.

**Fabrizio**, town of Italy, in the province of Ancona, 38 miles S. W. of Ancona, especially known for its paper-mills, established in the sixteenth century. Pop. 5699.

**Fabrizio**, da (GENTILE), an Italian painter of whom little is known; lived between 1360 and 1440, was a contemporary of Fra Angelico. Several of his works are at Urbino and Perugia, but his fame is associated with a picture in the great council-chamber in Venice, which, some say, was thought so remarkable that the republic conferred on him a life pension and the patrician's robe. Specimens of his work are in the churches Santa Maria Maggiore and St. John Lateran in Rome, and the San Felice, Venice.

O. B. FROTHINGHAM.

**Fabri'ce, von** (GEORG FRIEDRICH ALFRED), general of cavalry and secretary of war in the kingdom of Saxony, became widely known as commander of the German army of occupation in France from Mar. 7 to June 19, 1871. Was b. at Quesnoy-sur-Deule May 23, 1818; entered the Saxon service in 1834; became a member of the staff in 1850; was chief of the staff to the Saxon troops in Sleswick-Holstein in 1863 and 1864, and to the crown-prince of Saxony in 1866, during the Bohemian campaign, in which position he distinguished himself greatly, though the latter campaign could boast of no victory. Became secretary of war Oct. 1, 1866, thus assuming the great task of reorganizing the Saxon army after the Prussian pattern, in accordance with the present political position of the kingdom—a task which required both great military ability and great diplomatic talent, as, after the unfortunate war, there reigned in Saxony a great bitterness against Prussia. But he fulfilled the task with perfect success, and displayed the same talents as commander-in-chief of the army of occupation in France in 1871; even during the revolution of the Commune in Paris he understood how to maintain his position without incurring any conflict, and he commanded the respect of the Frenchmen at the same time he earned the hearty regard of the Germans. AUGUST NIEMANN.

**Fabric'ius** (JOHANN), b. at Altorf, in Saxony, Feb. 11, 1644; studied theology in his native town, at Nuremberg, and from 1663 to 1665 at Helmstedt, in Brunswick, where he became a disciple of Georg Calixtus; travelled in Germany and Italy from 1670 to 1677, during which period he was for some time a minister to the German Lutheran congregation in Venice; and was appointed professor in theology at Altorf in 1677, and at Helmstedt in 1697, which was especially famous as a school of theology, and Johann Fabricius vindicated its fame. His *Amenitates*

*Theologicæ* (1699) and *Consideratio Variarum Controversiarum* (1704) were received with great applause. King Charles of Spain, afterwards emperor of Germany under the name of Charles VI., proposed marriage to the princess Elizabeth Christine of the house of Brunswick, and wished her to embrace the Roman Catholic faith. Fabricius published a *Gutachten*; showing that it was proper, and even her duty, to renounce her Protestant faith to become queen of Spain and empress of Germany. The elector of Hanover, afterwards George I. of England, disliked this *Gutachten*, and in 1709 Fabricius was removed from his chair at the university. D. Jan. 29, 1729.

**Fabricius** (JOHANN ALBRECHT), German scholar and writer, b. at Leipsic Nov. 11, 1668, was professor of eloquence and philosophy at Hamburg about 1700. Published more than one hundred learned works, among the most important of which were *Bibliotheca Latina, sive Notitia Scriptorum Veterum Latinorum* (3 vols., Leipsic, 1697; revised and greatly improved by Ernesti, 3 vols., 1773); *Bibliotheca Græca* (14 vols., 1705–28; 4th ed., improved by Harles, 12 vols., 1790–1809); *Bibliographia Antiquaria* (1713; enlarged 1760); *Bibliotheca mediæ et infimæ ætatis* (5 vols., Hamburg, 1734; a 6th added by Schoettgen, 1746); *Codex Apocryphus Nov. Test.* (3 vols., Hamburg, 1719); and *Codex Pseudepigraphus Veteris Test.* (Hamburg, 1713). D. at Hamburg Apr. 30, 1736.

**Fabricius** (JOHANN CHRISTIAN), b. at Tondern, in the duchy of Sleswick, Jan. 7, 1743; studied natural history at Copenhagen, Leyden, Edinburgh, Freiberg in Saxony, at Upsal under Linnæus (of whom he became an enthusiastic disciple), and was appointed professor of natural science in 1775 at the University of Kiel, where he d. in 1807. Entomology was his favorite study, and his *Systema Entomologica* (Copenhagen, 1775, 4 vols.), *Philosophia Entomologica* (1778), and *Supplementum Entomologicæ* (1797) are his principal works. An utterance of Linnæus led him to establish the structure of the mouth as the principle of division in the entomological system, and he worked out this idea with great energy and enthusiasm. He undertook every year extensive pedestrian trips in different parts of Europe, studying the world of insects in nature and in the museums; and his writings are rich in observations.

**Fabricius** (THEODOSIUS), Lutheran theologian, b. at Nordhausen in 1560, was professor at Göttingen. His *Harmony of the Four Evangelists* was published in Latin, Greek, Hebrew, and German. D. in 1597.

**Fabrizio** (GERONIMO), Italian anatomist and surgeon, b. at Acquapendente 1537; was professor at Padua, wrote treatises on anatomy and surgery, and had for a pupil Dr. Harvey, whose discovery of the circulation of the blood was suggested by some observations of his teacher upon the valves of the veins. D. in May, 1619.

**Fabro'ni, or Fabbroni** (ANGELO), Italian biographer and Latin scholar, b. at Marradi Sept., 1732; published in 1766 the first volume of *Lives of Italians Eminent for Learning who flourished in the Seventeenth and Eighteenth Centuries* (twenty volumes in all), was prior of the church of San Lorenzo, Florence, 1767, is sometimes called the "Plutarch of modern Italy," and d. at Pisa Sept., 1803.

**Fabrioni, or Fabbroni** (GIOVANNI VALENTINO MATHIAS), b. at Florence Feb. 13, 1752; studied natural science in his native city and in France and England; was appointed director of the physical cabinet of the grand duke of Tuscany, and went in 1798 to Paris as a member of the committee assembled in that city for the establishment of unity between the French and Tuscan weights and measures. During the annexation of Tuscany with France, Fabrioni occupied a very conspicuous position both socially and politically, and many very difficult tasks, both scientific and diplomatic, he performed with great success. He constructed the bridge across the Dora Baltea, and the road across Mont Genève leading from the Sardinian province of Susa into the French department of the Hautes-Alpes, at an elevation of 6500 feet. After the restoration of the house of Lorraine in Tuscany, in 1815, Fabrioni retired to the chair of natural science at the University of Pisa, where he d. Dec. 17, 1822. His writings are on political economy, natural science, agriculture, education, etc.

**Fabry** (JEAN BAPTISTE GERMAIN), French writer, b. at Cornus in 1780; edited *Spectateur Français* (12 vols., 1805–12), wrote *Itinéraire de Bonaparte de l'île d'Elbe à Saint Hélène* (1817), and d. Jan. 4, 1821.

**Fabvier** (CHARLES NICOLAS), BARON, b. at Mousson, in the department of Meurthe, France, Dec. 10, 1782; educated at the Ecole Polytechnique and the military school of Metz; entered the first regiment of artillery in 1804; was sent in 1807, as a member of a corps of French officers, to Constantinople and Ispahan for the purpose of reorganizing

the Turkish and Persian armies after the French model; returned in 1809 to Europe; fought in Spain in 1811 as aide-de-camp to Marshal Marmont, and distinguished himself greatly in 1812 at the storming of Moskva. In 1817 he accompanied Marshal Marmont as chief of his staff to Lyons, and when the insurrection was put down, he published a pamphlet, *Lyons in 1807*, charging the whole civil service of the city and department with gross abuses. He was arraigned and fined; left the military service, and devoted himself for several years to commercial business. In 1823 he went to Greece, and fought with great distinction in the war of liberation until 1827. In the revolution of July, 1830, he played quite a conspicuous part; was for some time the military commander of Paris; became lieutenant-general in the army in 1839 and peer of France in 1845; was a member of the legislative assembly in 1849; filled minor diplomatic offices, and d. at Paris Sept. 15, 1855.

**Facade** [Fr.], one of the sides of a building viewed from without, especially applied to the principal front of a large or architecturally fine building. But there may be also rear and lateral façades, as well as interior façades surrounding a court.

**Facciola'ti**, or **Facciola'to** (GIACOMO), Italian philologist, b. at Torreglia, near Padua, Jan. 4, 1682; was professor of logic in the University of Padua 1722, published an edition of the *Lexicon Septem Linguarum* of Ambrogio Calepino (an Augustine friar of Calepio), (2 vols. folio, Padua, 1731), of the Greek lexicon of Schrevelius (Padua, 1715, etc.), and of the *Lexicon Ciceronianum* of Nizolius (Padua, folio, 1734). He began a Latin lexicon, finished by Forcellini, and d. at Padua Aug. 25, 1769. (See FORCELLINI.)

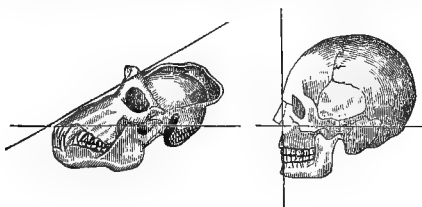
**Fa'cet** [Fr. *facette*, a "little face"], a term used by lapidaries to denote the plane surfaces cut upon precious stones to increase their lustre. The planes which bound a crystal, the flat surfaces of the cornea of an insect's eye, and in fact any minute plane surface may take this name.

**Face'tiæ** [Lat. pl. of *facetia*, "things facetious"], a collection of humorous sayings, witty stories, *bons mots*, repartees, in prose and verse. From the ancients nothing has come down to us except the *Jests of Hierocles*, the sayings and doings of one "Scholasticus," the typical blunderer of earlier times, the prototype of the modern perpetrator of "bulls"; e. g. hearing that a raven would live 200 years, he bought one to test the truthfulness of the statement. Of the earliest specimen in modern times, the *Liber Facetiarum* of Poggio Bracciolini (1st ed. Rome, 1470), Shepherd gives this account: "During the pontificate of Martin V. the officers of the Roman chancery were accustomed to assemble in a kind of common hall. In this apartment, which from the nature of the conversation of its frequenters, who were much more studious of wit than of truth, acquired the name of *Bugiale* [manufactory of lies], they discussed the news of the day, and amused themselves by the communication of entertaining anecdotes. They indulged themselves in the utmost latitude of satiric remark, dealing out their sarcasms with such impartiality that they did not spare even the pontiff himself." These "pointed jests and humorous stories . . . furnished the greater portion of the materials for the *Liber Facetiarum*."

Properly, *ana* and *table-talk* are *facetiæ*; *ana* being mainly the personal observations of him whose name forms the title, sometimes, though not always, supplied by himself. The first printed *ana*, *Scaligerana Secunda* (Joseph Scaliger), was the work of Jean and Nicholas de Vassan, published by Isaac Vossius (1666). *Menagiana*, one of the best (Paris, 1715), was furnished and published by the friends of Giles Menage. On the other hand, *Chevræana* (Amsterdam, 1700), *Parrhasiana* (Amsterdam, 1701), and *Huetiana* (Paris, 1722) were the recorded observations of the men whose names the books bear. *Walpoliana* (London, 1804) is the best English *ana*. *Table-talk* is graver in its tone than *ana*, giving the views of some thinker on topics with which he is especially conversant, less formally than in essays. Martin Luther's *Colloquia Mensalia* (best ed. Leipsic, 1844; English translation by Capt. Henrie Bell, London, 1652) handles phenomena of nature, matters in Church and State, and social relations. John Selden's *Table-Talk* (London, 1860) abounds in learned, pithy remarks. From Melancthon to Charles Sumner men have found amusement in these works. Richard Porson was fond of them; many of his own are in *Facetia Cantabrigienses* (London, 1825) and in E. H. Barker's *Literary Anecdotes* (London, 1852). America has furnished her share; e. g. the *Breitmann Ballads*, by C. G. Leland, the works of Bret Harte, of John Hay, of John G. Saxe; and in our newspaper press, as Mr. Frederic Hudson says, "there is a daily effervescence of *bons mots*, from Canada to Mexico. . . . The United States are a Vesuvius of wit and humor in a constant state of eruption, and the lava is in perpetual

motion down the sides of its mountains." (See JOURNALISM.) JONATHAN S. GREEN.

**Fa'cial Angle** (the angle formed by the face with a certain other plane), as generally accepted, is the angle subtended by (1) a line coincident with the face, or rather



Facial angle, according to Owen.

the most projecting parts of the face, and (2) a line drawn from the external opening of the ear to the floor of the nostrils. Such was the idea of Camper, who originally (about 1771) employed the facial angle as a diagnostic criterion for the distinction of the races of men and their contradistinction from the lower animals. Others have modified the criterion by taking different lines; thus, the angle subtended by (1) the face, and (2) the plane coincident with the axis of the floor of the skull, was considered by Von Baer to furnish a more trustworthy criterion for the purposes desired; by others, still, the angle intersected by (1) the face, or "the most prominent parts of the forehead and upper jaw," and (2) "a line drawn from the occipital condyle along the floor of the nostrils," is accepted as the facial angle. Such is the view promulgated by Prof. Owen (*On the Anatomy of Vertebrates*, ii. 572). These are all inconsiderable modifications of the same idea, and are the true expressions of the facial angle. With it must not be confounded, as has been done by some persons, measurements of the skull to express the relations of other parts of the skull and the comparative intellectual conditions of animals. The facial angle, as properly understood, is not only of little value in determining the relative intellectual rank of an animal, but is often very deceptive as an index. Its value has been greatly exaggerated, and it is now only used by scientific writers with great reserve and precautions as to its fallacious nature. To some extent, however, it is quite useful as a diagnostic character at least. If we compare the several races of mankind in their adult stages, it will be found that there are *average* indexes furnished by the facial angle for each one, and that between the European and negro the differences in this respect are notable; thus, in the former the facial angle (by Camper's method) is about 80°; in the latter, about 70°; if these are contrasted with the old individuals of some of the apes and monkeys, the differences will be found still greater; e. g. in the adult baboons the angle is only about 30°; in the common monkeys it ranges from about 45° to 60°; and in those nearest to man it varies considerably in the adult, and bears an indefinite relation to the size attained, the largest having a more acute angle. Thus, in the gibbons it is about 60°, in the larger apes about 30°-40°. The contrast in this respect between man and most other animals has led to a very exaggerated idea of the value of the character as an exponent of intelligence. A very few facts, however, serve to disabuse our minds. It will be readily granted, probably, that adults, on the whole, are more intelligent than the young of the same species, and that therefore there should be some coincidence between the development of the facial angle and that of the individual, if the angle were in fact an exponent of intellectuality. So far is this from being the case, however, that there is an *inverse* development of the angle and the individual, which is illustrated in the case of man, and to a much greater extent in other species. In the young of the different races of mankind the differences of the facial angle are inconsiderable, and the angle in all is more obtuse (instead of being more acute) than in the adult; and especially is the contrast marked between the negro baby and the adult negro. In the young of the apes and monkeys the head is well shaped—i. e. it resembles that of man rather closely in its contour—and the facial angle is proportionately developed, being generally not much if any less than about 70°. As has been already indicated, the angle is more acute in the old; and this acuteness, on the whole (but by no means in all), increases in proportion to the size of the animal; thus, in the older and larger monkeys it becomes as acute as 45°; in the large African apes nearly 30°, and in the Asiatic ape and baboon the angle is even more acute than 30°. If the facts in several cases are analyzed, it will be found that the same figures do not by any means always express similar factors; e. g. although there is little difference between the indexes for the chimpanzee and the orang-outang, the results are



produced by different causes, the upper jaw in the former being produced forward, and in the latter downward to the suture; on the other hand, there is apparently much greater difference between the adult male chimpanzee and gorilla indicated by the facial angle, although the differences otherwise are slight, from the fact that in the chimpanzee the supraorbital ridges are moderate, while in the gorilla they are very strongly developed; the differences in the facial angle in these cases are therefore not the exponents of differences in intelligence or brains, but simply of the development of osseous matter over the orbits. The differences in all the cases between the young and old result from the fact that whereas in the young the teeth are undeveloped and the jaws correspondingly reduced, in the old the teeth become developed and the jaws correspondingly enlarged to accommodate them; and hence they became prognathous—i. e. the jaws protrude—in proportion to the size and number of the teeth. Inasmuch as the same being is certainly less intelligent when just born or very young than when old, it follows that any index which points to the reverse must be fallacious; and such is the facial angle in this case. The facial angle, in brief, is merely the exponent of either (1) the development of the jaws (and to a certain extent of the teeth) in some one or other direction, or (2) the development of the forehead at some one point; e. g. by frontal sinuses or supraorbital ridges. It is a very uncertain and unreliable exponent of the size of the cranial cavity or brain, and therefore of the intelligence of any given animal. This truth has been recognized by the best naturalists; among others, Prof. Huxley (*Man's Place in Nature*, p. 171) has proposed a substitute in other measurements, remarking that "the lines the intersection of which forms the facial angle are drawn through parts of the skull, the position of each of which is modified by a number of circumstances, and is not the expression of any one definite organic relation of the parts of the skull." The application of the facial angle is also sometimes impossible, or would result in absurdities; e. g. in the case of the elephants and whales; and inasmuch as in the birds and lower vertebrates the position of the nostrils varies greatly in related forms, the facial angle determined in accordance with any of the criteria cited would be deceptive in its indications. The practical or diagnostic applicability of the character is also limited.

In the fishes, and to a great extent in the amphibians, no external ear is developed, and there is no certain external index for it or for the other bases taken by Von Baer or Owen; therefore, the use of the facial angle is impracticable. The modifications and diverse relations of the facial and other bones in allied forms are also so great in the fishes as to vitiate any results if they could be obtained. In the reptiles and birds, on account of the extreme modifications of the bill or snout and position of the nostrils in related forms, the index, unless specifically checked or counter-indicated by other characters, would be illusive and lead to false conclusions. In the mammals, likewise, the character would be very often extremely illusive; e. g. the sloths, ant-eaters, and various species of armadillos are closely related (within ordinal limits), yet the index of the facial angle for the sloths would be the same as for some of the highest monkeys, while that for the ant-eaters would be the same as for the long-snouted reptiles or long-billed birds. These examples will suffice to show with what extreme caution conclusions should be drawn from the indication of the facial angle; and although there may be a rough general agreement in the highest mammals between the index for the facial angle and the intellectual status, it is even in them very often exceedingly fallacious.

Of course the index of the facial angle will vary with the bases accepted, and the indexes of Von Baer's and Owen's methods differ considerably from that of Camper's; thus, while, according to Camper's method, the facial angle in the European is about 80° and in the African about 70°, according to Owen's in the former it would be about 95° and in the latter about 85°. It is important, therefore, to ascertain the method used in every case. Unless otherwise indicated, it may be assumed generally that Camper's is the one adopted.

The substitutes that have been proposed in place of the facial angle will be more properly indicated in the article on the SKULL (MEASUREMENTS OF THE). A method analogous to the facial angle is, however, noteworthy in this connection. CRANIOFACIAL ANGLE is a name given by Prof. Huxley (see *The Anatomy of the Vertebrated Animals*, p. 420) to the angle subtended by the intersection of (1) the plane of the bony face in its prominent parts, and (2) "a line drawn from the anterior extremity of the premaxilla to the anterior extremity of the basiscranial axis." In the several races of mankind "it varies with the extent to which the face lies in front of or below the anterior end of the cranium, from less than 90° to 120°. When

it is great, the face is *prognathous*; when it is small, the face is *orthognathous*. This is the fundamental condition of *prognathism* or *orthognathism*. A secondary condition is the form of the alveolar portion of the upper jaw, which so far as it is vertical tends toward *orthognathism*, but so far as it is oblique and produced tends to *prognathism*."

THEODORE GILL.

**Fa'cial Nerve.** The facial nerve is the seventh cranial nerve, according to the numerical classification of Sömmerring. It originates from a mass of nerve-cells lying deep in the medulla oblongata in its upper median part, passes out of the medulla at its upper lateral tract, just behind the pons Varolii, leaves the cranial cavity by entering the internal auditory foramen in company with the auditory (eighth) nerve, pursues an irregular course through the petrous portion of the temporal bone, and issues from the skull through the stylo-mastoid foramen. The majority of its branches are now given off, and the most important lie in the superficial parts of the face, and are distributed to the facial muscles—the muscles of expression. The deeper branches of the nerve go, after communicating with other nerves, to the muscles of the middle ear and to those of the palate. The facial nerve communicates with the following nerves: the auditory, the intra-cranial sympathetic, the pneumogastric, the glossopharyngeal, and with the various branches of the trigeminal. The seventh nerve is strictly a motor nerve, though, away from its origin, it communicates so freely with the trigeminal as to appear sensitive. It is often called *portio dura*, to distinguish it from *portio mollis*, the auditory nerve, considered by some anatomists a portion of the seventh nerve.

E. C. SEGUIN.

**Fa'cial Neural'gia**, a disease characterized by more or less paroxysmal pain in parts of the head and face supplied with sensibility by branches of the trigeminal nerve. Any one branch of the trigeminal nerve may be the seat of pain (in brow-ague the supraorbital branch), or all its branches may be involved. The cause of the neuralgia is a morbid state of the nervous centre giving origin to the nerve (the medulla oblongata); and this morbid state may itself be the result of simple malnutrition (anæmia), of blood-poisoning (malaria), or of inherited predisposition. Various other pathological conditions may give rise to pain in the distribution of the trigeminal, irritation of other sensitive nerves (bad teeth), tumors pressing on the nerve, inflammation of the nerve itself.

E. C. SEGUIN.

**Fa'cial Paral'ysis**, a paralysis of the superficial muscles of the face, due to a loss of the motor property of the nerve supplying them—the seventh or facial nerve. The symptoms are loss of expression on the affected side of the face, a drawing of the mouth and features generally to the opposite (healthy) side, inability to close the eyelids on the palsied side, slight impairment in articulation, owing to palsy of a part of the muscles of the tongue. When both sides of the face are palsied, the face appears like a smooth mask, the mouth (lips) is open, the eyes cannot be closed. The pathological conditions which produce this palsy may be disease of the cerebrum, pons Varolii, or of the medulla oblongata, pressure upon the nerve in the skull or in the canals in the petrous bone, injuries to the nerve in these locations or upon the face, or the sudden impact of cold air upon the face (draught).

E. C. SEGUIN.

**Fac Sim'ile** [Lat., "make the like," imperative] means simply an exact copy of a picture, a piece of handwriting, or a work of art.

**Fac'tor** [Lat., a "maker"], in mathematics, is one of the several measures or divisors of a number or quantity. The name is given to each of those quantities which, when all are multiplied together, will produce the *product*.

**Factor**, a general agent employed in the purchase or sale of merchandise, with power to retain possession of the property in regard to which his authority is exercised, and to control, to a large extent, its management and disposal by proceedings in his own name. By the possession of these peculiar powers a factor is distinguished from a broker, who only conducts negotiations and bargains concerning property of his principal, without having it in his charge, and who properly acts in a representative character by the use of his principal's name. The term "factor," though the one usually employed in law, is not so common in popular usage as "commission merchant" or "consignee." Compensation by the principal is generally a certain percentage on the amount of purchases or sales, called *factorage* or *commission*. A *domestic factor* is one who resides in the same country with his principal; a *foreign factor*, one who resides in a different country. A foreign factor, in his relations with third persons, is regarded, to a large extent, as if he were himself principal, and he is therefore under a greater responsibility than one merely domestic. In the application of this distinction

the States of the Union are not, according to the general course of decisions, regarded as foreign to one another. The fundamental duty of a factor is to exercise reasonable care in the performance of the duties with which he is entrusted, and to exhibit such skill and prudence as is required by the nature of the business and a proper consideration for the welfare of his employer. Otherwise, he has no valid claim for his commissions, and for injurious negligence and default may even be subjected to an action by his principal. In the management of the property committed to him he has commonly extensive discretionary power. He may buy and sell, sue and be sued, collect money, give receipts, etc., in the same manner as if he were himself owner of the goods, unless specially restricted by the principal. If any special instructions are given to guide his action, he is bound, as between him and his principal, to follow them strictly, except in some few cases where the necessary protection of his own interests requires that such directions be violated. An instance of the latter kind occurs where the factor has made advances for his principal, and finds it necessary to sell the goods upon the credit of which the advances were made, in order to reimburse himself, upon failure or refusal of the principal to make repayment after proper notice and demand. In such a case the generally established American rule is that the factor has a right to sell to the extent of his advances, even in opposition to the wishes of his principal. The English rule, however, is different. Even where the factor violates special instructions, he may, in certain cases, confer a title upon a purchaser acting in good faith. In the absence of instructions, factors should conform to the usages of the business in which they are engaged, and will be justified in the adoption of any practice which such usages warrant, provided there is no wanton disregard of their employers' interests. They have a lien upon the property entrusted to them for their commissions, advances, and other proper charges, so long as they retain possession. Sometimes, in consideration of an increased commission, a factor guarantees the payment of the price of goods by the purchaser to his principal. He is then said to act under a *del credere* or guaranty commission, and is subject to most of the obligations of a surety. A factor acquires no right to his commissions until all the services for which he was engaged have been rendered. (See AGENT; BROKER.) (See STORY on Agency; DUNLAP'S *Paley on Agency*; PARSONS, CHITTY, and other authors on *Contracts*. Statutes have been passed in England and some of the American States regulating the rights and duties of factors in certain respects.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Factory** [from the Lat. *factor*, a "maker," from *facio*, *factum*, to "make"]. This word is, in the U. S., applied almost exclusively to a building or collection of buildings devoted to the manufacture of goods on an extensive scale. Until near the close of the last century such a thing as a factory was hardly known in America. Now factories have multiplied till we have them not only for making cloth, to which our first factories were devoted, but for making it up into clothing; for hats and hose and boots and shoes; for doors and blinds and sashes; for household furniture, for carriages, for mechanics' tools and agricultural implements, for clocks and watches, for pins and buttons, and other articles innumerable. A million of our people, probably, are engaged in these various manufactures.

We propose to treat, briefly, in this article of the *factory system* of industry as distinguished from the separate and independent labor of individuals, with reference to its bearing upon the pecuniary, mental, physical, and moral interests of the community.

The *advantages* of the factory system are, 1st, the bringing together of a large number of workers for one purpose, thus securing such a division of labor that each may be employed constantly upon some one part of a complex object. In a carriage-factory, e. g., no individual makes an entire carriage. One set of men work on the bodies, another on the wheels, another on axles, etc. And these are again subdivided, no one making an entire wheel, but one working on the hubs, another the spokes, another the felloes; and even these several parts are still further distributed. The larger the number of hands employed in a particular establishment, the farther the division of labor may be carried; and the smaller the part that each one has to perform, the more skilful and expert he will be likely to become in doing it. In each of the breech-loading rifles manufactured (July, 1874) at the National Armory in Springfield, Mass., there were sixty different pieces, and more than six hundred distinct operations in making them, and some six hundred men were employed there. Now, if each workman were required to go through all these operations, far more time would be lost in making the changes from one to another, and getting mind, muscles, and tools adjusted to each new operation, than is now

spent in doing all the work. 2d. Machinery is made to perform a large share of most factory operations; and they are not only performed with vastly greater rapidity than they can be by hand, but most of them more accurately also. It is one of the marvellous triumphs of modern machinery that the corresponding parts in a thousand or a million complex mechanisms can be made so exactly alike that each of them will fit in the place of any other. So if a wheel or lever breaks in a factory-made watch, another that will be sure to fit can be ordered and sent by mail at a thousand miles' distance; or when a gun is disabled upon the battle-field, the damaged part may be replaced at once from another that is injured in a different part. Again: the simplification of processes by the use of machinery enables a cheaper class of hands to do a large share of the work, so diminishing further the price of the manufactured goods. The direct effect of the factory system, therefore, financially and as a matter of political economy, must be largely profitable to the community at large.

But there are aspects of the factory system that are not so pleasing—its *disadvantages*. Among these, real or alleged, are, 1st, *intellectual degeneracy* of the operatives. This, it is argued, is the natural consequence of being engaged in an everlasting routine of mechanical operations that require so little mental exercise; at the same time, opportunities for education and for acquiring general information are very limited.

Another danger from factory employment is *injury to health*. The work is often done in crowded and ill-ventilated rooms, frequently in an atmosphere loaded with particles from the materials wrought upon, or in air heated far above a healthful temperature, perhaps saturated with moisture, or sometimes even pervaded by poisonous gases. Then, the work is such as, more than in most other departments of labor, taxes some muscles at the expense of others. The result is, not seldom, positive distortion and deformity in a degree, and when it falls short of that, cannot but be unfavorable to good health. Some of these unwholesome influences touch comparatively few; others affect, in a measure, a large proportion of those employed in factories. And it is evident that the more complete the division of labor, the more will some of these injurious influences be aggravated.

Again: *family ties* and *domestic habits* are likely to suffer, especially through the extensive employment of females in the mills.

Furthermore, it is alleged that so large a capital is requisite to enable one to be a master-manufacturer that most of the workmen despair of attaining such a position, and become spendthrifts, and that they constitute a dangerous political element, their limited opportunities disqualifying them for intelligent citizenship, and their relation to their employers preventing them from casting their votes independently.

Finally, it is thought that factories are *demoralizing*, productive of irreligion and vice.

Such are the principal disadvantages known or suspected to attend on the factory system of industry. And there are those who believe that the densest masses of ignorance, thriftlessness, infidelity, and vice are found almost exclusively in manufacturing towns, and regard the rise of a factory village as the breaking out of a plague-spot in a community. Thus, a British poet, contemplating the manufacturing towns that had sprung up upon a certain stream dear to his youth, exclaimed—

"And call they this improvement?—to have changed,  
My native Clyde, thy once romantic shore,  
Where Nature's face is banished and estranged,  
And heaven reflected in thy wave no more;  
\* \* \* \* \*

And for the daisied greensward, down thy stream  
Unsilently brick-lanes smoke and clanking engines gleam.  
\* \* \* \* \*

"Speak not to me of swarms the scene sustains;  
One heart, free, tasting Nature's breath and bloom,  
Is worth a thousand slaves to Mammon's gains.  
But whither goes the wealth, and gladd'ning whom?  
See, left but life enough and breathing room  
The hunger and the hope of life to feel,  
Yon pale mechanic bending o'er his loom,  
And childhood's self, as at Ixion's wheel,  
From morn till midnight tasked to earn its little meal."

A melancholy picture, indeed! And its gloom is not *all* the mere product of the poet's imagination. But we think its counterpart would be easier to find in Great Britain than in America. And, if we may credit some apparently trustworthy statements recently published, it would not be difficult to paint as dark and as truthful a picture of the condition of the agricultural laborers in some districts there. It is not to be denied that there have been factory villages which, if we took them as fair specimens of what manufacturing communities are, should make us earnestly deprecate their multiplication. But there is reason to think

that facts as they exist, in this country at least, do not justify the very disparaging view which some take.

As to the tendency of manufacturing employments to dwarf the intellect, it may be said, first, that there are some compensations for any lack of ordinary means of culture. The contact of mind with mind where so many are thrown together will do something to sharpen the intellect. Perhaps the fact that the simple operations performed demand so little mental effort may lead, in some cases, to a freer range of thought abroad. And it not unfrequently happens that the compact populations of manufacturing towns have larger opportunities for schools and lectures and such means of mental improvement than those in agricultural towns. Even in Great Britain high authorities doubt the mental inferiority of the manufacturing class.

That factory employments are injurious to health seems better established. Yet the quietness of the life, and the shelter from storms and from extremes of heat and cold, may counterbalance some unhealthful conditions; and in most factories of recent construction the necessity of ventilation is recognized, and of securing a proper temperature and purity of atmosphere. This, however, is limited in some cases by the necessities of the work.

As to the alleged unthrift and hopeless poverty of factory-workers, it is not sustained by observation in New England. Many of them do accumulate property enough to make them more than comfortable in advanced years. And if this is not generally true, it is not for want of opportunity. The wages they receive are believed to be equal to those of the corresponding class in most other departments of labor, and, as a general rule, they are as well fed and clothed and housed.

Of the moral and religious condition of factory populations it is not easy to speak with assurance; different persons come to different conclusions. But from the direct testimony of numbers of intelligent men who have excellent opportunities to observe in various places and divers branches of manufacture, we conclude that, when rightly estimated, the moral standing of our larger manufacturing towns, at least, is not below that of others of equal size. They seem to be as well supplied with churches; and, since it is for the interest of employers that their workmen be temperate and virtuous, they are pretty sure to use the great power of control which they have to exclude certainly the grosser forms of immorality from their establishments. It is true that the operatives in some of our largest and oldest manufacturing towns are inferior in intelligence and in general character to what they were forty years ago. But this does not prove a damaging influence of factory employment. They are not only not the same persons, but they are drawn from very different sources. A large majority of those employed in our cotton and woollen mills to-day are of foreign origin, and others are from families at a low grade in the social and moral scale; so that, remembering what the raw material of these operatives is, we can believe, as we are assured by men who know, that there is in general a decided lifting up, and not a degeneracy in character after they enter this employment.

*Remedies.*—While thus we guard against an exaggerated estimate of the evils attending the factory system, unquestionably they are enough, and great enough, to demand the earnest inquiry, What can be done to remove or diminish them? Legislation may lend important aid toward that good end. It has done something in Great Britain and in this country. Laws limiting the hours of work, limiting the age at which children shall be permitted to enter the mills, and compelling a certain amount of schooling, have accomplished not a little good. And while there are difficulties attending the regulating of such matters by law, yet probably legislation might be advantageously yet farther invoked. Again: An important means of exciting a healthful ambition, and which would work for good in various ways, is allowing the operatives themselves to become owners of stock in the companies for which they labor. This is practised now by some companies, and might be by many others if they were so disposed.

But the grand remedy for the ills of this branch of industry is the same as for all others—a general purification of society. There are wise and good men managing some of our manufacturing establishments who do a great deal for the physical, intellectual, and moral health of their employes by providing good work-rooms, healthful lodging-houses, well-selected and free libraries, and helping to secure suitable religious privileges. And when upright, magnanimous Christian men shall be at the head of all our factory companies, there will be a great diminution of whatever special infelicities now attend them. Such a consummation may be distant, yet we cannot but cherish strong hopes that our multiplying manufactories, instead of being the curse and ruin of the country, are to con-

tribute to its prosperity socially, politically, and morally, as well as financially, and to have their full share of the glory which we fondly anticipate for the nation.

GEORGE T. DOLE.

**Factory System, The Growth of the,** is best illustrated by the cotton-manufacture. After the success of the power-loom the cotton manufacture took rapid strides in both England and America. Factories sprang up on all the streams of Yorkshire and Lancashire in England, and in America such places as Lowell, Lawrence, Holyoke, Fall River, etc. were founded and flourished; in the present generation the industry is even taking root on the banks of the Southern streams. In 1831 the U. S. contained 801 cotton-factories, employing 57,466 hands and 33,533 looms, and having a capital of \$40,612,054 invested; in 1880 there were 756 cotton-factories, 172,544 hands, 225,759 looms, \$208,280,346 capital.

**Faculæ.** See SUN, by PROF. CHARLES A. YOUNG, Ph. D.

**Fac'ulty** [Lat. *facultas*], as applied to the body of instructors of an institution of learning, is a term of mediæval origin, and at first designated all the graduates, or those who had received power or authority (*facultas*) to impart instruction. There were said to be four faculties—those of philosophy, medicine, law, and divinity. Even now, the whole body of graduates are occasionally so called, especially in the phrases “medical faculty” and “legal faculty;” but more frequently the officers of instruction and discipline in a college or university are collectively designated as the faculty of that particular college.

**Faculty of the Mind.** See MIND, by WILLIAM T. HARRIS, LL.D.

**Fæ'ces** [the plu. of the Lat. *fæx*, the lees of wine or the dross of metals], the substance ejected by animals from the alimentary canal, consists in general of (1) the surplus of the food, over and above what is needed for nutrition for the time being; (2) those elements of the food which are not available for nutrition; and (3) certain excrementitious and effete matters which the liver, the intestine, etc. have removed from the blood (stercorine, cholesterine, etc.). To these, in the Monotremata and all the vertebrates inferior to mammals (as well as in many invertebrates), the renal excretions are added. Fæcal matters are highly important as fertilizers; and this is especially true of guano and the excrement of birds generally, since it contains the urinary excretions combined, as we have seen, with those of the intestine, the whole in a very condensed form.

**Fæcula.** See STARCH.

**Fæd** (JOHN), artist, b. in 1820 at Burley Mill, Kirkcudbright, Scotland. His father was an engineer and millwright, but the lad showed a taste for painting that made the homely surroundings tributary to it, and at the age of twelve finished a picture so well that his future career was determined. In 1841 he went to Edinburgh for study, and there, in 1850, exhibited pictures which attracted attention from their naturalness and met a ready sale. He painted *Shakespeare and his Friends*, *The Cotter's Saturday Night*, *The Soldier's Return*, *Tam O'Shanter*, *Haddon Hall of Old*, *John Anderson my Jo*, *Parting of Gabriel and Evangeline*, and other pieces of kindred character, clothing historical fact with sentiment. Since 1864, he has lived in London.

O. B. FROTHINGHAM.

**Fæd** (THOMAS), R. A., younger brother of the above, b. at the same place in 1826. He too had a passion for art, and on the death of his father followed his brother to Edinburgh. At the Academy of Design there, under the instruction of Sir W. Allan, he soon distinguished himself. His first exhibited piece was in water-colors, *The Old English Baron*. After that he tried oil-painting, like his brother choosing humble themes—*The Players of Draughts*, *The Shepherd Boys*. In 1849, Fæd became an associate of the Royal Scottish Academy. Two years later the well-known picture, *Walter Scott and his Friends at Abbotsford*, made him famous. In 1852 he removed to London, and sent his work to the Royal Academy. From year to year his reputation increased. *The Mitherless Bairn* (1855) was pronounced the picture of the season. His painting *Baith Father and Mither* (1864) was again exhibited at the World's Fair of 1867, along with two other canvases by the same hand. Was made member of the Royal Academy Dec., 1864.

O. B. FROTHINGHAM.

**Faen'za**, city of Central Italy, 19 miles S. W. of Ravenna. The manufactures of the peculiar earthenware which received its name from this city (*faience*) have recently increased considerably. The city has many remarkable old buildings and fine pictures. Salt is manufactured in the neighborhood. Pop. 36,042.

**Fag'ging**, a technical term to denote a custom which has become part of the public-school system of England. This custom differs in detail in the several schools, but rests in all on the same principle. This principle is, that the discipline of the school should be left, as far as possible, to the boys themselves, the responsibility for order being thrown on the highest form, known as the sixth form, called also prefects (as at Winchester) or præpostors (as at Rugby). Those who are thus responsible for discipline have also the right of "fagging" the boys in the lower forms, those in the forms immediately under the sixth being exempted. Dr. Arnold defines fagging as "the power given by the supreme authorities of the school to the sixth form, to be exercised by them over the lower boys, for the sake of securing a regular government amongst the boys themselves, and avoiding the evils of anarchy; in other words, of the lawless tyranny of brute force." (*Quarterly Journal of Education*, vol. ix.) The origin of this custom of fagging cannot now be ascertained with any certainty, but, so far as there are any authentic records, it would seem to have always existed in the old schools. Thus, it is clear, from Christopher Johnson's poem *De Collegiis* and the *Consuetudinarium Vetus Scholæ Etonensis*, that it was in active operation at Winchester and Eton in the sixteenth century. It is probable, however, that the custom arose as soon as the schools received any large number of boys as boarders. It is indeed obvious that where large numbers of boys of ages ranging from ten and eleven up to nineteen are thrown together away from their own homes, they must be placed either under the constant surveillance of masters or under some distinct and recognized form of self-government. The latter alternative has always prevailed in the English public schools, and is, in fact, the only one which is in accord with the national character. There is abundant proof, moreover, that the custom of fagging as a part of the system does not stand merely on tradition, but is accepted as beneficial at the present time, in the fact that it has been deliberately introduced in the schools which have been founded within the last thirty years. The number of the great public schools had remained stationary for three hundred years, since Queen Elizabeth's reign, during which Harrow, Rugby, and others not so well known were founded. In the present reign a remarkable revival has occurred, and a number of public schools have been founded, of which the best known are Marlborough, Haileybury, Wellington College, and Cheltenham. Fagging has been introduced in the three former of these. At Cheltenham, where the school is in a large town, and is chiefly composed of day-scholars, or boys living at their own homes, though there is no legal system of "fagging" recognized by the school authorities, the practice exists, but without the usual safeguards against abuse. In all the schools the power of fagging carries with it certain duties. Besides that of keeping order generally, the sixth-form boy is the recognized adviser and protector of those fags with whom he comes in immediate contact. In any case of bullying or bad conduct the appeal of the aggrieved boy is to the sixth-form boy of his room or passage, or to the head of his house, and not to his tutor or house or form master. And the sixth-form boy is bound to accept the responsibility of acting himself, and would completely lose caste were he to refer any but flagrant cases of ill-conduct to the master.

Simultaneously with the public-school revival of the last thirty years, however, great modifications of the fagging system have been introduced. At the beginning of that period "fagging" included a number of menial functions, such as cleaning boots and candlesticks, and the power of the sixth form was practically unlimited as to hours. A boy might be fagged, for instance, during a whole afternoon at cricket, day after day. All this is now changed. At Eton and one or two other schools there is now no cricket-fagging, and in those where it still exists it is very light. Thus, at Haileybury the whole of the fags are taken in regular order for one hour, so that each fag's turn comes only once in three weeks, and even then he is let off if he makes a good catch or otherwise distinguishes himself. A similar custom prevails at Marlborough, where, however, besides the sixth form, the Eleven have the power of fagging at cricket—a solitary example (it is believed) where this power is not dependent on proficiency in study as evidenced by position in the school. Football-fagging is also very light at all the schools except Rugby, only some half dozen fags being told off to keep the ball in bounds. At Rugby every fag is obliged to play "little side," lasting two hours at most, unless he holds a medical certificate of inability to play. He is also obliged to run (in the paper chases) unless holding such a certificate. Apart from games, general fagging is practically confined to running errands, a sixth-form boy having power to call any fag, at

any time, for this purpose. House-fagging, in like manner, consists of little beyond small services of this kind—carrying up the trays on which their master's breakfast and tea things are set, and perhaps toasting a round of bread or a rasher of bacon. "Study-fagging" still exists at Rugby, where each sixth-form boy has two fags specially attached to him, who sweep out his study and put it in order in alternate weeks. At the school-house also "night-fagging" is still in force. Every fag has his choice between study-fagging and night-fagging. The rota of night-fags is kept by the head fag, who tells off four for each week in the term. Their duties are to be ready in the passages between 8.30 and 9.30 to answer the call of any of the sixth form.

At Eton the fifth form have the power of fagging, but (as above stated) it is usually confined exclusively to the sixth form. The numbers of the sixth are not strictly limited, but seldom exceed thirty-five or forty. Harrow has the largest sixth form of any school, divided into the "upper," "lower," and "modern side," and numbering eighty, all of whom have the power of fagging, but only the fifteen highest, or "monitors," have the power of enforcing discipline with the cane, if necessary. Only the fifth form at Harrow, numbering 140, are exempt from fagging. As the school averages in all 550 boys, there are consequently some 330 fags to 80 masters.

The most distinguished masters of public schools, from Dr. Arnold downward, have been singularly unanimous in their approval of the modified system of fagging which now exists. The public opinion both of old public-school men and of the boys themselves is also strongly in favor of it as the best means of maintaining the due subordination of ranks, of keeping down "cheek," and preventing bullying. There is every likelihood, therefore, that it will not only continue in its present form in all the higher public schools, but will also be adopted in the numerous middle-class public schools which are springing up in England upon old and neglected foundations or in consequence of local effort. (See also Arnold's *Life*, by STANLEY, 1st ed., vol. i., p. 105, and *Report of Public-School Commissioners* (1864), and *Appendix of Evidence of Bishop of Exeter, Drs. Butler, Balston, and others*; and specially section of *Report on Monitorial System*, p. 42 et seq.)

THOMAS HUGHES.

**Fa'gius** (PAUL BÜCHEIN), German Protestant theologian, b. at Rheizabern in the Palatinate 1504, was pastor at Isny in 1537, and professor of Hebrew at Strasburg in 1544. Was in England in 1549, and was appointed to the chair of theology at Cambridge University, but d. Nov. 12, 1549. His body was exhumed and burned by order of Queen Mary Feb. 6, 1557.

**Fagna'ni** (JOSEPH), b. at Naples, Italy, Dec. 24, 1819; studied in the royal academy of his native city, and made crayon portraits in early youth; went to Vienna, Paris, and Madrid, studying at their art-academies, and in 1849 came to the U. S. with Sir Henry Bulwer; in 1851 married an American lady and settled in New York; was afterwards distinguished, both in Europe and the U. S., as a painter of portraits, specimens of which are quite frequently met with in private circles, and for his skill and taste he received several decorations and other honors. D. in New York May 22, 1873.

**Fagus.** See BEECH.

**Fahln.** See FALUN.

**Fahr'enheit** (GABRIEL DANIEL), F. R. S., a physicist, b. in 1690 at Dantzig, Prussia; became a constructor of scientific instruments; resided in France, England, and afterwards in Holland, and was everywhere recognized as one of the leading physicists of his time. In 1720 he first introduced the use of mercury in thermometers. He invented the Fahrenheit scale (see THERMOMETER); also an improved areometer and other valued instruments. He was the author of several learned papers, chiefly regarding heat and specific gravities. D. at Amsterdam in 1740.

**Faidherbe** (LOUIS LÉON CÉSAR), French general of division and author of several geographical, ethnographical, and linguistic papers, was b. at Lille June 3, 1818, and began his career in the colonies, principally in Algeria, where he served with distinction. Made himself favorably known while governor of Senegal by several valuable scientific papers which were published in the *Annuaire du Sénégal* (1859, 1860, and 1861) and in the *Bulletin de la Société de Géographie*. He also wrote *Chapitre de Géographie sur le Nord-Ouest de l'Afrique* (St. Louis, 1864), and *Collection complète des inscriptions Numidiques* (Paris, 1870). Published from 1860 the *Bulletin du Sénégal* (St. Louis), and rendered the French dominion in Africa great service by his exact knowledge of the country and its population, and by his talent of organiza-

tion. At the outbreak of the war with Germany he commanded the subdivision of Bona, and was called to active participation in the war by the government of National Defence in Dec., 1870. On Dec. 3 received the supreme command of the armée du Nord, organized in and around Lille. He commanded in the undecided or drawn battles of the Hallue, on Dec. 23, 1870 (also called the battle of Quéruix), and of Bayaume on Jan. 2 and 3, 1871. On Jan. 19, 1871, he was defeated by General von Goeben at St. Quentin, but his artillery was weak, and he had almost no cavalry, and thus it is certainly not to be wondered at that his newly-organized and little-practised forces could not hold their ground against the old German soldiers, led by an excellent commander. Acknowledged as a very able commander and organizer in war, Faïdherbe entered into politics after the war during the reorganization of the government. Joined the party of Gambetta, and was elected to the National Assembly from three different places; accepted the election from his native place, Lille. But when the government of Thiers triumphed, and the influence of Gambetta decreased, Faïdherbe retired from public life. He wrote a book on the war, *Campagne de l'armée du Nord*, dedicated to Gambetta (Paris, 1871). A. NIEMANN.

**Faïence** [Fr., from *Faenza*, the original place of its manufacture], a name for glazed pottery having an earthenware ground and enamelled with painted designs.

**Fai-Fo**, seaport of Anam, and a mart of considerable importance. It trades principally with China, and exports sugar and cinnamon. It has a large Boeddhiic temple, with 2 Chinese temples. Pop. 5000.

**Faillon** (MICHEL ÉTIENNE), b. at Tarascon, France, in 1799, became a Sulpician in Paris, and in 1854 came to Canada as a visitor to the Sulpician houses of that country. He published numerous valuable biographies of distinguished French Canadian religionists, and undertook an extended history of the French in Canada, of which 3 vols. 4to (1865-66) were completed. D. at Paris Oct. 25, 1870.

**Failly, de** (CHARLES ACHILLE), French general, was b. at Rozoy-sur-Serre, Aisne, Jan. 21, 1810. After 1828 served partly in France, partly in Algeria. In the Crimean war distinguished himself in the battle of the Alma and the storming of Sebastopol; and at the battle of the Tschernaya led his brigade with valor and success. In the war against Austria, in 1859, commanded, as general of division, the third division of the fourth army corps, and on the day of the battle of Solferino received the grand cross of the Legion of Honor. After this war, and to 1870, was president of the comité consultatif de l'infanterie, and under his authority all improvements in the equipment and exercise of the infantry were discussed and put in practice; he had the merit of introducing the Chassepot gun. In 1867 commanded the expedition whose task was to protect the pope against the attacks of Garibaldi, and his name attained a sad celebrity from the battle of Mentona, in which Garibaldi's irregular host were slaughtered, and from the report of this battle, in which the Chassepot gun was mentioned as having done "wonders." At the beginning of the war with Germany, Failly received the command of the fifth corps, but was very unsuccessful, and was violently attacked by his countrymen; after the war he published a pamphlet in vindication of himself—*Marches et opérations du cinquième corps* (Brussels, 1871)—in which a broken heart speaks from every line. The principal charges brought against Failly are—that at Wörth he did not come to the support of MacMahon, though he stood near enough to do so; and that he marched his corps from Chalons to Sedan so badly and imprudently that it was surprised and defeated at Baumont. On these accounts he lost his command on the very day before the battle of Sedan. In the above-mentioned pamphlet he tries to refute these charges, but on his return from German captivity he received no command. AUGUST NIEMANN.

**Fainéants** [Fr., ("Do-Nothings"), a name applied to several Frankish sovereigns, chiefly of the Merovingian dynasty. The title is indicative of their idle and worthless reigns, which indeed were merely nominal. Thierry III. of Austrasia and Burgundy, Clovis III., Childbert III., Dagobert III., Chilperic II., Thierry IV., and Childeric III., all Merovingian kings of France, were *rois fainéants*, as was also Louis V., the last of the Carolingians. The same appellation is often applied to worthless monarchs of later times and other countries.

**Faint'ing** (*Syncope*), a more or less complete and sudden loss of sensation and of the power of motion, unaccompanied by convulsions, but usually attended by feebleness of the circulation and respiration. Fainting is attended by anæmia of the brain, its proximate cause; more remotely it may be caused by loss of blood, by profound emotional disturbance, or by heart-disease. Closely akin

to it, but more permanent and dangerous, are the collapse which occurs in cholera (caused by loss of the fluid constituents of the blood) and the shock which follows severe injuries. Fainting is to be treated by placing the patient on his back in a horizontal position, or with the head and chest slightly depressed below the level of the rest of the body; by admission of fresh air to the patient; and, in prolonged cases, by applying diffusive stimulants to the nostrils and resorting to artificial respiration. Fainting is seldom mortal, unless in cases of severe disease.

REVISED BY WILLARD PARKER.

**Faïoum**. See FAYOUM.

**Fair** [a word kindred to the Lat. *feria*, a "holiday"]. This name was originally given to stated temporary markets containing many kinds of goods and wares. When population was sparse, and the means of travelling and transportation were extremely limited, it was found most convenient to expose merchandise for sale at the largest gatherings of the people. Hence, European fairs were early identified with religious festivals, and were often designated by the name of the saint in whose honor each festival was held. However, as the difficulties and dangers of intercommunication diminished, and the number of cities and villages increased, factories, shops, and warehouses became more accessible, and the inhabitants generally found it more convenient, as well as more profitable, to buy goods as they needed them, from time to time, than to purchase a year's supply in advance. Thus, fairs for the sale of goods constantly decreased in number and importance with the growth and improvement of each country, until not more than two or three of any note were held in all Europe. The most famous of these—and, it is said, the largest in the world—is held annually during the months of July and August at Nijni-Novgorod in Russia, situated at the confluence of the rivers Volga and Oka, about 265 miles E. of Moscow. The amount of sales at this fair is reported to have reached the enormous sum of 150,000,000 roubles (about \$112,000,000). Yet it is not improbable that the proposed Siberian railway will, when completed, open new places of business along its line through Northern Russia and Central Asia, and thus eventually cut off the supplies which are now gathered annually at Nijni-Novgorod. In Arabia, Hindostan, and other Eastern countries such fairs are still held, and will continue to be so until the general introduction of railways and other modern improvements.

In the U. S., temporary markets containing the effects of itinerant merchants are entirely unknown, although the term *fair* is often applied to such collections of fancy articles as are generally sold by ladies for the benefit of religious and charitable associations. This term has, however, a far higher meaning, and now more frequently designates a collection of superior products which are exposed, not for sale, but solely for public inspection, and for careful examination by experts as to their respective qualities. Numerous annual fairs, embracing rare specimens of skill, industry, and inventive genius, and furnishing abundant evidence of progress and improvement, form a feature peculiar to this country. They are identified with a grand movement for bettering the material condition of man, which, by enlisting all classes, and thus securing the hearty co-operation of the mass of the people, has already gathered irresistible force, and must therefore be regarded as the most significant sign of advancement in the nineteenth century.

Several attempts were made at an early day in this country to encourage art and invention by offering prizes for superior specimens of a few kinds of goods, but no permanent system for improvement was established until the year 1810. Elkanah Watson, a merchant of Albany, N. Y., whose original plans regarding inland navigation, uniform currency, and general education entitle him to a prominent place among American philanthropists, was the real author of the present system of fairs and cattle-shows sustained and directed by agricultural societies. Having retired from active business, and removed to his farm near Pittsfield, Mass., he conceived the idea of interesting the farmers of Berkshire county in holding an exhibition of improved breeds of cattle and superior products of the soil, for the purpose of proving what might be accomplished by proper culture; and to compensate and reward exhibitors for the care and labor bestowed on their specimens, prizes were to be awarded for the best. The first fair was quite a success, and for the purpose of enlarging the next he appealed to the citizens of Boston for pecuniary aid, but failed to get a single favorable response. Ex-President John Adams, in his reply, made it quite apparent that the leading men of that day did not appreciate the importance of this new step for encouraging the useful arts. This was pithily expressed in a single sentence: "You will get



no aid from Boston: commerce, literature, theology, medicine, the university, and universal politics are against you." Watson was not thwarted by this rebuff; he redoubled his exertions at home, and for several years annual fairs were held. In 1815 he returned to Albany, and immediately proceeded to organize an agricultural society and to establish fairs and cattle-shows in the neighboring counties. In 1819 the legislature of the State of New York passed an act appropriating \$10,000 annually, for six years, for the promotion of agriculture and family manufactures, which was to be divided among the agricultural societies of the several counties in proportion to their population, provided a like sum was raised in each by voluntary subscription. In 1832 the present State Agricultural Society was incorporated, and in 1841 a law was passed similar to that of 1819, appropriating the sum of \$8000. Under the present system each county agricultural society is required to report annually to the State society, which embraces the essential parts of the whole in its report to the legislature. This plan of organizing State and county agricultural societies, with power to hold fairs, was adopted before 1858 in the States of Michigan, New Hampshire, Indiana, Wisconsin, Massachusetts, Connecticut, Illinois, Vermont, Tennessee, California, Maine, and Iowa. Many other States have been added to this list since that time. Nothing illustrates the rapid extension of this system, and the popular sentiment in its favor, better than the announcement of a great fair at Omaha, Neb., and another at Colorado Springs within the Rocky Mountain range, in the fall of 1874. These societies are, as a general rule, under the guidance and patronage of the best and most influential farmers, who take a natural pride in the efficient management of their respective fairs. The collected transactions of State agricultural societies, including reports on annual fairs, printed by order of the several legislatures, already form a large and valuable library on the subject of agriculture and the allied arts.

Other fairs of a more varied and comprehensive kind have been held in many of the large cities of this country, prominent among which are those of the American Institute of the city of New York, the Franklin Institute of Philadelphia, the Maryland Institute of Baltimore, the Massachusetts Charitable Mechanics' Association of Boston; also the industrial exhibitions of Chicago, Cincinnati, St. Louis, New Orleans, and San Francisco.

These exhibitions embrace not only agricultural products, but superior specimens of the fine, ornamental, and useful arts, including working models of recent inventions, machinery in motion, improved chemical and mechanical processes, with the material resulting therefrom, and practical illustrations of the best methods of generating and utilizing force. The articles composing these displays are arranged according to various systems of classification: that of the American Institute is the simplest and most comprehensive of any yet devised. It consists of seven departments, each of which is divided into seven groups; and every possible product or device can be readily assigned to a proper place in one of these forty-nine divisions. The remarkable feature of these fairs is the spirit of emulation evinced by exhibitors. This desire to excel, although it may be stimulated by both rewards and rivalry, springs from a longing to accomplish a given end by the best and most economical methods. Their highest ambition is to add something to the stock of useful knowledge. Fortunately, this friendly strife for supremacy in skill and ingenuity has a constant tendency to expand and give greater variety and value to every display. Competition is not solely an incentive to improvement, for by demanding the severest tests it becomes the means of exposing the advantages and defects of every construction, thus ensuring the adoption of the best.

Few persons are aware of the great expense incurred by many exhibitors for the purpose of making an imposing display at these fairs, or of the large sums expended by their respective managers to render them attractive, instructive, and of real benefit to their patrons. Complete returns of the number of persons attending the numerous agricultural and other fairs have never been made, but from careful estimates it may be safely assumed that the average total number of visitors during each year exceeds 5,000,000.

The advancement of man is clearly indicated by invention and discovery. Whatever may be the state of his shifting opinions on social and political questions, his actual progress and elevation mainly depend on increased facilities for supplying his wants of body and mind by means of new devices which will lessen the rigor of manual labor and render knowledge more accessible. The highest evidences of the increasing skill of our artists and artisans, and of the constant growth and prosperity of this country, are to be found in its numerous autumnal fairs,

and together they form a reliable index of the annual progress made in developing its material resources.

SAMUEL D. TILLMAN.

**Fairbairn** (PATRICK), D. D., a farmer's son, was b. at Greenlaw, Berwickshire, Scotland, in 1805, graduated at the University of Edinburgh, was settled in 1830 in one of the Orkney Islands, at Bridgeton, a suburb of Glasgow, in 1837, and at Saltoun, near his birthplace, in 1840. After being for some years professor at Aberdeen, he was in 1856 made principal and professor of systematic theology and New Testament exegesis in the Free Church Theological College at Glasgow. He d. suddenly Aug. 6, 1874. His principal works are *The Typology of Scripture* (1847; 5th ed. 1870); *Commentary on Ezekiel* (1851; 2d ed. 1855); *Prophecy, its Nature, Functions, and Interpretation* (1856); *Hermeneutical Manual* (1858); *Revelation of Law in Scripture* (1868); and a commentary on *The Pastoral Epistles of Paul* (1873). He visited the U. S. in 1871.

R. D. HITCHCOCK.

**Fairbairn** (ROBERT BRINCKERHOFF), D. D., a clergyman of the Episcopal Church, was b. in the city of New York May 27, 1818; educated at the Mechanics' School in Chambers street, New York, and at Trinity College, Hartford, where he graduated B. A. 1840, and also at the General Theological Seminary, New York. Immediately after his ordination as deacon July 2, 1843, became the rector of Christ Church, Troy, N. Y. From 1853 to 1862 was the principal of the Catskill Academy, as well as rector of Calvary Church, Cairo, N. Y. In 1862 was appointed the professor of mathematics and natural philosophy in St. Stephen's College, Annandale, N. Y., of which institution he became warden in 1863, and also professor of moral philosophy. He still continues to preside over this college. Is the author of several printed sermons, addresses, and pamphlets on religious and educational subjects.

**Fairbairn** (SIR THOMAS), BART, C. E., eldest son of Sir William Fairbairn, b. at Manchester 1823, received a private education and resided for several years in Italy. There he found opportunities for the study and appreciation of art, and was induced to make efforts for its encouragement in his own country, especially in connection with education. As "Amicus" in the *London Times* and in other ways he has worked for the social progress of England, writing upon trade-unionism, art, etc. He was chairman of the exhibition of the art-treasures of the United Kingdom at Manchester in 1857, and he was active in arrangements for the great English exhibitions of 1851 and 1862. Succeeded to the baronetcy in 1874.

**Fairbairn** (SIR WILLIAM), BART., F. R. S., LL.D., a noted British civil engineer, b. at Kelso, Scotland, in 1789; received his early education at a parish school, with some instruction from his uncle, and was apprenticed to an engine-wright at a British colliery. On the termination of his apprenticeship worked for two years in London, when he visited various places in England, Wales, and Ireland, working for a brief time in each, in order to acquire a practical knowledge of mechanical engineering. In 1817 began business on his own account at Manchester. His first important improvement was the substitution of iron for wood in the shafting of cotton-mills, and the use of lighter shafting where metal was already in use. By this change the cost of machinery was reduced and the speed increased fourfold. His attention was next directed to the use of iron for ships, and he was the first in England to construct an iron ship. This branch of industry he subsequently developed to a great extent, making it his principal business. More than one hundred iron ships were constructed by his firm, varying in size from the smallest to the war-vessel of 2600 tons. By invitation of the British Association (1834-35), in connection with Mr. Hodgkinson, he investigated the causes of certain supposed defects in iron produced by hot-blast furnaces, and submitted a valuable report upon the subject. Also, at the instance of scientific bodies, and for his own information, made a protracted series of experiments to test the strength of various kinds of iron; also on the resistance of hollow tubes or cylinders to outside pressure, which led to valuable practical results. Mr. Fairbairn co-operated with Robert Stephenson in designing and constructing the great tubular bridge across the Menai Strait, and at his instance the plan suggested by Mr. Stephenson was modified to better meet the required conditions, and it was owing to his "determined perseverance" that Mr. Stephenson's conception became realized. Sir Wm. was one of the founders of the British Association for the Advancement of Science, and the author of many valuable professional books and papers, among which may be mentioned *Mills and Mill-work, Iron, its History and Manufacture, Application of Iron to Building Purposes, Iron Shipbuilding*

*Useful Information for Engineers*, 1st, 2d, and 3d series, *An Experimental Enquiry into the Strength, Elasticity, Ductility, and Other Properties of Steel* (1869), which was several times reprinted. President of the British Association, corresponding member of the National Institute of France, member of many other learned societies, and chevalier of the Legion of Honor. Created a baronet in 1869. D. Aug. 18, 1874. G. C. SIMMONS.

**Fairbanks** (ERASTUS), LL.D., an American manufacturer, b. at Brimfield, Mass., Oct. 28, 1792, formed a partnership with his brother for the making of scales in 1825 at St. Johnsbury, Vt., and their works there have a worldwide reputation. Was member of the Vermont legislature 1836-38, governor of the State in 1852-53 and 1860-61, and d. at St. Johnsbury, Vt., Nov. 20, 1864. Governor Fairbanks was a man of unusual business abilities, a faithful and disinterested public officer, a citizen of spotless virtue and integrity, and a liberal benefactor of many religious and charitable enterprises, in the success of which he took a deep interest.

**Fairburn**, on R. R., capital of Campbell co., Ga. (see map of Georgia, ref. 3-G, for location of county), 18 miles S. W. of Atlanta. Pop. in 1870, 305; in 1880, 563.

**Fairbury**, R. R. junction, Livingston co., Ill. (see map of Illinois, ref. 4-F, for location of county), 10 miles S. E. of Pontiac, Ill. It has grain-elevators, a fine hall, also coal-mines, mills, shops, factories, etc. It is in a thickly-settled and fertile region, abounding in coal, limestone, fire-clay, sandstone, and a micaceous quartz which affords a fine fireproof building-material. Clays of nearly all colors abound. Pop. in 1870, 1493; in 1880, 2140.

**Fairbury**, capital of Jefferson co., Neb. (see map of Nebraska, ref. 11-G, for location of county), is situated on R. R. and the Little Blue River. It has a splendid water-power, a fine flouring-mill, a good school-house, and a steam saw-mill. Pop. in 1870, 370; in 1880, 1251; in 1885, 1423.

**Fairchild** (JAMES HARRIS), D. D., president Oberlin College, b. Nov. 25, 1817, at Stockbridge, Mass., was removed to Ohio when a year old; at sixteen years of age entered Oberlin College, and has been connected with the college thenceforth to the present time. In 1839 was tutor, in 1842 professor of languages, in 1872 of mathematics, in 1858 of theology, and in 1866 became its president. Has published *Moral Philosophy* and pamphlets on questions connected with his college, particularly on the education of women, besides contributing to periodicals.

**Fairchild** (LUCIUS) was b. at Franklin Mills, Portage co., O., Dec. 27, 1831, served in the war of 1861-65 from Wisconsin, becoming a brigadier-general of volunteers Aug. 5, 1863; was secretary of state of Wisconsin 1864-65, and governor 1866-71. In 1874 he was U. S. consul at Liverpool, England, and was U. S. minister to Spain 1880-81.

**Fairfax**, Franklin co., Vt. (see map of Vermont, ref. 2-B, for location of county), 37 miles N. W. of Montpelier. It has manufactures of woollens, leather, lumber, and other goods, and is the seat of the New Hampton Theological and Literary Institution (Baptist). Pop. of tp. in 1870, 1956; in 1880, 1829, including 359 in v.

**Fairfax**, Va. See CULPEPER.

**Fairfax Court-house**, cap. of Fairfax co., Va. (see map of Virginia, ref. 4-H, for location of county), 14 miles W. by N. of Alexandria and 4 m. from Fairfax Station. Principal business, farming, stockraising, and dairying. It is about 160 feet above tide-water. Pop. in 1880, 376.

**Fairfax** (BRYAN), LORD, was born about 1730, and d. at Mount Eagle, near Cameron, Va., Aug. 7, 1802. Was an Episcopal clergyman at Alexandria, Va., during the last of his life. Was a loyalist in the war of the American Revolution, but preserved the friendship of Washington.

**Fairfax** (DONALD MCNEIL), U. S. N., b. Aug. 10, 1823, in Virginia, entered the navy as a midshipman Aug. 12, 1837; became a passed midshipman in 1843, a lieutenant in 1851, a commander in 1862, a captain in 1866, a commodore in 1873. Commanded the steamer Cayuga in 1862 on the Mississippi River; in command of the monitor Nantuxet participated in the first attack upon Fort Sumter, Apr. 7, 1863, and commanded by Rear-Admiral Dupont, in his report of that action, for "the highest professional capacity and courage." In command of the monitor Montauk took part in all the fights with the forts and defences of Charleston harbor which occurred during July and August, 1863, and for his excellent service on these occasions received the thanks of Rear-Admiral Dahlgren in general orders and in official communications to the navy department. He became rear-admiral July 11, 1880; retired Sept. 30, 1880, at his own request, after forty years' consecutive service. FOXHALL A. PARKER.

**Fairfax** (EDWARD), English poet, son of Sir Thomas

Fairfax, b. at Denton, Yorkshire, about the end of the sixteenth century, translated Torquato Tasso's "Jerusalem Delivered" into English, verse for verse, and this work is still of standard excellence. A *History of Edward the Black Prince*, in verse, and a *Discourse of Witchcraft*, etc., are also his works. The American edition of his great translation, last ed., 12mo (1855), gives the text of Charles Knight's edition from the old folio edition of 1600.

**Fairfax** (JOHN CONTEE), M. D., the eleventh Lord Fairfax, a resident of Bladensburg, Prince George co., Md., b. in 1830, a younger son of Hon. Albert Fairfax, succeeded to the title in 1869 on the death of his brother, the tenth Lord Fairfax. Dr. Fairfax formerly practised medicine at Woodburne, Md., and in 1857 married a daughter of Col. Edward Kirby, U. S. army. His cousin, Mr. Raymond Fairfax, is the heir-presumptive to the title. The Fairfaxes are of the Scottish peerage, and never had a seat in the British House of Lords. The first of the title was Ferdinando, a nephew of the poet; made a peer in 1627, d. in 1648. He was the author of some extant writings.

**Fairfax** (THOMAS), LORD, English general, b. at Denton, Yorkshire, Jan., 1611, was son of Ferdinando, Lord Fairfax, and Mary, daughter of Edmund Sheffield, Lord Mulgrave; served in Holland as a volunteer under Horace, Lord Vere, whose daughter he afterwards married; at the outbreak of civil war in 1642 received from Parliament a commission as general of cavalry, his father being commander-in-chief of the northern forces; defeated the royalists under Col. Bellasis, Apr., 1644, and July 2 of that year was especially distinguished by bravery and activity at the king's defeat at Marston Moor, where he commanded the right wing; in Jan., 1645, became commander-in-chief of the Parliamentary or "new model" army, with Oliver Cromwell as lieutenant-general; gained the battle of Naseby, June 14, 1645, and on the 18th of June took Leicester; on the 22d of July took Bridgewater, on the 10th of Sept., Bristol; in June, 1646, captured Oxford, and Charles I. fled to Scotland. Fairfax was then commissioned by Parliament to carry £200,000 to the Scotch army, who agreed to deliver the king to him for that sum. He met the king near Nottingham Feb. 11, 1647. Soon after this he yielded to the genius of Cromwell, and when, in Mar., 1648, he succeeded to his father's titles, continued to fight for him. Appointed one of the High Court of Justice in 1649, he attended but a single session of the court. In the spring of 1649 he was made commander of all the forces in England and Ireland, but refused to fight the Scots, and resigned his commission in June, 1650. In Sept., 1654, he was a member of Cromwell's first Parliament, and in Dec., 1659, took part with Monk in the defeat of Lambert; Jan. 1, 1660, was a member of the council of state, and in May chairman of the committee delegated by the House of Commons to prevent the return of Charles II. D. of a fever at Nun Appleton, on his estates, Nov. 12, 1671. Fairfax was a warm friend to learning, wrote *Short Memorials of Thomas, Lord Fairfax*, besides theological, poetical, and other MS. compositions.

**Fairfax** (THOMAS), LORD, of the same family as the preceding, was b. in England 1691, but settled in the county of Frederick in Virginia, where he had large estates. Making the acquaintance of George Washington in 1748, the friendship between them was unbroken by the American Revolution, although Fairfax was ever a frank and avowed loyalist. Such were his qualities, indeed, that his property was always equally respected by the Americans and the English. D. at Greenway Court, Frederick co., Va., Dec. 12, 1781, and his immense domain of 5,282,000 acres was then confiscated.

**Fairfield**, on R. R., capital of Solano co., Cal. (see map of California, ref. 4-B, for location of county). Pop. in 1870, 329; in 1880, 424.

**Fairfield**, formerly one of the capitals of Fairfield co., Conn. (see map of Connecticut, ref. 6-C, for location of county), near Long Island Sound, and on R. R., 52 miles N. E. of New York. The village was burned by the British troops under Tryon in 1779. Fairfield was the scene of the last conflict with the Pequot Indians in 1637. It is a port of entry, and one of the most beautiful villages in the State. Fairfield township includes also the villages of Southport, Greenfield Hill, and Black Rock, all beautiful places. Southport is the chief business centre, and Black Rock has a fine harbor; lat. 41° 8' 30" N., lon. 73° 12' 44" W. Fairfield has some manufactures and considerable foreign and coastwise traffic. The village of Fairfield is half a mile from the sound, and is a place of summer resort. Since 1870 some 3 square miles of the township have been annexed to Bridgeport. Pop. of tp. in 1870, 5645; in 1880, 3748.

**Fairfield**, R. R. junction, cap. of Wayne co., Ill. (see

map of Illinois, ref. 9-F, for location of county), 90 miles E. of St. Louis. It has an extensive woollen-factory, and large flouring and saw-mills. Principal business, farming. Pop. in 1870, 719; in 1880, 1391.

**Fairfield**, city and R. R. junction, capital of Jefferson co., Ia. (see map of Iowa, ref. 7-J, for location of county), 50 miles W. of Burlington, situated on a fertile, high-rolling, and well-wooded prairie. It is the seat of Parsons College (Presbyterian) and a female seminary. Pop. in 1870, 2226; in 1880, 3086.

**Fairfield**, Somerset co., Me. (see map of Maine, ref. 6-C, for location of county), on R. R. and the W. bank of the Kennebec River, 21 miles N. of Augusta, with which it is connected by the Maine Central R. R. It has an excellent water-power. The township contains an extensive corn and fruit-canning factory, furniture-factories, wood-shops, saw-mills, tannery, machine-shop, and foundry. Pop. of tp. in 1870, 2998; in 1880, 3044.

**Fairfield**, cap. of Freestone co., Tex. (see map of Texas, ref. 3-I, for location of county), 155 miles N. E. of Austin. It is the seat of two colleges. Pop. in 1870, 800; in 1880; 358.

**Fairfield** (GENEVIEVE GENEVRA), American writer, a daughter of S. L. Fairfield, mentioned below, was b. in New York 1832, wrote *Genevra*, or *the History of a Portrait*, *The Vice-President's Daughter*, *The Wife of Two Husbands*, *The Innkeeper's Daughter*, etc.

**Fairfield** (JOHN), b. at Saco, Me., Jan. 30, 1797, became a lawyer of Saco, and reporter of the supreme judicial court 1832; published (1835-37) 3 vols. of law-reports; was in Congress 1835-39; governor of Maine 1839-40, 1842-43; U. S. Senator 1843-47. D. Dec. 24, 1847.

**Fairfield** (SUMNER LINCOLN), American poet, b. at Warwick, Mass., June 25, 1803, studied at Brown University, Providence, R. I., and sailed for London in Dec., 1825. Returning to the U. S., he married Miss Jane Frazee of Rahway, N. J., and subsequently was principal of Newtown Academy, 30 miles from Philadelphia. He published *Cities of the Plain*, *Père la Chaise*, *Westminster Abbey*, *The Sisters of St. Clara* (1826), *Abaddon*, *The Last Night of Pompeii* (1832), *Lays of Melpomene* (1824), and *The Heir of the World* (1829). From 1833 to 1838 he published the *North American Magazine*. D. Mar. 6, 1844. (See his *Life* by Mrs. FAIRFIELD, 1846.)

**Fair Haven**, on R. R., New Haven co., Conn. (see map of Connecticut, ref. 6-D, for location of county), now part of the city of New Haven. It is celebrated for its oyster-trade. (See NEW HAVEN.)

**Fair Haven**, Bristol co., Mass. (see map of Massachusetts, ref. 5-I, for location of county), on R. R. and the E. side of New Bedford harbor (which is the estuary of Acushnet River), is 60 miles S. of Boston. It has manufactures of coopersage, ships' furniture, metallic wares, tacks, castings, etc., besides oil-refineries and some fishing interests. A fine school-house, completely furnished (costing about \$100,000), was presented to this town in 1885 by Mr. Henry H. Rogers of New York. The harbor is good. The village is connected with New Bedford by a bridge three-fourths of a mile long. Sept. 7, 1788, it was attacked by the British, who were repulsed by the militia under Major Israel Fearing. Pop. of tp. in 1870, 2626; in 1880, 2875, including 1269 in v.

**Fairhaven**, Rutland co., Vt. (see map of Vermont, ref. 7-B, for location of county), on R. R., 8 miles N. E. of Whitehall, N. Y. It has great water-power and extensive manufactures of slate and marble goods, the materials for which are quarried here. Pop. of tp. in 1870, 2208; in 1880, 2211.

**Fair Havens** [Gr. Καλοί Λιμένες], a harbor on the S. side of the island of Crete, mentioned by Luke (Acts xxvii. 8), and by no other ancient writer. Saint Paul sailed out of this harbor shortly after the middle of October, and was shipwrecked about the first of November, 60 A. D. It appears to have been the port of Laææ, the ruins of which were discovered in 1856 by the yachting-party of Hugh Tennent, Esq. (See JAMES SMITH'S *Voyage and Shipwreck of Saint Paul*, 1st ed. 1848; 2d ed. 1856; 3d ed. 1866.)

**Fair Head**, or **Benmore Head**, a lofty promontory of the coast of Antrim co., Ulster, Ireland, opposite Rathlin Isle. It consists of carboniferous strata overlaid by greenstone columns, and rises 636 feet perpendicular above the sea. Lat. 55° 13' N., lon. 6° 8' W.

**Fairholme** (GEORGE), English writer on the connection of the Bible and science, published a *General View of the Geology of Scripture* in 1838, and *New and Conclusive Physical Demonstrations both of the Fact and Period of the Mosaic Deluge* (1830; 2d ed. 1840).

**Fairholt** (FREDERICK WILLIAM), English artist and

writer, b. in London 1814, published *Costume in England, a History of Dress to the Close of the Eighteenth Century* (1846), *The Home of Shakespeare Illustrated and Described* (1847), *Remarkable and Scientific Characters* (1849), *Dictionary of Terms in Art* (1854), etc. D. Apr. 3, 1866.

**Fair Isle**, a solitary isle, 4 by 2½ miles in extent, between Orkney and Shetland. It rises 708 feet above the sea, and is accessible for ships only at one point, on the S. E. In 1588 the duke of Medina Sidonia, admiral of the Spanish Armada, was wrecked here, and most of his crew were murdered. Lat. 59° 33' N., lon. 1° 38' W.

**Fairmont**, on R. R., capital of Martin co., Minn. (see map of Minnesota, ref. 11-D, for location of county). Pop. in 1880, 541.

**Fairmont**, on R. R., Fillmore co., Neb. (see map of Nebraska, ref. 11-G, for location of county), 100 miles W. of the Missouri River. Pop. in 1880, 600; in 1885, 976.

**Fairmont**, capital of Marion co., W. Va. (see map of West Virginia, ref. 3-E, for location of county), 77 miles W. of Wheeling, at the head of navigation of the Monongahela River and on the Baltimore and Ohio R. R. It has a State normal school, several large mills and shops, and a number of coal-mines. Principal business, mining. Pop. in 1870, 621; in 1880, 900.

**Fairmont Park**. See PHILADELPHIA, by T. WESTCOTT, Ed. "PHILADELPHIA SUNDAY DISPATCH."

**Fair Oaks**, locality in Henrico co., Va., on the Richmond and York River R. R., 7 miles E. of Richmond.

**BATTLE OF**. In the movements of Gen. McClellan's army in its advance from Yorktown, after reaching a point near Roper's Church on the Williamsburg and Richmond road, the right wing, consisting of the corps of Gens. Sumner, Porter, and Franklin, took the road *viâ* Cumberland and the White House, striking the Chickahominy at New Bridge, while the left wing, comprising the corps of Heintzelman and Keyes, kept the Richmond road to Bottom's Bridge; the advance-guards reaching these points about May 16, 17, 1862. The Chickahominy here is a stream of no great volume, flowing through a belt of heavily-timbered swamp (averaging from three to four hundred yards wide), sometimes in a single channel, more frequently divided into several, and when but a foot or two above its summer level overflows the whole swamp. The bottom-lands between the swamp and the highlands are little elevated above the swamp, so that a few feet rise of the stream overflows large areas of them. Thus, while the stream was no obstacle for infantry, the swamp and bottom-lands were impracticable for cavalry and artillery. On the 20th of May, Gen. Naglee crossed the Chickahominy with his brigade near Bottom's Bridge, and pushed forward to within two miles of the James River without meeting serious resistance. The rest of the Fourth corps, commanded by Gen. Keyes, crossed on the 23d. On the 25th the corps was advanced about a mile in front of Savage Station, which position was fortified; on the 28th, Casey's division moved forward to a point half a mile in advance of Seven Pines, where a new line of rifle-pits and a redoubt for six guns were commenced, and timber felled in front of the line; Couch's division, in support, advanced and encamped along the Nine-mile road. On the 26th the Third corps had crossed the Chickahominy, and taken a position two miles in advance of Bottom's Bridge; Gen. Heintzelman, its commander, was placed in command of both corps. On the 30th, Heintzelman obtained permission to advance the Third corps to a better supporting position. The position of the left wing just previous to the battle of the 31st was as follows: Casey's division (5000), in advance, extended from the Williamsburg road to the York River R. R.; Couch's (7000) along and in front of the Nine-mile road, its right near Fair Oaks Station, its left near Seven Pines; Kearny's (6500) 1½ miles to the rear, in advance of Savage Station; Hooker's, guarding the approaches to White Oak Swamp. The right wing still remained on the N. side of the river. Gen. Johnston, the Confederate commander, perceiving the possibility of destroying the Fourth corps in its advanced and (as he supposed) isolated position, ordered, on the 30th, a concentrated attack with his whole force (57,000 men) to be made early next morning; a heavy rain, however, which fell during the afternoon and evening of the 30th, so swelled the streams that his plans could not be fully executed, and at 1½ p. m. the division of 'D. H. Hill advanced alone, striking Naglee's brigade, posted in front of the intrenchments, and to which, after a gallant struggle, it was compelled to retire. A messenger sent to Gen. Heintzelman for reinforcements was delayed, and it was nearly 5 p. m. before Kearny's division arrived. Gen. Hooker was ordered up from White Oak Swamp, arriving after dark. As soon as the firing was heard, Gen. McClellan, still at New Bridge, ordered Sumner to have his corps,

encamped on the N. side of the river, some six miles above Bottom's Bridge, in readiness to move. This corps consisted of Sedgwick's and Richardson's divisions, each division having now a bridge over the stream opposite its own position. At 2 p.m. these divisions were ordered to cross without delay, and push forward to support Heintzelman; which movement was at once commenced. In the mean time, Naglee's brigade, with the artillery of Casey's division, under command of Col. G. D. Bailey, and reinforced by a regiment from Peck's brigade, struggled gallantly to maintain the redoubt and rifle-pits against the superior attacking force. The left of this position was, however, turned, and the whole line driven back, with the loss of six guns, beyond the position occupied by Couch. Gen. Couch had previous to this time been ordered to advance two regiments to relieve Casey's right flank. In making this movement he discovered large masses of Confederates crossing the railroad, as well as a heavy column moving towards Fair Oaks Station. This column he engaged with two regiments, but, though reinforced by two additional regiments, was overpowered. The Confederates pushed between him and the main body of his division; falling back with these four regiments and one battery about half a mile, Couch, learning that Sumner had crossed, at once formed line of battle, facing towards Fair Oaks, and prepared to hold the position. Kearny's division had now arrived in front of Seven Pines. Berry's brigade was ordered to deploy to the left, so as to have a flank fire upon the hostile lines; which movement was brilliantly executed, materially retarding the pursuit in that direction. This position was held till after dark, when, being cut off from the main body, he fell back, and succeeded in bringing his men by a circuitous route in good order within the Federal lines. Jameson with two regiments, moving rapidly to the front on the left of the Williamsburg road, succeeded for a time in keeping the abatis clear, but was forced back, gaining camp under cover of night. Gen. Devens, holding the centre of Couch's division, after gallant efforts to regain portions of the lost ground, finally withdrew behind the rifle-pits near Seven Pines. The Confederate attack here had been made by Hill's and Longstreet's divisions, reinforced by Smith's. Meantime (6 p.m.), Gen. Sumner had arrived with Sedgwick's division at the point held by Couch, the road being so muddy that Sedgwick was able to get but one of his batteries to the front. The First Minnesota was deployed to protect the flank; the rest of the division formed in line of battle, Kirby's battery near the centre, and a regiment was sent to open communication with Gen. Heintzelman. These dispositions were no sooner made than a heavy fire was opened by the Confederates along the line, and several charges were made, which were repulsed with great loss. Gen. Sumner now ordered a charge to be made, which was brilliantly executed, and the Confederates driven from the field in confusion. At this moment Gen. Johnston was severely wounded, and shortly afterward Richardson's division arrived upon the field. Darkness now ended the battle for that day. During the night dispositions were made for its renewal. Couch's division, and as much of Casey's as could be collected together, with Gen. Kearny's, occupied the rifle-pits near Seven Pines; Hooker brought up his division about dark, and bivouacked in rear of the rifle-pits on the other side of the railroad; Sedgwick's division held about the same position as when the fight ceased; and Richardson was ordered to place his division on the left to connect with Kearny. French's brigade was posted along the railroad, and Howard's and Meagher's in second and third lines. During the night three batteries of Sedgwick's division arrived, it being impossible to move the rest; but the corps of Franklin and Porter were not brought forward, these 35,000 fresh troops remaining on the other side of the Chickahominy during the next day. The command of the Confederate army had, upon Johnston being disabled, devolved upon Gen. G. W. Smith. About 5 a.m. (June 1) skirmishers and cavalry appeared in front of Richardson's division, which were soon dispersed. Richardson's line was extended to close the wide interval between him and Kearny; and scarcely had this position been gained when the Confederates appeared in large force from the woods in front, and opened a heavy musketry-fire along the line, approaching rapidly in columns of attack, supported by infantry in line of battle on each side, cutting Gen. French's line, and appearing determined to carry all by one crushing blow. The first line of Richardson's division withstood this fire nearly an hour, Howard being finally ordered to French's assistance; which order being obeyed, the fire of the Confederates ceased, and their whole line fell back from that part of the field. On the opening of the fire in the morning, Hooker advanced on the railroad with two regiments, followed by Sickles' brigade. On coming near the woods, which were held by the Confeder-

ates in force, Hooker found Birney's brigade in line of battle. Sending back to hasten Sickles' brigade, he found it had been turned off to the left by Gen. Heintzelman to meet a column advancing in that direction. Calling upon Col. Ward (in command of Birney's brigade) to support him, Hooker at once attacked with two regiments, pushing the Confederates before him; and a final charge being ordered, the Confederates fled in confusion, abandoning their arms. Sickles, who had been ordered to the left, formed in line of battle on both sides of the Williamsburg road, and after a brief interchange of musketry the brigade pushed into the timber and put the Confederates to flight. On the right, vigorous efforts had been made to break through Gen. Richardson's lines, which were frustrated. In about an hour Richardson's whole line advanced, pouring in a heavy fire at close range, and forcing the Confederates back. This was followed by a bayonet charge, led by Gen. French in person, which turned the Confederate retreat to flight. The Confederates were now retreating in confusion along the whole line toward Richmond. The pursuit was continued until the lines held by the Union forces before the attack on May 31st were regained. On the field were found large supplies of arms and stores abandoned by the Confederates in their flight. On the next morning the Confederate pickets were pressed back to within five miles of Richmond, but Gen. McClellan did not pursue farther, and the old lines were resumed. The loss on either side was probably about equal, but the result was against the Union forces, inasmuch as the opportunity of striking a decisive blow was not improved; for there is scarcely a doubt that had McClellan followed up with his whole army, Richmond would have fallen into his hands; and the occasion thus presented did not return. The Union loss in killed, wounded, and missing is officially reported at 5739; the estimated Confederate loss is somewhat greater.

**Fairplay**, capital of Park co., Col. (see map of Colorado, ref. 3-D, for location of county), at the head of S. Park, on mountain-route between Denver and Santa Fé, 117 miles by R. R. from the former place. It is noted as the supply-point for the Mount Lincoln mining district. Its altitude is 9964 feet—nearly two miles above sea-level—and 3500 feet above Mount Washington. Its inhabitants, though never experiencing the "heated term," yet from June to September have the luxury of moderately warm days and cool nights, the monotony being occasionally relieved by a snow-storm in August. Mount Lincoln towers above the plain to a height of over 14,300 feet, and along its sides to within a few yards of the top, often enveloped by clouds, and frequently above them, miners and prospectors are developing or seeking new discoveries. Pop. in 1880, 450.

**Fairport**, Monroe co., N. Y. (see map of New York, ref. 4-D, for location of county), on the New York Central R. R., 11 miles E. of Rochester and on the Erie Canal. It has manufactures of sal-aërated, cream-tartar, and baking-powder, a flouring and three planing-mills, a furnace, manufactures of barrels, staves, agricultural implements, carriages, confectionery, etc., a fruit-canning establishment, marble-works, and a union school. Pop. in 1880, 1920.

**Fairview**, on R. R., Fulton co., Ill. (see map of Illinois, ref. 5-C, for location of county), is situated in Fairview township, 30 miles S. E. of Galesburg, Knox co. Pop. of township in 1880, 1296, including 394 in v.

**Fairview**, capital of Hancock co., W. Va. (see map of West Virginia, ref. 1-D, for location of county), 3 miles E. of the Cleveland and Pittsburg R. R. It has several large mills and shops. Principal business, farming. Pop. about 400.

**Fairville**, post-village of St. John co., N. B., on the St. John River and the European and North American Railway, 2½ miles from St. John. It is the seat of the New Brunswick Lunatic Asylum. Pop. about 1500.

**Fairy Lore** is closely allied to mythology, fairy tales being mere remnants of myths which remain lingering in popular superstition for some time after the myths themselves have died out of popular belief. Only those races which have created a mythology possess a fairy lore—as, for instance, the Hindoos, Greeks, Scandinavians, and Finns—while those races which never formed myths—as, for instance, the Jews and the Arabs—never produced any fairy tales either. There are stories enough, both in the Jewish and Arabic literatures, which tell of wonders wrought by spirits and other supernatural beings, but they are *fairies* like Spenser's *Faerie Queen* or Shakspeare's *Midsummer Night's Dream*; that is to say, they are literary treatments of fairy tales, and not fairy lore; they express a certain taste, not a certain state of consciousness in general. The true fairy tale was originally a myth. All mythological creations have a double character. The materials of which

they are produced are either fused into form around moral ideas which place the human mind in a relation of absolute obligation, or they are kept in a floating state, which leaves the mind free in pure contemplation, and allows almost unlimited play to the imagination. Of these two elements, the former, the religious, dies out when a mythology is supplanted by a higher form of religion; but the latter, the poetical, may remain for centuries, and live on among the people as its fairy lore, modified and developed in a most striking manner by influences from the new religion, from the climate and surface of the country, from the occupations and history of the nation, etc. The same story, originally based on some truth, will be differently colored by the miners in the mountain-regions, the sailors along the coasts, and the shepherds on the prairies. Having no moral substance which commands obedience, and addressing people through their imagination only, it will hardly come into collision with the religion; on the contrary, it will shift and change till it falls into harmony as well with the interior spiritual conditions as with the external surroundings. And it is this character of being an unconscious, natural, and living expression of the spirit of a people in its most mysterious activity which gives to the study of fairy lore its peculiar charm and its paramount importance.

**Fairy Rings** are imperfectly circular or annular patches in grass-land in which the vegetation is either richer or more scanty than that around it. They are common in the British Islands and other parts of Europe, where, according to folk-lore, they are caused by the dancing of fairies. They began to attract the attention of scientists in the latter part of the eighteenth century. At first they were considered to be the effect of lightning. After much investigation, however, and not a little debate, it has been shown that they are caused by the growth of mushrooms (*Agaricus*), which spread from the centre outward, and at first check, but afterward by their decay accelerate, the growth of the grass.

**Faith** [Lat. *fides*; *fidere*, to "trust"] is belief, conviction, assurance, or trust, resting on any sort of evidence whose force is affected subjectively—that is, by the mental condition of the recipient. An assurance resting on purely objective grounds relies upon the common state of all minds, not on the special condition of any, and involves knowledge. We believe there is a God, but there are temptations to unbelief which have led men to atheism. We know that twice two are four, and it is not possible to tempt us to doubt it. One and the same thing may be an object of faith at one stage of evidence, and of knowledge at another. There may be a subjective difficulty which is invincible to the sort and degree of evidence which is ordinarily sufficient for faith, yet is overcome by the evidence which produces knowledge. The mind may pass therefore from unbelief to belief, from belief to knowledge, or from unbelief to knowledge. It may pass from unbelief to belief without addition to evidence, solely by change in itself, but it cannot pass from either to knowledge, except by additions to evidence. The faith of one man may rest on the presumed knowledge of another, and thus be confounded with knowledge itself. The great body of scientific fact is actually the object of knowledge to a few, and is supposed to be a part of the knowledge of the many only because the many have faith in the statements of the few, though they can neither verify them, nor even understand the processes by which they are reached. "We believe," says Lewes (*Problems*, i. 21), "that the sensation of violet is produced by the striking of the ethereal waves against the retina more than seven hundred billions of times in a second. . . . These statements are accepted on trust by us who know that there are thinkers for whom they are irresistible conclusions." Knowledge involves intellectual coercion—faith involves freedom. We are not responsible for the fact that under the conditions of knowledge we know, or in defect of them do not know; we are responsible if under the conditions of a well-grounded faith we disbelieve. In the history of philosophy the names of Hobbes, Huet, Leibnitz (*Faith and Reason*), D'Alembert, Kant, and Daub are connected with special views of faith. (For the philosophy of faith or belief, see JACOBI, F. H.)

In theology the relations of faith to knowledge and the question of precedence have long been agitated. Augustine and his school held that faith precedes understanding; Jacobi confessed that to him the dualism of the two was hopeless; Hegel proposed to relieve the antagonism by absorbing faith into knowledge; Schleiermacher says they are the two foci of one ellipse. In the Bible, faith is by pre-eminence trust, a conjoint movement of the intellectual powers, the affections, and the will. Its object is the super-sensuous, God, and God in Christ. It involves knowledge or mental vision, voluntary reception, personal adhesion, and obedience. The Scholastics distinguish between belief-

ing that God is, believing God, and believing in God. Faith *informis* is merely intellectual; faith *formata* involves love, and is a virtue. Faith was regarded as a general intellectual assent to revealed truth as interpreted by the Church. In contradistinction to this, the Reformers laid stress on faith as a personal assurance of the forgiveness of sins for Christ's sake. This faith involves knowledge, assent, and trust. It justifies not by the merit, or on the ground of the works which follow it, but as the medium, the hand which lays hold of and appropriates Christ and his merit. (See JUSTIFICATION.) C. P. KRAUTH.

**Faith, Articles of.** See FAITH, CONFESSIONS OF.

**Faith, Confessions of**, official statements of doctrine—SYMBOLS (which see) in the theological sense. As distinguished from CREEDS (which see), confessions of faith are fuller presentations. We speak of the Apostles' Creed, the Westminster Confession. Confessions are, with reference to time, ancient or modern. In the extent of reception they are (1) oecumenical, catholic, or general, as accepted by the whole Church catholic; (2) particular, as accepted by particular parts of the Church. The term has also been applied to the carefully prepared statement of the faith of individuals. Articles of faith are the separate parts of confessions. A confession is an organic body or *corpus* of faith, its parts are members or *articuli*, such as the articles concerning God, sin, Christ, the Church. (See the articles on the particular systems, as ARMINIANISM, etc., the Confessions, as the AUGSBURG CONFESSION, etc., and the various churches.) C. P. KRAUTH.

**Faith, Rule of** (*Fidei Regula*), that to which FAITH (which see) appeals as its source and guide. Why do I believe this or that? and what am I bound to believe? are questions answered by the rule of faith, while the confession of faith, as such, simply states what I do believe. The confession is drawn from the rule. In the Roman Catholic Church the rule of faith is the body of revealed truth embraced in Holy Scripture and tradition ("in libris scriptis et sine scripto traditionibus"—*Council of Trent*, Sess. IV.), in the sense in which the Church holds that truth. In the Protestant churches the canonical Scriptures are regarded as the sole rule of faith.—RULE OF FAITH, ANALOGY OF FAITH, have been applied also from very ancient times to the body of most necessary and saving doctrines, so explicitly and clearly set forth in the Scriptures as to form a general guide in interpreting the more obscure parts. The APOSTLES' CREED (which see) was frequently so styled by the Fathers. The *Regula Fidei* is valid on the assumption that there is absolute unity in all parts of the doctrinal teaching of the Bible. C. P. KRAUTH.

**Faithfull** (EMILY), MISS, was born at Headley rectory, Surrey, in 1835; educated at Kensington, and at an early age displayed the firmness and independence which have characterized her subsequent life; becoming interested in the condition of women, she devoted her time to extending their sphere of labor, establishing in 1860, in spite of great opposition, a printing establishment in which women were employed. Queen Victoria gave this project her approval, and a printing business was formed styled "The Victoria Press," which is still conducted with steam machinery in Farringdon street. A fine specimen of workmanship, entitled *Victoria Regia*, and dedicated, by special permission, to the queen, secured the approbation of Her Majesty, who appointed Miss Faithfull publisher in ordinary to Her Majesty. In 1863 the *Victoria Magazine*, a monthly publication, was commenced, being devoted to the claims of women to remunerative employment. Miss Faithfull has established a publishing-office, with all the appliances of bookseller, stationer, and bookbinder connected. She visited the U. S., and lectured on her favorite topic. (See her *Three Visits to America*, 1854.)

**Fai'thorne** (WILLIAM), English engraver, b. in London about 1616, was imprisoned as a loyalist, and then banished from England under Cromwell. He went to France and studied engraving. From 1650 to 1680 he was a printseller in London, and d. there in May, 1691. He engraved *Christ at Prayer in the Garden of Olives*, *The Marriage of Cana in Galilee*, etc., and wrote a treatise on the art of engraving.

**Fa'kir** [from an Arabic word signifying "poor"], a class of religious mendicants in India, found there now in large numbers, and with evidence of their existence very early in Hindoo history. Rules for some of their practices are found in the *Institutes of Manu*, 1000 B. C., while they are distinctly mentioned by the Greek historians at the time of Alexander's conquest, by whom they were termed Gymnosophists—a name, it would seem, indicative much more of their bodily than of their mental state. Some of them are ascetics, who practise surprising mortifications



and bodily tortures, such as swinging on hooks thrust through their flesh, lying on a bed of spikes, walking on sandals through which spikes are driven, hanging suspended during life before a slow fire, fulfilling a vow to continue in one position during life, holding the limbs in a fixed position till they become immovable, carrying a cumbrous load or drawing a heavy chain, crawling on their hands and knees for years, rolling on the earth from one end of the land to the other, etc. By these means they acquire a reputation for sanctity which gives them a great hold upon the superstitions and the fears of their countrymen, though there is little religious sense displayed in all these performances, which are adopted, for the most part, as a mode of obtaining notoriety or a livelihood. The Hindoos have apparently little respect for these men, but they dread their curses, and the powerful rajah will rise up on his elephant and salute one of these "saints" as he passes by.

Formerly, the fakirs often banded together in robber hordes, sometimes numbering thousands, which carried devastation through whatever region they visited. The English government has put a stop to all this, as it has to many of their self-inflicted tortures. These men rarely appear now in absolute nudity, as was formerly often the case, but one meets them in the streets of any Hindoo city, daubed with ashes and paint, a bit of sackcloth depending from their loins, their long, coarse hair hanging in a tangled mat over their face and shoulders or wound in a thick mop around their heads, and presenting a most hideous and revolting spectacle. They number hundreds of thousands, and perhaps two millions in India, at the present day.

J. H. SEELYE.

**Falaise**, a town of France, in the department of Calvados, 22 miles S. S. E. of Caen. It is picturesquely situated on a lofty platform bordering on a rocky precipice (*falaise*), which position made it a very strong fortress in olden times, before the invention of gunpowder. Its old castle, now mostly in ruins, was the seat of the dukes of Normandy and the birthplace of William the Conqueror. Pop. in 1881, 8486.

**Fal'ashas**, those Abyssinian Jews inhabiting the mountainous regions of Samen and the plains along Lake Tzana, and numbering about 250,000. Their origin is as uncertain as that of all Abyssinians. (See ABYSSINIA.) The name *Falashah* signifies "exile" or "wanderer," and hence it is inferred that he is not a native of the soil. According to Falashah tradition, their forefathers, who were of the tribe of Levi, came to Abyssinia in the days of Solomon, but ethnologists hold that they must have come there some time in the seventh century, during the Mohammedan invasion of Egypt, while some of the German missionaries who have been in Abyssinia believe that the Falashas came originally from the kingdom of YEMEN (which see) in the tenth century. But, however uncertain their origin, they have become thoroughly Abyssinian, and are distinguished from their fellows only by their religion. Like the native Christians, they are handsomely built, and resemble the nomads of Arabia. They are of medium height, with face oval, nose finely sharpened, mouth well proportioned, lips properly formed and by no means exuberant, sparkling eyes and well-set teeth, and hair somewhat curled or straight. (See FIGUIER, *Les Races Humaines*, Paris, 1872, 8vo, p. 406.) Until the beginning of the nineteenth century they constituted an independent tribe, and were governed by their own prince; in the tenth and twelfth centuries it appears that they even ruled over the Abyssinians. They were subjected by the Amharas about 1800, and are now under the rule of the princes of Tigré. The Falashas speak both the Amharic and a dialect of the Agaon tongue, and are very industrious, devoting themselves to the various trades, particularly architecture; also largely to agriculture. During the late war between Great Britain and their country, many of their number distinguished themselves as able warriors. Unlike other Semites, they are averse to commerce, regarding traffic an obstacle to fidelity and rigor in religious observances. The Falashas, although they possess the whole of the Old Testament or Jewish canon (in the Geez language, a sister-tongue of the Hebrew, Arabic, and Aramean dialects and the mother of the Amharic), together with the apocryphal books accepted by the Abyssinian Church, deviate in many instances from Jewish usages. Thus, the fringed "praying-scarf" (*talith*) and the "phylacteries" are not used in their devotions; and while they retain the usage of offering sacrifices, it is rather as commemorative ceremonies than as real sacrifices. The most common is the offering for the repose of the dead; but no sacrifice is permitted on the sabbath or on the day of atonement. Like other Jews, the Falashah hopes for a return to Jerusalem. Very peculiar are their priests, who live round the enclosures of the temples (which are situ-

ated near the edge of the villages, and have more the appearance of the ancient sanctuary than the modern synagogue), observe the laws of purity with rigor, prepare their own food, and keep aloof from the world. They are principally engaged in the education of youth, making the Bible and tradition the basis of their instruction. Polygamy, though tolerated, is nevertheless discouraged. Slaveholding is suffered, but slave-dealing is strictly forbidden. Slaves are kindly treated, instructed in the laws of Moses, and on conversion are manumitted. Attempts on the part of the London Missionary Society and the Scottish Church Mission to convert the Falashas to Christianity induced the Jewish Alliance Universelle in 1867 to send among them M. Halévy of Paris, to secure their education and to counteract the Christianizing influence of the missionaries. (See, besides works on Abyssinia, HOTTEN, *Abyssinia and its People* (London, 1868), and particularly the articles by HALÉVY in the *Bulletin* of the French Geographical Society for Mar. and Apr., 1869.) JAS. H. WORMAN.

**Falcid'ian Law**, a law under the civil or Roman law system, proposed by a tribune Falcidius during the reign of Augustus, in the year of Rome 714 (A. C. 37), by which it was enacted that testators should not have power to dispose of more than three-fourths of their property by will, and that the remaining one-fourth should descend to the heir. This fourth was termed the "Falcidian portion." No such restriction exists at common law, a testator having an unqualified power to distribute his property entirely among strangers, and leave his family unprovided for if he desires. Among the American States, Louisiana, which has adopted the civil law, has a provision similar to the Falcidian law. In some of the other States restrictive enactments have been made in regard to bequests to charitable corporations or associations. For instance, in New York a testator having a husband, wife, child, or parent living can only leave to such institutions one-half of his property after the payment of his debts. (*Laws* 1860, ch. 360.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Falck'enstein, von** (EDUARD VOGEL), Prussian general of infantry, was b. in Silesia Jan. 5, 1797. He was the son of a Prussian major, but the father d. early, and the mother, unable to educate the boy herself, asked assistance from her relative the prince-bishop of Breslau. The prince-bishop promised to help, but on the condition that the boy should be a clergyman. But at the rising of the Prussian people against Napoleon in 1813, the boy left the ecclesiastical career, and entered as a volunteer into the West Prussian grenadier battalion of Colonel von Klück. He distinguished himself in the battle of the Katzbach, and at Montmirail, when all the officers had fallen, he led the battalion with imperturbable calmness, though a youth of hardly seventeen years. After the war he studied topography with great zeal, and founded a school for glass-painting in Berlin, under the auspices of Friedrich Wilhelm IV. On Mar. 18, 1848, in the riots in Berlin, he was wounded, but took part in the same year in the campaign in Holstein, and became commander of the foot-guards in 1849, and in 1851 colonel and chief of the staff of Wrangel. He held the same position in 1864 during the second war with Denmark, but after the war he was made commander-in-chief of the seventh army corps. In the war of 1866 he commanded against Hanover, Hesse, Nassau, Baden, Würtemberg, and Bavaria, and displayed considerable strategic talent. After the war he received a dotation, was elected to the North German Diet by the city of Königsberg, and spoke energetically for a triennial military service and a strong military budget. During the war of 1870 he held the chief command of the maritime provinces, and organized the whole defence of the Baltic and of the North Sea.

AUGUST NIEMANN.

**Fal'con** [Lat. *falco*], a name applied to various accipitrine (raptorial) birds (birds of prey) of the family Falconidae, and especially to those of the group Falconinæ, including the genus *Falco* and others closely allied to it. In the language of FALCONRY (which see) the term *noble falcon* designates those birds of whatever species which may be trained for use in hawking; the rest are *ignoble*. Others designate the high-flying falcons which stoop upon the prey as *noble*, while those which fly low, chasing the prey, are *ignoble*. The most important of the long-winged, high-flying falcons are the gyrfalcon, the merlin, the lanner, the peregrine, and the white falcon. Of the ignoble birds we may mention the hobby, the goshawk (or falcon gentle), the sparrowhawk, and certain small species of *Hypotriorchis* and *Ierax*, much used in Asia in hawking. Of these, the more important are noticed in this work under their alphabetical heads. Anciently, the term *falcon* designated only female birds, while the male, always smaller and weaker, was called a *falconet*, or *tercel*, whatever the species. The peregrine falcons (*Falco peregrinus*

or *communis*) of Europe and North America and the gyrfalcon (*Falco candicans*) are typical species. The true



Gyrfalcon (*F. candicans*).

falcons are of numerous species, both in the Old and the New World. (See FALCONIDÆ.)

**Falco'ne** (ANIELLO), one of the first and best painters of battle-scenes, a pupil of Spagnoletti and master of Salvatore Rosa, b. in Naples in 1600, and d. in 1665. His paintings are in high esteem, and there are many engravings ascribed to him.

**Fal'coner** (HUGH), M. A., M. D., F. R. S., b. at Forres, Scotland, Sept. 29, 1808; graduated M. A. at Aberdeen 1826; M. D. at Edinburgh 1829; went to India as a surgeon 1830; commenced palæontological explorations in the Siwalik Hills 1831; became superintendent of the botanical garden at Seharanpoor 1832; received the Wollaston medal 1837; became F. R. S. 1845; superintendent of the botanical garden at Calcutta 1847; d. in London Jan. 31, 1865. Published *Selections from the Bostân of Saadi*, 1838; *Fauna Antiqua Sivalensis* (1846, jointly with T. P. Cautley); *Palæontological Memoirs*, 1868.

**Falconer** (WILLIAM), a poet, b. in Edinburgh about 1730, was a barber's son. His brothers and sisters were deaf and dumb. Falconer was bred a sailor, and is best known by his great poem, *The Shipwreck* (1762); published also a *Marine Dictionary* (1769), and various minor poems. Lost at sea in 1769, while purser of the Aurora frigate.

**Falcon'idæ** [from *Falco*, one of the genera], a family of the birds of prey (order Raptores) which is by most naturalists made to include all the order except the vultures and the owls. It includes the eagles, true buzzards, kites, falcons, hawks, etc., which are generally arranged in seven or more sub-families. They all have a bill sharp, curved, and compressed, with a partial cere, a broad tail, long, pointed wings, sharp and curved claws, a sunken eye, and a feathered head and neck.

**Fal'conry** is the art of capturing, rearing, and training falcons for the chase of other birds, and even of small quadrupeds. The name *falconry* was also applied to the aviary or enclosure where the falcons were kept. It appears that the practice of hunting with falcons was introduced into Europe from the East, for Ctesias alludes to the existence of such a custom in India in his time. Marco Polo also, in his *Milione*, speaking of the Tatars, says that their great khan "took with him full ten thousand falconers and good five hundred ger-falcons, with falcons peregrine and falcons *sacre* in great abundance; also he had a great number of goshawks for fowling along the waters," etc. Hawking seems to have passed over from the Tatars to the czars of Muscovy, who took great pleasure in this amusement. (See *Prince Serebriani*), by Alexis Tolstoi, London, 1874.) In Europe this pastime is anterior to the Middle Ages, as, among the later Romans, Martial, Apuleius, and Julius Firmicus make special mention of it.

On the descent of the Lombards into Italy, hawking became much more general, and from this it may be inferred that the ancient Germans were acquainted with it. Charlemagne took great delight in it, and he is said to have kept as many falconers as huntsmen. Pope Gregory IX. appears to have kept falcons. (See DU CANGE, v. *Falco*.) Henry the Fowler received his surname from his passion for this sport. The emperor Frederic II. not only enjoyed hunting with falcons, but he was a master of the art, and even wrote a treatise upon it, annotated by his son Manfred, with the title *De arte venandi cum avibus*. Another treatise on the same subject is attributed to Edward the Confessor of England. Brunetto Latini, in his *Tesoro* (chs. ix., x., xi., xii.), speaks of falconry; Dante reminds him of it in the *Divina Commedia*.

To English readers the most interesting treatise on this subject is that ascribed to Dame Juliana Berners, forming the first part of the *Boke of St. Albans*, first printed in 1481. Among the many continental writings upon falconry should be mentioned *La Venerie et Fauconnerie de Jacques du Pouillou*, Paris, 1535, and the Italian work of Federigo Giorgi, who published in Venice in 1578 a volume entitled *Del Modo di conoscere i buoni falconi, astori e sparrieri, di esercitarli e farli perfetti, di governarli e di medicarli*, describing the various qualities of the falcon and the methods of keeping and caring for it. We learn from the *Glossary* of Du Cange that the privilege of keeping falcons was, in the Middle Ages, confined to the nobility. This, however, does not seem to have been the case in all countries, for in the *Boke of St. Albans* it is stated that certain falcons belonged by right to certain ranks; for instance: "an Egle, a Bawtere, a Meloune, . . . thyse thre by theyr nature belonge unto an Emperor. A Gerfawkon, a Tercell of a Gerfawkon, are dewe to a kyng. There is a Fawkon gentyll; and a Tercell gentyll; and thyse be for a prync. There is a Fawkon of the rooke; and that is for a duke. There is a Fawkon peregryne; and that is for an erle." Then follow various other classes, till we come to "the Merlyon; and that hawke is for a lady;" and finally, "there is a Goshawk; and that is for a yoman. There is a Tercell; and that is for a poore man," etc. From this we must infer that in England, at least, the amusement of hawking was not wholly confined to the nobility. The office of grand falconer at the Byzantine court, in that of England, and in the ducal court of Savoy, was one of the highest dignity. Both the art of falconry and the practice of it, hawking, had their special vocabularies or "kindly speche," the thorough knowledge and accurate use of which were thought highly important as a test of good-breeding and as a means of distinguishing "a gentyman fro a yoman, and from a yoman a vylayne."

A great number of these terms and much other quaint matter on this subject will be found in the *Boke of St. Albans* and the other treatises above quoted. In the fifth chapter of Cibrario's *Della Economia Politica del Medio Evo* is a full description of this sport: "The time of the chase was either early in the morning or towards evening. The sportsmen rode out, with their falcons resting upon their strongly-gloved wrists. When a bird was discovered suited to the nature and the habits of the falcon, the little hood which covered its eyes was drawn off, and the falcon rose in rapid circles high above its destined prey; if the quarry was a small bird, she then suddenly swooped (or stooped, as the phrase was) directly upon her victim; but if the latter was a large and powerful bird, formidable in beak and wing, the falcon was cautious and cunning in her advances, turned and wheeled with great dexterity, seizing only the favorable moment to strike. Having secured the prize, she swept in large circles over the head of the falconer, and finally presented him the booty; the falconer put it in the game-bag, and then set before his falcon the food prepared for her. Falcons which soared high and pursued birds of lofty flight were called *altani*; others took a lower but more extended range; some were for the inland country, others for aquatic birds. These last were assisted by dogs. When, for example, a flock of herons is discovered, the falconer approaches them secretly, and suddenly beats a drum before the herons can get sight of the falcon, otherwise they would not dare to rise. Frightened by the drum, they take to flight; then the sportsman lets loose his falcon, and while she prepares to seize the herons in the air, the barking of the dogs prevents the poor birds from hiding again in the water. Eagles and falcons of the largest species may be trained for this chase, and they will even take foxes and hares." With Eastern sovereigns hawking is still in great favor, but it has almost entirely disappeared from Europe. The rare occasions in which the falcon is now employed are rather scenic representations of the old custom than attempts to revive it. The history of this pastime is especially interesting, as being almost the only outdoor amusement in which women of rank, in the Middle

Ages, took an active part, and it has furnished the writer of fiction with many a romantic situation, the poet and the painter with many a happy illustration. (For more complete information we refer to G. E. FREEMAN, *Falconry, its Claims, History, and Practice*, London, 1859, and the authorities there cited.) ANGELO DE GUBERNATIS.

**Fal'eme**, a river of Senegambia, Western Africa. It is one of the most important tributaries of the Senegal, which it joins in lat. 14° 40' N., lon. 11° 48' W.

**Fal'erii**, powerful city of ancient Etruria, situated N. of Mount Soracte and W. of the Tiber. It is believed to have been one of the twelve cities of the Etruscan confederation. It was often at war with Rome, but in 241 B. C. was conquered and destroyed by that power. A new Roman Falerii was founded near by, whose ruins, 5 miles distant from Nepi, are of great interest. The old Falerii probably stood at Civita Castellana.

**Fal'ernian Wine** [so called from *Falernus Ager*, a region of Campania Felix, where it was grown], the most celebrated of the wines of the ancient Romans, was of three varieties—a light, a sweet, and a dry—as we learn from Pliny. It was very strong and generous, so that it would take fire from a lighted taper. When new it was very harsh and unpleasant. The excellent Massic wines came from the same region, and the two sorts were often confounded. Indeed, the better qualities were called indiscriminately by either name. These regions still produce good wine. From all accounts, the Falernian must have resembled the modern sherry wine.

**Falie'ri** (MARINO), doge of Venice, b. of an eminent family in 1274; served the republic with applause in war and on important embassies; and in 1354, when seventy-nine years old, was chosen to the dogate, soon after which the Venetian fleet was lost in a great battle with the Genoese. Not long after, at a carnival feast, he was grossly insulted, as he conceived, by a young nobleman, and in revenge determined to destroy the whole body of nobles, who were detested by the people. His conspiracy was detected and suppressed, and the doge, after a full confession, was beheaded Apr. 17, 1355. His story has been a favorite one with the poets, dramatists, and even the musical composers—Byron, Delavigne, Hoffman, Donizetti, and others.

**Fal'kirk**, parliamentary borough of Scotland, 24 miles W. N. W. of Edinburgh, on the Edinburgh and Glasgow and Scottish Central Railway, near the old Roman wall of Antoninus and the well-known Carron Iron-works. Its three annual trysts are the largest cattle-fairs in Scotland, sales being made to the amount of nearly £1,000,000. In 1298, Sir William Wallace was defeated here by Edward I., and in 1746 the Highlanders under Prince Charles Edward defeated the royal troops. Pop. in 1881, 13,170.

**Fal'kland**, royal borough of Scotland, in the county of Fife, 22 miles N. of Edinburgh. It is situated at the base of the Lomond Hills, which rise so abruptly behind it as to intercept the rays of the sun from it for several weeks during winter. The remains of Falkland palace are very interesting, both in architectural respects and on account of their connection with the history of James IV. and James V. Pop. in 1881, 1068.

**Falkland** (LUCIUS CARY), VISCOUNT, born at Burford, Oxfordshire, in 1610, was educated at St. John's College, Cambridge. In 1633, upon the death of his father, Lucius succeeded as viscount, and was made by King Charles gentleman of the royal bedchamber. In 1640 he was chosen member of the Short Parliament, and was re-elected to the Long Parliament. Opposed to what seemed to him the excesses and illegalities of the popular party, he entered the lists in defence of the king, and became secretary of state. When civil war broke out he joined the king, fought admirably at the battle of Edgehill, and was killed at the battle of Newbury, Sept. 20, 1643. He wrote various treatises, of which is best known the *Discourse of the Infallibility of the Church of Rome* (best ed. London, 1660, 4to).

**Falkland Islands** [Fr. *Malouines*], a cluster of islands in the South Atlantic Ocean, between lat. 51° and 53° S. and lon. 57° and 62° W., consisting of nearly 200 islands and presenting an area of about 13,000 square miles. Of the two largest islands, respectively called East and West Falkland, and separated from each other by a narrow sound, the former has an area of 3000 square miles, the latter of 2000 square miles; the rest are small islets. On account of the peculiar climate, the thermometer ranging in the winter between 30° and 50°, and in the summer between 40° and 65°, with frequent rain and high winds, the soil is much better adapted to pasturage than to cultivation. No trees, no fruits, scarcely anything but a few vegetables, are raised in the settlement, but the natural grass is extremely luxuriant, and horses and cattle, origin-

ally imported by the Buenos Ayreans and others, have gone on increasing in an astonishing degree. Pigs and rabbits are also abundant, and the coasts teem with fish. The islands were first discovered by Davis in 1592. In 1690 they were visited by Strong, who gave them the name which they now bear. French, Spanish, and English settlements have alternately been formed on them, but the English have ultimately retained possession of them. Port Stanley, a thriving town with an excellent harbor on East Falkland, is an entirely English settlement. Pop. in 1881, 1553.

**Falk Laws, The, or The May Laws.** Paul Ludwig Adalbert Falk, the author of the so-called Falk Laws, or May Laws, was born at Metschkau, in Prussian Silesia, Aug. 10, 1827, studied law at Breslau, received an appointment in the Department of the Interior at Berlin in 1861, and was appointed Prussian minister of worship and education Feb. 22, 1872, which position he held till July 14, 1879. In the so-called Kulturkampf, the contest then raging between the civil and ecclesiastical authorities in Germany—or rather between the Prussian government and the Ultramontane party of the Roman Catholic Church—he played a very prominent part, carrying through the Prussian diet a series of laws which radically changed the relations of Church and State, at least so far as the Roman Catholic community was concerned. The first of those laws was passed in March, 1872, and transferred the superintendence of the primary schools from the Church to the State by ordering that the inspector of schools should be a layman, and a ministerial order of June of the same year almost completely excluded the Roman Catholic Church from exercising any influence on the schools by forbidding the members of the religious orders to teach in them. By a law of November, 1872, a supreme ecclesiastical court was established, which enabled the government to deal in an effective manner with refractory bishops, and another law, of March, 1873, considerably restrained the power of the bishops over the inferior clergy, and the power of the clergy in general over the laity. At the same time, civil marriage was made obligatory, the religious orders living within the boundaries of the Prussian kingdom were forbidden to receive new members, the control of church-property was transferred from the clergy to boards of trustees composed of laymen, and a law of April, 1875, required the whole clergy, inclusive of bishops, to sign a declaration of obedience to the laws of the State before entering upon office.

**Fal'köping**, town in Sweden, Westergöthland, known by the battle of 1389, in which the Danish queen Margrethe conquered the army of the Swedish king Albrecht, and took him prisoner. This victory led to the famous Union of Calmar, 1397.

**Fal'lacy** [Lat. *fallacia*, from *fallax*, "deceitful;" *fullo*, to "deceive"], in logic, is produced by an incorrect performance of the process of reasoning. Not every wrong notion is a fallacy. If the process of reasoning is performed correctly, and the wrong notion rises either from a biased and prejudiced assumption of distorted premises or from a weak and groping confidence in insufficient premises, it is in the first case an error—in the last, a mistake. Only when the wrong notion is the result of a fault in the reasoning process itself is it a fallacy, properly speaking.

As the whole process of reasoning can be reduced to the making of inferences, and as the fundamental character of all inferences is the syllogism, the fallacy may be defined as the result of some fault in the formation of the syllogism. And furthermore, as all faults which can be committed in the formation of a syllogism rise either from the two propositions being a repetition of each other, and consequently incapable of producing any legitimate third proposition, or from their being wholly incongruous, lacking the true middle term, which alone could draw the premises together into a conclusion, all fallacies fall into two classes corresponding to these two divisions of faulty syllogisms, and may be characterized either as a reasoning in a circle or as a jumping to the conclusion.

The first kind of logical fallacy, the reasoning in a circle—which, in the terminology of the old logical systems, was called a *petitio principii*—consists in proving one position by assuming another which is identical with it. Of all kinds of logical fallacies, this is the most desperate. When a person is caught by such a fallacy, debate must stop; when an age is caught, civilization must stop. It acts on the mind like a magical ring. A person or an age may move around in it, around and around, with steadily increasing passions, and there is no escape from it unless through a revolutionary concussion of the whole mind. It is of most frequent occurrence in theological matters, and in those questions of politics which it seems

impossible to solve satisfactorily by the mere application of the principle of expediency, without any intermediate agency of moral principles.

The other kind of logical fallacy—which, in accordance with a striking expression from every-day conversation, I have characterized as a “jumping to the conclusion”—is much less dangerous, though much more frequent, and comprises a great number of distinct forms, which the old logic describes as the fallacy of the *equivocatio*, *accidens*, *argumentum ad hominem*, *post hoc ergo propter hoc*, *undistributed middle*, etc. The general characteristic of all these different forms is the application of a middle term composed not of truly constituent, but of merely accidental, qualifications of the two ideas which it is put to combine. Thus, in a comedy of Holberg, Erasmus Montanus proves that his mother is a stone in this way:

A stone cannot fly; you cannot fly. *Ergo*, You are a stone. A more thoroughgoing definition of the terms will, in most cases, be able to destroy this kind of logical fallacy, which, however, has become dangerously frequent in our days in cases in which statistics are applied to the solution of historical or moral questions. Thus Mr. Buckle, in his “History of Civilization in England,” reasons as follows: “Necessary laws exclude free will. Statistics show the existence of necessary laws in history. *Ergo*, free will is excluded from history.” Any definition of history which in any way can pretend to cover the field which in reality belongs to the idea will break this syllogism to pieces, and show the fallacy of the conclusion.

It must be noticed, however, that even when a fallacy of this kind shows us a fault in the construction of the syllogism, thus making the incorrectness of the performance of the process of reasoning perfectly apparent, it generally originates in a wilful or otherwise unwarranted assumption of premises; and in his book on logic Mill treats fallacies of this kind as errors and mistakes, though he retains the name of fallacy. CLEMENS PETERSEN.

**Fallet** (NICOLAS), born at Langres, in the department of Haute-Marne, France, in 1753, died in Paris Dec. 22, 1801. He was the son of a hatter, and was destined for the bar; but, irresistibly drawn toward literature, he removed to Paris, where he became a contributor to the *Gazette de France*, the *Journal de Paris*, and the *Dictionnaire universel*. He wrote several tragedies (*Barneveldt*, 1775; *Ti-bère*, 1783, which was parodied by Radet), several comedies and comic operas (*Matthieu*, represented at Fontainebleau in 1783, and afterward in Paris; *Les fousées Nouvelles*), and several collections of poems (*Mes Premices*, 1773; *Mes Bagatelles*, 1776).

**Falling Bodies.** Among the earliest ideas derived from experience are those of *weight* and of the direction *up and down*. All material bodies tend downward with more or less force, and the measure of this tendency in each is the weight of that body. The tendency itself is imputed to an influence called *gravitation* inherent in matter universally (see GRAVITATION), and is the resultant of the mutual attractions which take place between all the material particles of the body and those of the earth. When this tendency is adequately resisted, the body is said to be supported, and it remains at rest; when the resistance is withdrawn, the body falls. Observation of bodies falling naturally shows that all do not fall equally fast. A metal bullet descends with great rapidity; shreds of paper flutter downward slowly; some very light substances, like the down of feathers or the winged seeds of plants, seem scarcely to descend at all; and some, relatively lighter still, like bubbles and balloons, even rise. But when we observe that if heavy bodies be immersed in water the differences and seeming anomalies of this kind which occur are much more numerous and more remarkable still, we soon learn to attribute the unequal velocities with which bodies fall in the atmosphere to the buoyant power of the air, and the resistance it opposes to bodies moving through it. If, in order to test the truth of this hypothesis, we make the experiment of dropping from the same support, at the same instant, in a tall receiver exhausted of its air, two substances so physically different as a bullet and a bit of thistle-down, we shall find our anticipation confirmed; for the velocity of fall will be the same for both, and the two will reach the bottom together. If we would inquire, therefore, the laws which govern the fall of bodies, we must consider bodies as falling *freely*—that is to say, *in vacuo*. The buoyant power of the air simply diminishes the downward tendency and velocity of descent; it is the resistance to motion which disturbs the law of fall.

This resistance is proportioned to extent of surface; the weight or urging force is proportioned to density. Bodies of large specific gravity, exposing small surface, are very little interfered with in their fall (at least, through the heights to which observation can extend) by atmospheric

resistance. But the densest substances, when spread out into thin laminæ, such as gold and silver in leaf, fall as irregularly and as slowly as tissue-paper or down.

The earliest experiments on the fall of bodies were made by Galileo at Pisa, who took advantage of the favorable opportunity offered by the famous leaning tower of that city—which is 180 feet in height, and overhangs its base by about 14 feet—to observe the effects produced upon the time and velocity of fall by changing the form and the material of the body subjected to experiment. He deduced the correct conclusion that in the absence of the air all bodies, without regard to their form or density, would fall with the same velocity; but in his time this truth could not be experimentally demonstrated, since the air-pump was then unknown.

The law governing the motion of a body falling freely may be abstractly inferred by considering the relation of force to motion. Velocity in a given body is proportional to the force impressed. As gravity is a *constant* force (that is, a force which acts all the time), it imparts every instant to the falling body a minute addition, always the same in amount, to the velocity which the body had before. Thus, this velocity goes on increasing, and increases equally in equal times—in technical language it is uniformly accelerated—and the final velocity is always proportional to the time which has elapsed since the fall began. By experiment it is found that a body, in falling from a state of rest, acquires, in one second of time, a velocity which, continued uniformly, would carry it over 32.2 feet in a second. If, then, we put 32.2 ft. =  $g$ , and represent any other time in seconds (whole or fractional) by  $t$ , and also represent the final velocity by  $v$ , we shall have  $v = gt$ .

The expression for space  $s$ , fallen through in time  $t$ , is not so obvious, because the velocity is not uniform. But since, for uniform velocity, we have  $s = vt$ , if we suppose the time  $t$  to be divided into an indefinite number ( $=n$ ) of minute parts, during each one of which the velocity remains uniform, while the velocities, in the successive instants denoted by  $v_1, v_2, v_3, \dots, v_n$ , etc., uniformly increase, and the final velocity  $v_n$  is equal to  $v$ —that is, to the velocity acquired by falling through the whole time,  $t$ —then the sum of all the spaces  $s_1 = v_1 t/n, s_2 = v_2 t/n, \dots, s_n = v_n t/n$ , will be equal (with only a very minute error) to  $s$ , the whole space fallen through

in time  $t$ . By making  $n$  infinitely great,  $t/n$  becomes infinitely small, and  $s_1 + s_2 + s_3 + \dots + s_n = s$ . But  $s_1 + s_2, \dots$  etc. is an arithmetical series, of which the sum is equal to half the sum of the extremes multiplied by the number of terms. Hence,

$$s = \frac{s_1 + s_n}{2} = \frac{v_1 + v_n}{2} \cdot \frac{t}{n} \cdot n.$$

Or as, on this supposition,  $v_1$  is so small to be appreciable,  $s = \frac{1}{2} v_n t = \frac{1}{2} vt$ . And as  $v = gt$ , we have, finally, by substitution,  $s = \frac{1}{2} gt^2$ . If  $t = 1$  second,  $s = \frac{1}{2} g = 16.1$  feet. That is, the space fallen through in one second from rest is half that through which the acquired velocity would cause it subsequently to move if continued uniform for another second. This proposition may be stated conversely and generally thus: The velocity acquired by a body in falling from rest during the time  $t$  is such as, continued uniform, would carry it in an equal time over twice the space through which it has fallen to acquire that velocity. The following table shows the spaces fallen during the number of seconds or fractional parts of seconds specified in it, the distances through which the acquired velocity, continued uniform, would carry the body in a time equal to the time of fall, and the acquired velocity (per second) itself:

$t$ = time of fall, seconds or fractions.	$s$ = space fallen, feet and decimals.	$d$ = distance in time $t$ , with vel. = $v$ .	$v$ = vel. acquired by fall, in feet.
0.001	0.000016	0.000032	0.0322
0.01	0.00161	0.00322	0.322
0.1	0.1610	0.3220	3.220
$\frac{1}{2}$	0.2516	0.5081	4.025
$\frac{3}{4}$	1.0062	2.0185	8.050
1	4.0250	8.0500	16.100
$\frac{3}{2}$	9.0562	18.1125	24.150
$\frac{5}{4}$	12.3284	24.6568	28.175
2	16.1	32.2	32.2
3	64.4	128.8	64.4
4	144.9	289.8	96.6
5	257.6	515.2	128.8
6	402.5	805.0	161.0
7	579.6	1159.2	193.2
8	788.9	1577.8	225.4
9	1030.4	2060.8	257.6
10	1304.1	2608.2	289.8
11	1610.1	3220.0	322.0
12	2318.4	4636.8	386.4
13	4622.5	9245.0	458.0
14	5216.4	10432.8	579.6
15	6440.0	12880.0	644.0

The value of  $g$  = the velocity acquired in one second of fall, is commonly said to represent the accelerating force of gravity; and this varies slightly with the latitude of the place, being greatest at the poles of the earth and least at the equator. The value 32.2 ft. corresponds to about latitude  $45^\circ$ , and for ordinary uses may be taken as true everywhere.

Of the three quantities  $s$ ,  $v$ , and  $t$ , if any one be known, the other two may be found from the following formulæ, of which two have been given above and the rest are deducible from them:

$$\begin{array}{lll} 1. s = \frac{1}{2}gt^2. & 3. t = \frac{v}{g}. & 5. v = gt. \\ 2. s = \frac{v^2}{2g}. & 4. t = \sqrt{\frac{2s}{g}}. & 6. v = \sqrt{2gs}. \end{array}$$

If a body be projected downward with the velocity  $v_a$ , it is obvious that, for the space passed over in the time  $t$ , there must be added the space  $v_at$  due to the velocity of projection, to  $\frac{1}{2}gt^2$  due to gravity; hence  $s = v_at + \frac{1}{2}gt^2$ . But if the body be projected directly upward, the gravity opposes the ascent, and  $s = v_at - \frac{1}{2}gt^2$ . Substituting for  $gt$  from (5) we have  $s = v_at - \frac{1}{2}vt$ . The space  $s$  is maximum when the projectile force is exhausted, and the body then falls again as from rest. On reaching the point from which it was projected, it will have re-acquired the velocity  $v_a$ , lost in ascending, which will also be the velocity  $v$  imparted by gravity. Hence, when the space  $s$  described by a body projected vertically upward becomes maximum,  $v_a = v$ ; and  $s = v_at - \frac{1}{2}vt = vt - \frac{1}{2}vt = \frac{1}{2}vt$ ; that is, the body will ascend to the same height from which it must have fallen to acquire the velocity of projection. A cannon-ball leaves the gun with a velocity of about 1200 feet per second. If fired directly upward, it ought to rise  $1200^2 \div 64.4 = 22,360$  feet, or nearly  $4\frac{1}{2}$  miles, and be absent 74.534 seconds (time of rise and fall), when it should return with the original velocity of 1200 feet. But the resistance of the air at such high velocities is so great that these anticipations will be far from being realized.

The motions of bodies descending inclined planes (without friction) are governed by the same laws as those of bodies falling freely, the urging force being reduced, however, in the ratio of radius to the sine of inclination. If  $\alpha$  be the angle of inclination, all the foregoing formulæ will be made applicable to this case, by substituting  $g \sin. \alpha$  for  $g$  wherever this letter occurs. As  $v = \sqrt{2gs}$ , and as  $s = l$ , the length of the plane, when the body descends it to the bottom, we have  $v = \sqrt{2gl \sin. \alpha}$ . But  $l \sin. \alpha = h$ , the height of the plane, or  $v = \sqrt{2gh}$ . Hence the velocity acquired by a body in descending an inclined plane is precisely the same as that attained in falling freely through the vertical height of the plane. Also, putting  $t$ , for the time of descent of the plane,

$$\text{Since } t = \frac{\sqrt{2l}}{g \sin. \alpha} = \frac{\sqrt{2l \sin. \alpha}}{g \sin.^2 \alpha} = \frac{1}{\sin. \alpha} \sqrt{\frac{2h}{g}} = \frac{t}{\sin. \alpha};$$

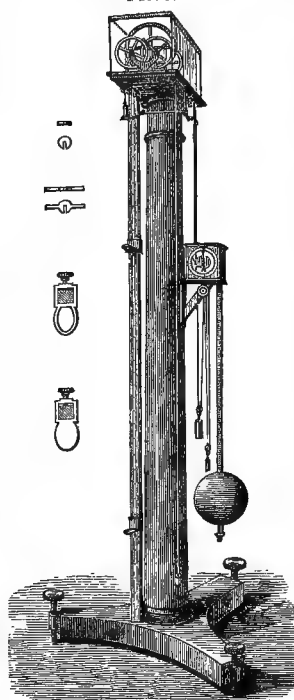
hence,  $t, \sin. \alpha = t$ ; or  $t : t :: 1 : \sin. \alpha :: l : h$ .

That is, the time down the plane is to the time of falling through the height of the plane as the length of the plane is to its height; and if any number of planes have the same height, the several times of descent down them will be as their respective lengths. Hence, if a plane be one foot high and forty feet long, a body will be ten seconds in descending it; if of the same height and twenty feet long, five seconds. With four feet height and eighty feet length, the time will be ten seconds; with the same height and forty feet length, five seconds. Owing to the retardation of velocity and the protraction of the time of descent of bodies upon inclined planes, the experimental investigation of the motion of falling bodies is much easier upon such planes than when bodies fall freely, the resistance of the atmosphere being also greatly reduced. Hence, Galileo made use of such planes for the purpose of determining the laws of fall. Since his time more elaborate instrumental means have been devised for accomplishing the same result, of which the most important are the machines of Atwood, Morin, and Bourbouze.

Atwood's machine is briefly described under that name in our first volume, but this is the proper place to explain its uses. The appearance of the machine is shown in Fig. 1. An upright column about eight feet high sustains a small platform on which the essential part of the machine rests. This consists of a light wheel delicately supported upon large friction-wheels, and carrying two equal weights suspended at the extremities of a slender and very flexible silken cord, which runs in a groove upon its circumference. While these two weights continue to be equal the system remains at rest, but if an additional weight, however small, be placed upon either, this one will descend, and in de-

scending will generate a velocity in a given time as many times less than that produced in the same time by gravity

FIG. 1.



Atwood's Machine.

the distances of descent are to be noted. A clock, supported by a bracket on the side of the column, is connected with the movable arm above mentioned by a mechanism which causes the arm to drop just as the second-hand marks zero. Sliding on the scale is a small movable brass stage, which may be placed at any point at which it is desired to arrest the fall. And there is also a ring sliding on the same scale, on which the load of the descending weight may rest, leaving the weight afterwards to descend unloaded. The forms of the weights used as loads may be seen represented on the left in the figure, where also are given direct views of the stage and ring. The loading weights designed to be arrested by the ring are constructed with arms. The others are simple disks notched to the centre, that they may not interfere with the suspending hook and cord. The clock marks the seconds with a loud tick. The moment at which the load is taken off by the ring, or at which the moving weight strikes the stage, is indicated by the sound of the contact. The law of motion is illustrated by noting the points on the scale at which coincidence takes place between these sounds and the beats of the clock. Thus, if as above supposed, the load is one sixty-fourth of the whole moving mass, and the stage is fixed three inches below zero, the stroke of the weight on the stage will coincide exactly with the first beat of the clock heard after the movement begins. But in order that coincidence may occur at the second beat, the stage must be placed at four times as great a distance down, or at twelve inches. For coincidence at the third beat the distance must be nine times as great, or twenty-seven inches. In like manner four seconds require sixteen times as great a distance; and five seconds, twenty-five times, or seventy-five inches, which is equal to six feet and three inches. This illustrates the law of uniform acceleration theoretically established above—viz. that the space is as the square of the time. If, however, the moving weight be unloaded at the distance three, by placing the ring at that point, then its subsequent motion will not be accelerated, but uniform, and its velocity will be  $2 \times 3'' = 6''$ ; so that it will take it twelve additional seconds (or thirteen in all) to reach the stage at the seventy-fifth inch—a point which, under the previously supposed conditions, it reaches in five.

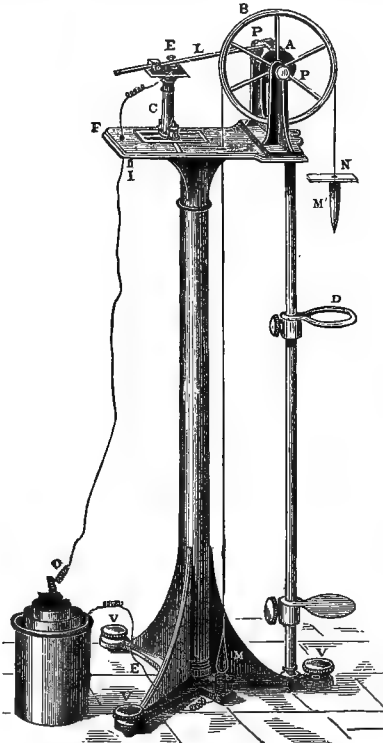
The apparatus of Bourbouze, represented in Fig. 2, offers some advantages, in respect to the accuracy of its indications, over that just described. This has the pulley, weights, ring, and stage of Atwood's. The pulley also sometimes runs on friction-wheels, though none are shown in this figure. But this machine differs from the other in being provided with a light cylinder on the same axis with the

in bodies falling freely as the added weight is less than the entire mass moved. It is common, in experimenting with this machine, to employ weights having a definite proportion to this mass. Thus, if the whole mass is sixty-four times as heavy as the added weight which furnishes the motive-power, the velocity generated in one second will be the sixty-fourth part of thirty-two feet (disregarding for the moment the fraction); that is to say, six inches. And as the space fallen through in the first second from rest is only half as great as that which expresses the acquired velocity, the weights of the machine will move only three inches in this first second. In preparing for experiment, one of the weights is loaded and raised nearly to the platform at the top of the column, where it is detained by a movable arm brought beneath it, and is held at rest at the zero of a divided scale, shown in the figure, on which



pulley, on which rests the extremity of a delicate tracer, L. This tracer is an elastic spring capable of a slight lateral

FIG. 2.



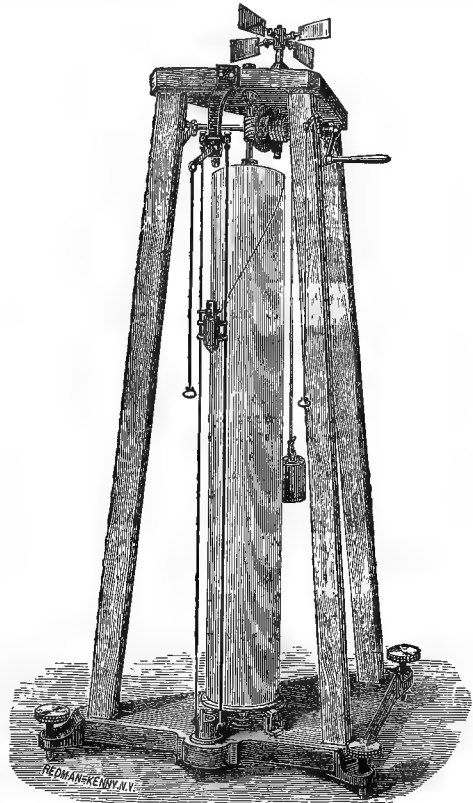
Bourbouze's Modification of Atwood's Machine.

vibratory motion, which is maintained during the experiment by an electro-magnet, E, of which the exciting battery is seen at O; the battery circuit being alternately closed and broken by the vibration itself. The same battery excites an electro-magnet at M, which holds one of the pulley-weights at M', though loaded with the additional weight N. If the circuit is momentarily broken, the weight M is released and M' falls. The tracer then describes upon the surface of the cylinder A a sinuous curve, in which the summits of the successive undulations will be equidistant if the motion is uniform, and gradually increasing in distance if it is accelerated. As the vibrations of elastic bodies are isochronous, the undulations are described in equal times, and the distances of the successive summits from the beginning of the trace are proportional to the distances simultaneously passed over by the weight M'. In order to prevent the curves described in the successive revolutions from confusing or obliterating each other, the cylinder is made to run upon a helicoidal axis which gradually displaces it laterally. And since it is necessary that the motion shall be as little interfered with as possible by the friction of the tracer, the surface of the cylinder is covered with paper coated with lampblack from the smoke of burning camphor. It adds to the exactness of the measurements between the successive sinuosities to allow the machine, after having prepared it for the experiment, to run for a few seconds without attaching the battery. The trace will then be a simple line without sinuosities. Afterwards, on restoring the original arrangement, connecting the battery, and experimenting in the usual manner, the undulating line described by the tracer will cross the mean line previously traced, at intervals of time exactly equal, and the intersections thus formed will afford more definite points of reference in measurement than are found in the rounded summits of the undulations.

Morin's machine, which remains to be described, is represented in Fig. 3. The essential part of this machine is a vertical cylinder six or seven feet high, turning easily upon its axis of figure, and driven by clockwork and a descending weight. A wind-vane regulator serves to maintain uniformity of motion. The cylinder is closely covered with white paper, which ought to be ruled with equidistant parallel lines, both horizontally and vertically. A weight, which is perfectly free to fall when released from a detent at the top of the machine, is guided in its fall by a couple of wires stretched vertically, and carries in its descent a pencil, of which the point is kept by a light spring in con-

tact with the paper wrapping the revolving cylinder. The machine, after being started, is allowed to run until the

FIG. 3.



Morin's Apparatus.

rotation becomes sensibly uniform, when the detent is touched and the weight allowed to fall. The velocity of descent being accelerated, while that of the rotation is uniform, a trace will be described by the pencil, which, as the resultant of these two motions, will be necessarily a curve. By measuring the co-ordinates of this curve, which the regular ruling of the paper will make an easy process, it will be found to have the properties of a parabola; and from this the law of acceleration is at once deduced, and is found to be identical with the law determined by theory.

F. A. P. BARNARD.

#### Falling Stars. See METEORS.

**Fallmerayer** (JAKOB PHILIP), b. at Tschötsch in Tyrol Dec. 10, 1791, d. at Munich Apr. 26, 1861, known as a traveller, political agitator, and historical investigator. His contributions to the history of Greece during the Middle Ages are of great value (*Geschichte des Kaiserthums Trapezunt*, Munich, 1827; *Geschichte der Halbinsel Morea im Mittelalter*, Stuttgart, 1830-36, etc.). He was the first who asserted that the modern Greeks are a completely Slavonian race, without one drop of true Greek blood in them.

**Fall of Man**, in theology, the lapse of the first man, and through him the lapse of the race, from the state of integrity into that of corruption. The myths and legends of paganism have many parallels with the Scripture account of the Fall. The tree of knowledge is generally regarded as simply affording the means of testing man, not as having in its fruit any special objective character. The serpent is simply organic and instrumental, the mask of the real tempter, the devil. The sin of the Fall is apostasy from moral fellowship with God, caused by abuse of the freedom of the will, and followed by the loss of the divine image and by liability to temporal and eternal death on the part of Adam and his posterity. Various explanations have been urged as substitutes for the historical sense of the narrative, both in ancient and modern times. The Ophites regarded the serpent as incarnate Wisdom. Many modern German thinkers consider the Fall as a necessary part of man's development in reason and character, "the happiest event in human history." Hase calls it "the image of that which occurs in every man." Nietzsche says, "it is true history, but not actual." (A statement and vindication of the received view will be found in KRAUTH'S

*Conservative Reformation*, 376-455, and Hodge's *Systematic Theology*, ii. 123-129.) C. P. KRAUTH.

**Fallopian Tubes** [named from Fallopius, long reputed as their discoverer], or more properly **Oviducts**, in the higher animals, two canals in the free margin of the broad ligaments of the uterus, one on either side, extending from the ovary to the uterus. In woman the tubes are each about four inches long, with a very narrow passage along the inner half of the length, but much larger outward. The inner end opens into the cavity of the uterus, and the trumpet-shaped outward end opens into the abdominal cavity. The outward end is frimbriated with fringe-like processes, and has been called *cornu diaboli*. The oviducts are identical with what are called Müller's ducts in the foetus. Birds have but one developed oviduct. In most marsupials each tube serves as a separate uterus. In the higher animals the uterus and vagina are regarded as formed by the union of the oviducts. The office of the Fallopian tubes is to convey the ovum from the ovary to the uterus.

REVISED BY WILLARD PARKER.

**Fallop'ius, or Fallopio** (GABRIELE), an illustrious anatomist, b. at Modena in 1523, or, according to Tomassini, in 1490. With Vesalius and Eustachius (the latter his rival) Fallopius has the honor of being the chief restorer of anatomical science; he taught at Ferrara and Pisa, and in 1551 became professor of anatomy and surgery at Padua and director of the botanic gardens. His name is given to the Fallopian tubes, which he did not first discover, though he first suggested correctly their use.

**Falloux, de** (FRÉDÉRIC ALFRED PIERRE), VICOMTE, b. at Angers, France, May 7, 1811, became distinguished as a political leader of the Catholic party, but retired from public life in 1851; became one of the editors of the *Correspondant* in 1855; and is known by his *Histoire de Louis XVI.* (1840), a Legitimist work; *Histoire de Pie V.*, 1844; *Madame Swetchine, sa vie et ses œuvres*, 1859; and another volume of Madame Swetchine's letters, 1866; some devotional works; also, in 1882, two volumes of political speeches and some writings.

**Fal'low**, a name formerly applied to land which is allowed to rest after cropping for one or more seasons with no tillage, except perhaps one or more ploughings. Such are now called *naked fallows*. The custom is a very ancient one, and is chiefly useful on heavy soils, where it acts probably by way of liberating plant-food from hitherto unavailable compounds. It has, among the best farmers, given way to what is called the green fallow, of which the clover-fallow is one of the best kinds. Some green crop, as clover or buckwheat, is grown and allowed to rot on the surface, or is ploughed under. This crop serves at once to choke the weeds and to fertilize the land, and the growing crop saves the soil from blowing away in the winds, which in naked fallows causes a serious loss.

**Fallow Deer** [*fallow* means "pale yellow"], the most common deer of Europe, found also in Northern Africa, is the *Dama vulgaris*. Though now very common in England, it was introduced there, but very early, it is supposed by the Roman colonists. In a wild state it only exists in Southern Europe, but in the later Tertiary its range extends farther N. In summer it is beautifully mottled. The male is called a buck, the female a doe, the young a fawn. The doe is without horns. The venison of the fallow deer is regarded as the most savory known. It is smaller than the stag, and has more spreading and palmated horns. It goes in herds, and each herd has its master, an old buck which all the others obey.

**Fallows** (SAMUEL), D. D. See APPENDIX.

**Fall River**, city and important R. R. centre of Bristol co., Mass. (see map of Massachusetts, ref. 5-I, for location of county), in lat. 40° 42' 3" N., lon. 71° 9' 37 1/2" W., on the Rhode Island border, on the eastern side of Mount Hope Bay, the north-eastern arm of Narragansett Bay, and along Taunton River, some 20 miles from the sea. It is about 9 miles in length, comprising 2 1/2 square miles; is 4 1/2 miles S. of Boston, Mass., 20 from Providence, R. I., 15 from Taunton, Mass., 13 from New Bedford, Mass., and 18 from Newport, R. I., being central to them all and connected with each by railway. It is at the head of deep-water navigation, and the terminus of a line of steamers from New York.

**Manufactures.**—The census of 1880 showed 258 manufacturing establishments; capital, \$25,076,518; average number of hands employed, 17,085; wages paid during the year, \$4,659,077; value of products, \$18,913,584. The industries comprise iron-works that run 105 nail-machines and turn out 120,000 kegs of nails yearly; large calico print-works (the American), which has over 900 employes and runs 20 machines, and turns out 1,485,000 yards or 33,000 pieces of calico per week; 1 woollen-factory; 36 cotton-mills, turning out some

467,250,000 yards per annum, mostly print cloths; a large bleachery, a spool and bobbin factory employing 120 hands, and a multitude of mechanical enterprises connected with the cotton manufacture. The capital employed in these industries is over \$21,000,000, keeping in motion 1,678,016 spindles and 39,297 looms.

The city contains water-works, completed at a cost of \$1,500,000, bringing the water from Watuppa Lake, a beautiful sheet of water 10 miles long in the eastern part of the city; an efficient paid fire department with fire-alarm telegraph; immense granite-quarries; a large coast-wise shipping-trade; a children's home; a free public library and reading-room; a high school, 3 large graded grammar and many primary schools; and a public-park of 60 acres. Fall River was first settled in 1659, incorporated as a town in 1803, and became a city in 1854. Pop. in 1870, 26,766; in 1880, 48,961. ALMY & MILNE, PUBLS. OF "DAILY EVENING AND WEEKLY NEWS."

**Falls City**, capital of Richardson co., Neb. (see map of Nebraska, ref. 11-H, for location of county), 9 miles W. of the Missouri River, in the Great Nemaha Valley and on R. R. It has good schools, excellent flouring-mills, and a broom-factory; also a pork-packing house. Pop. in 1870, 607; in 1880, 1583; in 1885, 2070.

**Falls of Montmorenci**, a celebrated waterfall and village in the counties of Quebec and Montmorenci, province of Quebec, Canada. Here the river Montmorenci falls from a precipice 250 feet high directly into the St. Lawrence, 7 miles below Quebec. The village at this point has a population of about 850, and has manufactures of lumber. The falls are visited by great numbers of travellers in summer, when the scene is one of great beauty. In winter very large and remarkable cones of ice form here.

**Fal'mouth**, parliamentary and municipal borough of England, in the county of Cornwall, on a branch of the estuary of the Fal, which here forms one of the best harbors in England, 5 by 1 to 2 miles in extent, 12 to 18 fathoms deep, and capable of sheltering 500 vessels at a time. It is a rendezvous for fleets and mail-packets. Pop. in 1881, 5973.

**Falmouth**, capital of Pendleton co., Ky. (see map of Kentucky, ref. 2-I, for location of county), on R. R., 39 miles S. by E. of Covington, and on the Licking River. Pop. in 1870, 614; in 1880, 967.

**Falmouth**, post-t. of Barnstable co., Mass. (see map of Massachusetts, ref. 5-K, for location of county), at the extreme W. end of Cape Cod, on the shores of Buzzard's Bay and Vineyard Sound. It has a spacious harbor at Wood's Holl, which is safe, never freezes, and is of sufficient depth for the largest ships or steamers. The Pacific Guano Co. at Wood's Holl has a capital of \$1,000,000. Falmouth is rapidly becoming noted as a watering-place, and Falmouth Heights has already attained a wide reputation as a seaside resort. Pop. in 1870, 2237; in 1880, 2422.

**False Bay** is an inlet on the E. side of the mountainous district of South Africa which terminates in the Cape of Good Hope. As it is sheltered from the N. W. monsoon, to which the harbor of Cape Town is exposed, it receives periodically all trading-vessels from Cape Town for temporary protection, and it is the permanent station of the naval force of the colony.

**False Imprisonment**, an unlawful deprivation of personal liberty. It is not necessary to constitute this offence that there should be an actual incarceration of the person, or that any actual force should be employed in procuring the wrongful restraint. An unwarrantable detention in a private apartment, or even in a public highway, is sufficient, and there need be no other exercise of power than a mere command or direction to submit to arrest, provided it is accompanied with such a display of authority, or such threats of compulsion, or exhibition of means to procure compliance, as naturally lead the person accosted to believe that he is submitting to legal authority, or that he will be forced to yield if he attempts resistance. It is enough that one's voluntary control and direction of his own movements is wrongfully interfered with. False imprisonment usually occurs from the unjustifiable exercise of pretended legal authority, as by arresting without process when process is known to be necessary, or when there is a mistaken assumption that a case is one in which no process is required to sanction an arrest. For instance, a constable or other peace-officer has power to arrest without warrant if he have reasonable ground of suspicion that a felony has been committed and that the person whom he seeks to detain is the offender. In like manner, a private individual needs no legal process to justify him in taking into custody the supposed perpetrator of a felony whose guilt is reasonably presumable. A private person's privilege in this respect, however, is more restricted than

that of a constable, for mere suspicion that the offence has been committed is not enough, but it must be shown to have actually occurred, even though the party suspected be in fact innocent. Furthermore, any person, whether he be an officer or not, in whose presence a breach of the peace is committed, may detain the wrongdoer and deliver him to the proper legal authorities for punishment. But whenever the right of arrest without warrant is exercised, a just occasion must be shown to exist by the entire correspondence of the circumstances of the case with those requirements which alone afford a sufficient cause for detention without process, or the person making the arrest will be guilty of false imprisonment. In all other grades of offence legal process is necessary to justify an arrest, and without it any restraint or detention of a person is unlawful. So an arrest is invalid and wrongful, even if made under color of process, if the process be void from some irregularity or defect, or if the arrest be made on an unlawful occasion, as on Sunday or a legal holiday, upon civil process merely. All who are engaged in a wrongful interference with a person's liberty, either as principals or instigators, or those who are indirectly its cause, as by suing out illegal process, knowing it to be unjustifiable, are guilty of an unlawful arrest, and equally punishable.

The remedies for false imprisonment are adapted to secure either a restoration of the person confined to liberty, as by writ of HABEAS CORPUS (which see), or the punishment of the party who is chargeable with the wrongful confinement, as by a civil action for damages or a criminal indictment. The jealous care and watchfulness with which the right of personal liberty is protected at common law, and the numerous safeguards which have been provided to secure its unhampered exercise, are abundantly indicated by this variety of remedies, and by the strict rules which confine the power of arrest without process within narrow limits, only permitting its exercise when offences of a particularly criminal character are to be punished, and when any requirement of delay for the purpose of obtaining a warrant would be attended with danger to the welfare of the community. The high degree of civil liberty which English-speaking peoples have developed and maintained so sedulously is an outgrowth of that sense of personal independence and individuality of which the law of false imprisonment furnishes so ample and noteworthy an exemplification. GEORGE CHASE. REVISED BY T. W. DWIGHT.

**False Pretences.** See CHEAT, by PROF. T. W. DWIGHT, LL.D.

**Falsetto.** See FALSE, by WILLIAM STAUNTON, S. T. D.

**Fal'ster.** Danish island in the Baltic, separated from Seeland, Möen, and Laaland by very narrow straits. It is very low, entirely flat, and somewhat unhealthy, but it is very fruitful and well cultivated. It has an area of 178 square miles, and a population of 32,413. The principal town is Nykjöbing, on the Guldborgsund, between Falster and Laaland.

**Fa'un, or Fah'un.** town of Sweden, situated at Lake Runn, 120 miles N. W. of Stockholm. It is famous for its copper-mines, which gave Gustavus Adolphus occasion to call it "the treasury of Sweden," but at that time the mines yielded 3000 tons annually, while at present they yield only 400 tons. Pop. 7305.

**Faluns,** a name given to a sub-division of the miocene tertiary in the valley of the Loire, France. The Falunian beds of D'Orbigny include the *gres de Fontainebleau*—the upper portion of the eocene—and also the overlying miocene strata.

**Famagos'ta, or Famagusta,** city on the eastern coast of Cyprus. From the twelfth to the eighteenth century, while Cyprus was under the Venetian rule, Famagosta was one of the principal commercial cities of the Levant, but now its defences, warehouses, palaces, and churches are in ruins, and its harbor is choked up by sand. It is inhabited by 200 or 300 Greeks.

**Famil'ars** [so called because they belonged to the official family of the inquisitor], officials of the Inquisition, whose office it was to take suspected persons and convey them to a place of confinement. Familiars received large indulgences from various popes. The office was highly honorable in the popular view, and even noblemen and their sons were willing to possess it.

**Familiar Spirits** [derived by some from *familia*, denoting intimacy; by others from *famulus*, denoting subjection and service], demons supposed to be in attendance upon fortune-tellers, necromancers, and the like. The original Hebrew word (אֹרִי; plu. אֹרִיִּים) which is rendered in our English version *familiar spirit* or *sprits* occurs in the Bible at least fifteen times (Lev. xix. 31; xx. 6, 27; Deut. xviii. 11; 1 Sam. xxviii. 3, 7, 8, 9; 2 Kings xxi. 6; xxiii. 24; 1 Chron. x. 13; 2 Chron. xxxiii. 6; Isa. viii.

19; xix. 3; xxix. 4). The primary meaning of אֹרִי, *oboth*, is *leathern bottles*, suggesting the idea of inflation by the familiar spirit, with some reference, perhaps, to the tricks of ventriloquism. The Hebrew word has also two secondary senses. In some of the passages referred to above it denotes the persons who "have" or employ familiar spirits; in others, it denotes the spirits themselves. For example, persons are meant in Lev. xix. 31, and spirits in Deut. xviii. 11. Nothing is said in the Bible to justify the inference that such spirits were actually in attendance upon fortune-tellers and necromancers. The Witch of Endor (1 Sam. xxviii.) was generally supposed to have a familiar spirit. But the coming of Samuel in answer to her incantations appears to have been more than the Witch herself was expecting. R. D. HITCHCOCK.

**Fam'ilists, or Family of Love,** an English mystic sect, was founded in Holland by Henry Nicholas, a native of Westphalia, and originally an Anabaptist, and was finally transferred to England near the middle of the sixteenth century. They taught that religion consists wholly in love, independently of any form of truth held and believed. Through love man could become absolutely absorbed in and identified with God in a subjective sense; that God regards not the outward actions, but only the heart; that to the pure all things are pure, even things forbidden. Nicholas, as the apostle of this "service of love," claimed, it is said, superiority over Christ, on the ground that Moses only preached *hope*, Christ *faith*, but he preached *love*. Much misrepresentation of their confession of faith (given in Strype's *Annals*, ii. 57) brought out an *Apology* in 1575, in which they seek to identify themselves with evangelical Christianity. In 1580, Queen Elizabeth instituted an investigation into their practices, and in consequence they were dispersed and their books publicly burned. They continued to flourish, however, for another century, and in 1604 petitioned King James for permission to publicly clear themselves of the charges preferred against them. This request was denied them, because they were known to have been guilty of grossly immoral practices. (BAXTER, *Autobiography*, p. 77.) (See a curious book by J. R. (JOHN ROGERS) entitled *The Displaying of an Horrible Sect naming themselves the Family of Love*, London, 1579; and KNEWTON, *Confutation of Monstrous and Horrible Heresies taught by H. N., etc.*, London, 1579; MOSHEIM, *Ecclesiastical History*, ch. xvi., § iii., p. xii., § 25; COLLIER, *Ecclesiastical History of England*, vi. 609; vii. 311; HARDWICK, *History of the Reformation*, ch. v.; CARRIÈRE, *Philos. Weltanschauung d. Reformationzeit*, Stuttgart, 1847.) JAS. H. WORMAN.

**Fam'ily** [Lat. and Span. *familia*; Fr. *famille*; It. *famiglia*]. The word is said to have its origin in the Ocean root *famul*, which signifies a "slave." The idea of subjection is thus identified with it always. In its early use this idea was most prominent. Latin writers often use the word for the collective body of slaves owned by one master. In a wider sense they made it comprehend all, both free persons, slaves, and objects of property, that were subjected to the will of an individual head of a house. By Roman law, children and grandchildren, as well as slaves, were subject to the almost absolute power of the head of the family.

The English word properly represents a household living together under one head, including parents, children, servants, and such other persons as may have a continuous place in the association. It is also extended to embrace the descendants of a common ancestor regarded collectively; and in the widest sense mankind are spoken of as the family of Adam.

By divine ordinance the family is the germ of all human society: "God setteth the solitary in families." It is an arrangement of highest economy and efficiency to provide, by detailed responsibility and care, for the increase, nurture, and best development of the human race. It begins at the best time of life, and under the most favorable circumstances, the training of men in subjection to legitimate authority, in self-sacrifice of individual choice for a common good, in the recognition of the rights of others, in the exercise of kindness and good-will to benefit others, and so in habits most favorable to social harmony and peace and order. The family is in its ideal a little commonwealth under government of rightful authority, sustained by the bond of mutual respect and love between its members. The simplest form of government for the state is the patriarchal—just an extension of family rule and order. Hence, it is true, as Plato says, "Whatever is most excellent in the state must always begin at the fire-side." Hence a nation's prosperity and civilization are best secured by influences which first pervade, and then flow from, its families. The family lies at the foundation of social science, and a prime object of that science is to pro-

more the order, the freedom, the purity, and the refinement of social life in the family. A. L. CHAPIN.

**Family**, in zoology, indicates a group of animals intermediate between the genus and order; it is based on structural features of a more general character than the genus, while the limits are determined by the range and extent of the differential characters which exist between the typical form and the next allied: a family may therefore be monotypic (*i. e.* limited to a single known species), or exceedingly polymorphic (*i. e.* embracing thousands of species). Examples of family groups are found among mammals in the cat-like animals (Felidae), the dog-like animals (Canidae), and the bear-like animals (Ursidae), in the order of Carnivora; in the horses and asses (Equidae), the rhinoceroses (Rhinocerotidae), the tapirs (Tapiridae), and the hollow-horned ruminants—*i. e.* cattle, sheep, goats, and antelopes (Bovidae)—in the order of Ungulates, and in man (Hominidae) in the order of Primates. Inasmuch as a distinctive similarity of form is associated with the structural characters which distinguish most of these and many other families, especially of mammals, the group has been defined, by Prof. Agassiz, as the embodiment of form determined by structure. This definition, however, entirely fails in many, and even perhaps most, cases; for example, in the Unionidae some forms are higher than long, while others are extremely elongated; and in the Primates there is a greater difference in form between some monkeys of one family than there is between others of different families. Families are therefore distinguished on account of certain differences in structure which may or may not be correlated with corresponding modifications of form. No exact criterion can be given, discrimination being a matter of judgment.

The term *family* was originally introduced by French naturalists as the vernacular equivalent of the Latin *ordo*, and in this sense it is still used by botanists—*e. g.* by Dr. Asa Gray, who combines certain forms in groups, for which he employs the word *order* as the scientific term, and *family* as the popular; thus, *Order 1. Ranunculaceae (crow-foot family)*. By Lamarck and Latreille, however, the two terms were restricted in meaning, the word *order* being retained in the sense in which it was employed by Linnaeus, while the word *family* was re-established for a section of the order. Later (in 1811), William Kirby (*Trans. Linn. Soc.*, London, xi., p. 88) proposed that all families should have the patronymic termination *-idae*; and this was gradually adopted, and now it is almost universally employed by zoologists. Although, strictly speaking, the use of this termination may not always be in exact accordance with grammatical purity, its great convenience as a uniform indicator of the taxonomic value of the group outweighs the objections, and has ensured its present currency. THEODORE GILL.

**Famine.** America has never known a famine, in the proper sense of the word. Droughts, long-protracted periods of cold weather, plant-diseases, grasshoppers, mice, etc. have now and then caused dearths, but even these have generally been confined within narrow limits. In Europe also famines belong to the past, in consequence of the change which since the latter part of the eighteenth century has taken place in the cultivation of the soil and the diet of the great mass of the population. Since the general introduction of the potato a failure of the cereal crop does not mean immediate want of breadstuffs. By means of the steamship, the railroad, the telegraph, etc. the movement both of bread and meat can be regulated at will. Thus, a famine may be said to be now an impossibility in Western and Central Europe.

In Asia the situation is quite otherwise. Here Nature has only partially provided for a speedy communication with the interior by means of navigable rivers. Canals and roads are rare. The aversion to railroads and the great difficulties in building them have been successfully overcome only in India and Japan. In the interior and in the northern parts immense regions of deserts or steppes occur, in which good crops can be raised only along the rivers and by means of irrigation. In the southern parts, where the vegetation is generally luxuriant, good crops depend upon rain in the right season; and here the climate and religious prejudices have engendered many peculiar customs: millions of people eat no meat, others eat only one kind of cereals—for instance, rice, etc. Add to this the enormous density of the population in many districts—392 to a square kilometre (see METRIC SYSTEM) in Howrah, near Calcutta, 381 in the Chinese province of Kiang-Su—and it will be easily understood that a failure of the crops must cause great distress. As every means of making up for the dearth of one region by the abundance of another is wanting, famines, with all their horrors, are of frequent occurrence. In the last decade India, Persia,

and Turkish Armenia have suffered from them, and Japan has escaped only by prohibiting all exportation of rice.

In the middle of Oct., 1873, it became apparent that in the district of Behar, in North-western Bengal, the rice-crop would yield only one-fourth the average harvest. The region is exceedingly ill-provided with means of communication, and as rice forms the only kind of breadstuff, the difficult problem arose how to supply a population of 15,000,000 with what was absolutely necessary. If nothing were done, the result was sure to be that a great number of the inhabitants would perish, as experience had shown in 1866 in the district of Orissa, in which 27 per cent. of the population starved to death. The government determined to buy, at its own expense, the necessary provision and forward it to the place of distress: 9,000,000 cwts. of rice were bought, mostly in Farther India, and transported by rail from Calcutta to Patna. In order to carry this enormous mass farther and distribute it in the distressed districts, 50,000 oxen and 15,000 horses, mules, and asses were employed, a railway of 74 kilometres length was built by a pioneer regiment, and ten small river-steamers, drawing only one metre, were brought from England; their engines, however, proved too weak for the violent current in the affluents of the Ganges. The rice was given gratis to all invalid, old, or sick persons—to others, either as pay for labor on some public work, or as a loan, computed at fixed but low rates, and to be paid within a certain time. That which was given gratis and as alms was distributed by committees; and at the time when the distress was at its highest there were no less than 1448 such committees in existence. For a long time 3,900,000 persons received daily support—650,000 in the form of alms, 1,800,000 in the form of pay for work, and the rest in the form of loans. The public works which were undertaken comprised river regulation, the building of canals and railways, etc., but the progress made was very small, as it always must be when the bodily constitution of the laboring man becomes seriously impaired by lack of nourishment. Nevertheless, when afterward the officials assembled to discuss their experience, they all agreed that the support in form of pay for labor was, on account of the moral impressions produced, the most to be recommended. The whole system was commenced in Oct., 1873, and continued till Dec., 1874. The expenses of the government amounted to 130,000,000 francs; private subscriptions brought in 7,000,000 francs; large donations were sent from all parts of the British empire; and the Hindoo magnates, whose riches have become proverbial, gave enormous sums. The result of all these exertions was, that a real famine, which the population itself would have been utterly unable to grapple with, was actually alleviated, and felt only as a severe and widespread dearth; only twenty-five persons died from actual hunger or starvation.

While people in Bengal were still discussing the most effective measures to prevent a repetition of such a calamity, a new famine began to threaten in Southern India. During July and August, the rainy season in the Deccan, the rainfall was very small in 1873, and in September it became evident that the government had to encounter a widespread famine. On a tract of land comprising an area of 147,777 square kilometres, and inhabited by about 8,000,000 people, the crops yielded only one-sixteenth the average harvest. The means of communication, however, are much better, here; railways and good roads cross the country in various directions. The government could leave the importation of rice to private speculation, and confine itself to giving alms and providing work. In Jan., 1877, the number of persons who received support in the form of pay for labor in public work amounted to 1,500,000, but a circular of Jan. 16, 1877, set forth that the government could not hold itself responsible for every Hindoo who died prematurely from lack of food—that the magnitude of the famine-debt, and of the taxes necessary to repay this debt, might prove even a greater danger to the country than the famine itself, etc. A scrutiny was instituted, and the number of persons supported was decreased every week by from fifty to seventy thousand without any noticeable increase in the rate of mortality. Nevertheless, the public debt of the country increased on account of this famine by 120,000,000 francs.

In both these cases of Indian famine the origin, as well as the whole course of the crisis, shows that its causes must be sought for principally in the miserable social and economical conditions of the people, while the climate has played only a secondary part. The social and economical conditions, however, are undergoing rapid change for the better, and thus it may be hoped that also for India the time has now arrived when the sufferings of famine shall not be the subject of personal experience.

The famine in Persia from 1870 to 1872 extended over the whole country, and, according to the judgment of an

eye-witness, Dr. Bellew (*Seistan Mission*, Calcutta, 1873), its effects will be felt for fully thirty years. More than 1,500,000 people died—that is, one-fourth of the whole population. In several provinces hardly a child was to be seen. Music and song were never heard, but half-starved beggars were met with everywhere. Meanwhile, the Turcomans of the desert took advantage of the general disorder and desolation; they made one invasion after another, and in the course of three years they carried away more than 20,000 Persians to the slave-markets of Khiwa and Bokhara. To some extent the greatness of the evil was due to the stupidity and avarice of the officials; wherever the officials were able and honest the importation of breadstuffs proved sufficient. But in many places they actually compelled the farmers to cultivate poppy instead of wheat, for the sake of the opium, and the ruler of the realm set the example himself.

The interior provinces of Asia Minor—for instance, Angora, celebrated for its breeds of goats and cats, and Konich or Iconium, situated immediately to the S. of Angora—suffered severely from 1873 to 1875. On account of the drought, 2,500,000 oxen and horses and 528,000 goats died in Angora; the number of persons who starved to death varied in the different provinces from 6000 to 20,000. Under the political conditions, which withdrew from the families their natural supporters, the dearth long continued, and many villages formerly populous have now become almost desolate.

There is hardly any question which shows so strikingly as the history of famines the importance of a well-organized government and its beneficent consequences. Severe dearths may embarrass, or for some time even stop, the development of progressive communities, but they will never there, as in Persia or in the interior districts of Asia Minor, cause the death of whole masses of the population from lack of food.

E. SCHLAGINTWEIT.

**Fan** [from the Ang.-Sax. *fānn*, allied to the Latin *vanus*], an implement used to agitate the air for coolness, seems to have been in use from the remotest times with all people living in hot or warm climates. China, however, is generally called the fatherland of the fan, and there and in Japan it is as indispensable to a gentleman as his boots. It is used in all different ways, even as a newspaper, since on important occasions news, libels, and political caricatures are transmitted on it. During the riots when missionaries were attacked at Peking in 1873, popular ill-feeling was excited by inflammatory pictures on fans; and the first locomotive-engine seen in Japan was promptly published in the same manner. Also is the common Chinese palm-leaf fan generally supposed to be the oldest form of this implement, as it is still by far the best for simple utility. It is manufactured in immense quantities in China, especially at Canton and Nankin, where also fans of great elegance are produced from bamboo, palm leaf, silk, sandal-wood, tortoise-shell, and ivory. A very singular style of Chinese fan consists of a round paper disk mounted in a split handle on a pivot like a wheel. When not in use it is turned around and folded up, so as to make a straight stick. In Persia, Egypt, Greece, and Rome fans were known at a very early period, and in each country they attained great elegance. The Egyptians knew the peculiar fan made of a bird's wing extended, and so beautifully manufactured by the Chippeway Indians and in England. From a passage in Euripides it appears that Greek fans were round and made of feathers, and when the Greeks obtained the peacock (about 500 B.C.) they began to use its plumes for fans. In Hericulanum there is a fresco representing a youth holding a peacock fan, and in an ancient representation of the twelve months, published by Lambecius, one of the same kind hangs up by the genius of August. The Roman fan for ladies was often made of thin tablets of perfumed wood, and as branches of myrtle, acacia, and palm were the first fans or materials for them, these shapes were preserved in imitations for centuries. A fan with a wooden handle, and a *feuille* provided with a picture of a love-affair or a view of a city, with a corresponding inscription, was much in use in Italy during the Middle Ages. In a work of costumes which appeared at Venice in 1664, containing several hundred dresses, especially the Lombard from the eleventh century, women often hold fans, some of them of very eccentric shapes. The *tuft-fan* of peacock's feathers was set on an ivory handle adorned with gems, and one like this, but with a horse's tail, appears on the sculptures of Persepolis. In a volume of Italian costumes of the Middle Ages in the *Wolfenbüttel Library* (A. L. Millen) fans may be seen made of the feathers of parrots and many other kinds of birds. In Queen Elizabeth's wardrobe twenty-seven fans are enumerated, one of which cost £40, and about 1660 the manufacture of this article was quite extensive in England, as appears from a petition of the fan-makers, who complained that 550,000 fans having

lately been brought over, "great numbers of poor people, continually employed in the work, must perish unless a stop be put to the importation." In the twelfth year of the reign of Charles II. a protecting duty of 40s. per dozen was imposed on fans, and the importation of all painted fans was prohibited. The folding fan was introduced in France by Catharine de Medicis, and under Louis XIV. the manufacture became a great industry. Those who exercised it formed a corporation, established in 1673, and four years of apprenticeship were required, though the masters who made this regulation wisely set it aside in favor of their own sons or of any man who should marry their daughters or widows. One of the most original patterns of French fans was the so-called *Pompadour*, consisting of brins without *feuilles*, and forming, when opened, a beautiful oval. During the Revolution fans went out of fashion, but in this century, especially of late, the manufacture has again become very prosperous. Large quantities of costly fans are produced in Paris, made of what is called chicken skin (a very thin yet tough preparation of kid skin), satin, gauze, tulle, crape, or parchment, and provided with beautiful pictures by great artists, such as water-colors by Marie Bonheur, A. Soldé, Edouard Moreau, Tony Faivre, and others, priced at from £50 to £130. Large numbers of these fans are exported to Spain, where the fan is as essential an article as in China or Japan. The native Spanish product, however, is rather coarse and ungainly, and, although Spain has laid a heavy duty on French fans, the Spanish workmen are yet not able to compete with the French. A curious but very elegant exhibition of fans was held at the South Kensington Museum, London, in 1870. The empress of France, who had been instrumental in developing this branch of industry, as of all kinds of luxury in dress, sent to it all her finest fans, thirty-four in number. An illustrated catalogue of this exhibition was published at London. In the U.S. the production of anything beyond the cheapest grades of paper fans is one of our more recent enterprises. The character of the cheap goods, palm leaf, paper, etc., is well known, but the ivory, bone, and composition fans have been among the rarer Oriental luxuries. We have imported very largely a variety of grades of fans of what are known as the wood stick, as well as ivory, pearl stick, and bone fans, from France; our importation of these, mostly in muslin, linen, silk, and satin, decorated or plain, amounting to about 2,000,000 francs (\$400,000) per annum. We have also imported large quantities of the finest leather fans from Austria, in kid and imitation or genuine Russia leather. The attempt to compete in our market with the European manufacturers is of recent date, and met at first with serious difficulties. In this, as in most articles of luxury, the popular prejudice was strongly in favor of imported goods. Our people are very slow to be convinced that any description of fancy goods or articles of luxury can be made as well and as tastefully here as abroad. At first the carving, perforating, and polishing of the sticks were done by hand, by slow and laborious processes. But ingenious machines have been invented, working rapidly and with great precision. Also the painting and decoration are now carried to such perfection by American manufacturers that they are able to compete successfully with the finest imported painted fans.

CHARLES G. LELAND.

**Fana'riotes** [from *Fanar*, one of the quarters of Constantinople where they dwell—from *φανάριον*, the "beacon" there situated], a body of Constantinopolitan Greeks who claim a noble Byzantine descent. Spared by the Turkish conquerors, they artfully insinuated themselves into public affairs, and until 1822 held many important civil, military, and naval positions, in which they displayed, as a rule, selfish and ungenerous qualities. Their power as a class is now completely broken.

**Fan'cy** [from *phantasy*, the Gr. *φαντασία*, from *φαίω*, to "show"], a term used by philosophers, sometimes as synonymous with IMAGINATION (which see), but the better practice would appear to conform more or less closely to that of Dugald Stewart, who says: "The office of this power is to collect materials for the imagination; and therefore the latter power presupposes the former, while the former does not presuppose the latter." Others make the two powers the same.

**Fandan'go**, a national dance of Spain and Spanish America, usually in 3-4 or 6-8 time. It is thought by some to have been introduced by African slaves into the colonies, and thence carried to Spain. It is danced generally to the guitar and the castanets, and is a favorite dance with the people.

**Faneuil** (PETER), merchant of Boston, Mass., was b. of a French Huguenot family at New Rochelle, N. Y., in 1700. In 1740, at a public meeting in Boston, he offered to erect a suitable edifice for a public market-house at his



own expense and give it to the town. Faneuil d. at Boston Mar. 3, 1743.

**Faneuil Hall**, in Boston, Mass., was built by Peter Faneuil in 1742, and given to the town. It was burned in 1761, its walls of brick remaining. It was rebuilt at the expense of the town. It is called the "Cradle of Liberty," from the fact that the "Sons of Liberty" held many meetings there during the early years of the final struggle of the colonies with the mother-country. The British troops, during the occupation of the city, used it as a theatre. In 1805 it was made forty feet wider and one story higher. The hall, which is used for public meetings, is now about eighty feet square, and contains several good paintings. Its vane, in the form of a grasshopper, was copied from that of the Royal Exchange, London. A grasshopper was the crest of Sir Thomas Gresham, the founder of the Royal Exchange.

**Fanfa'ni** (PIETRO), b. at Pistoia in 1817, was well known as a writer on philological subjects, and also produced novels and tales for children. In 1859 became director of the Marcuccellian Library at Florence. D. Mar. 4, 1879.

**Fanfare** [Fr.; Sp. *fanfarria*], a loud flourish of trumpets, or any short, lively military air played upon brass instruments.

**Fani'no**, or **Fan'no** (FAVENTINO), one of the earliest martyrs during the reformatory period in Italy, was a native of Faenza, then in the Papal dominions; was won over to the Protestant cause by the reading of the Scriptures (probably Brucioli's version, 1532) and of Protestant apologies, and became so enthusiastic for the new religion that he gave himself to proselyting efforts, which came to the ear of the ecclesiastics, and he was imprisoned. Being the head of a family, he was persuaded to recant for the sake of his wife and children. Upon his release, however, he became dejected in mind, and found peace only in the resolve to openly battle for liberty of conscience; and he set out on a tour through the Romagna, preaching everywhere the Reformed religion. He was arrested in 1548 at Bagna Cavallo, and conducted in chains to Ferrara. During his imprisonment he was visited by many distinguished Italians, among them the princess Lavinia della Rovere and Olympia Morata, who were edified by his instruction and prayers, and took a deep interest in his fate. But his repeated and emphatic refusals to recant caused his condemnation to the stake by Pope Julius III. Fani'no was strangled at dawn, and his body burned at noon in Sept., 1550. (See for interesting details YOUNG, *Life of Paleario*, ii. 111; McCRIE, *History of the Reformation in Italy*, pp. 259-261.) JAS. H. WORMAN.

**Fanner**, a machine for winnowing grain whose principal feature is a rotary fan generally put in motion by the hand. As the grain passes through the strong current of wind produced by the fan, it is thoroughly cleansed from chaff. The machine was invented in Scotland in 1737 by Andrew Rodger, a farmer of Roxburghshire, but, though it in every respect far excelled the old method of winnowing by throwing the grain across the threshing-floor, its introduction met with great opposition from the Scotch farmers of the old Puritan description. Not only was the inventor subjected to persecution, but also those who wanted to make use of his invention, because the raising of wind by human art was plainly against Scripture. Amos iv. 13. (See FANNING-MACHINE.)

**Fannin** (JAMES W.), COLONEL, Texan, was b. in North Carolina, fought in the war for Texan independence, and was one of 357 prisoners shot at Goliad by order of Santa Anna, the Mexican general, Mar. 27, 1836.

**Fanning** (ALEXANDER C. W.), lieutenant-colonel in the U. S. army, was b. in Massachusetts 1788, graduated at West Point Military Academy 1812, was lieutenant Third Artillery, Mar. 1812, captain Mar. 13, 1813, was made brevet major for gallant conduct in the defence of Fort Erie Aug. 15, 1814, major Fourth Artillery Nov. 3, 1832, brevet colonel for meritorious service in battle near the Wethlacoochie and in defence of Fort Mellon, Fla., Feb. 8, 1837, and lieutenant-colonel Fourth Artillery Sept. 16, 1838. D. at Cincinnati, O., Aug. 18, 1846.

**Fanning** (COL. DAVID), b. in Wake co., N. C., about 1756; became the leader of a band of Tories or "loyalists," chiefly of Chatham and Randolph counties, who during the later years of the war of the Revolution performed in Central North Carolina many daring exploits, tarnished by wholesale cruelty and the desolation of settlements. In 1781 he took the town of Pittsborough, and soon after Hillsborough, then the State capital, carrying off Gov. Burke and his whole suite. He was one of the three persons excluded by act of the North Carolina legislature from the amnesty proclaimed after the peace; escaped into

Florida, traded with the Indians, made his way to New Brunswick, and thence to Digby, N. S., where he d. in 1825. He wrote a curious *Autobiography*, which was copied in 1860 by Porter C. Bliss, and printed in limited number at Richmond, Va., in 1861, as vol. i. of *Historical Records of the Old North State*, with introduction by Col. John H. Wheeler and T. H. Wynne, and instructive notes by ex-Gov. David L. Swain. A 2d ed. of 100 copies was printed by J. Sabin, New York, 1865.

**Fanning** (EDMUND), LL.D., American Tory in the Revolution, was b. on Long Island 1737; graduated at Yale College 1757, settled in Hillsborough, N. C., and became colonel of Orange co.; took part against the people in their struggle for independence of Great Britain, raising and commanding the king's American regiment of foot. After the war he was appointed councillor and lieutenant-governor of Nova Scotia and governor of Prince Edward's Island (1786-1805) by the English. He was successively major-general, lieutenant-general, and general in the British army, and d. in London Feb. 28, 1818.

**Fan'ning-machine**, or **Fanning-mill**, an agricultural implement for winnowing grain. Anciently, the wind was the agent chiefly employed for separating chaff and dirt from grain; and the *mystica vannus Iacchi*, like the winnowing-fan of the Bible, seems to have been at first a mere shovel for throwing up the grain and exposing it to the action of the wind. The artificial combination of sieves and fans which now makes the farmer independent of the uncertain action of the wind is a Dutch invention, probably of no great antiquity. There have been many improved forms invented, particularly in the U. S.

**Fan'nius** (CAIUS) **Stra'bo**, son-in-law of Lælius, is introduced by Cicero as one of the speakers in his works *De Amicitia* and *De Republica*. Served in the third Punic war under Scipio Africanus (b. c. 149-146). Was distinguished as an orator, and was one of the earliest Roman historians who wrote in Latin. His *History* treated of contemporary events, and the eighth book is referred to, though the extent is not known. The few fragments remaining are collected in Krause's *Hist. Rom. Fragm.*, pp. 173-174. (See GERLACH, *Geschichtschreiber der Römer*, pp. 70-71.) This Fannius is often confounded with C. Fannius Strabo, who was consul b. c. 122, and from whose speech on the allies and Latins, directed against Gracchus (praised as good and noble by Cicero), certain fragments are preserved. These are given by MEYER, *Orat. Rom. Fragm.*, pp. 199-200. H. DRISLER.

**Fa'no**, town and seaport in Central Italy, in the province of Urbino e Pesaro, on the shore of the Adriatic, lat. 43° 51' N., lon. 13° 1' E., 30 miles N. W. of Ancona. It is a well-built and beautifully-situated town, containing many splendid paintings by Domenichino and Guido, and the remains of a triumphal arch of white marble erected in honor of Augustus. Pop. 21,341.

**Fans**, a cannibal race found upon the Gaboon River in equatorial Africa. They are coffee-colored, have rather thin lips, and are slight of frame. They eat their own dead, and purchase the dead of other tribes as food, use poisoned arrows and the cross-bow, and are fast becoming the dominant people of that region, where they first appeared since 1847.

**Fanshawe**, or **Fanshaw** (Sir RICHARD), D. C. L., English diplomatist and translator, b. at Ware, in Hertfordshire, 1608, studied at Cambridge, and was minister resident at the court of Spain under King Charles I. of England. He was a royalist, and at the battle of Worcester, 1651, was taken prisoner and kept captive for years. Was privy councillor of Ireland 1661, the same year ambassador to Portugal, and negotiator of the marriage between Charles II. and the princess Catharine. In 1664 was ambassador to Spain, and died at Madrid June 16, 1666. His translations were those of Guarino's *Pastor Fido*, *The Lusiad* of Camoens, etc.

**Fantail**. See PIGEON.

**Fanta'sia** [Fr. *fantasie*; It., Span., Port., and Lat. *fantasia*], in music, a species of composition nearly identical with the capriccio, in which imaginative and fluent writers express their thoughts with the highest freedom compatible with an observance of the fundamental laws of harmony. Originally, the fantasia was probably nothing more than simple improvisation—a transient, unstudied, and unwritten effusion of the performer's fancy. But as extempore playing naturally leads to the recording of the ideas, themes, and general course of thought pursued in any successful effort, the transition was easy to the writing, at leisure, of compositions resembling improvisations in peculiarities of movement, form, modulation, expression, and harmony. In many of these compositions

writers give free play to the impulses of a luxurious fancy, regardless of method and design, but still preserving a certain continuity of outline amid much that is wild, rugged, and abrupt. The term "fantasia," however, is now often given to compositions which are perfectly regular in time and harmony, and even more symmetrical in their structure than many pieces not so designated. WILLIAM STAUNTON.

**Fan'tee, or Fan'ti**, is the name of a tribe, and of the country it inhabits, in Western Africa, on the coast of Guinea. The country consists of a small strip of land extending along the Atlantic from the Sakum on the E. to the Kaku on the W., and separated N. from the dominions of the Ashantees by a belt of impenetrable forests crossed only by a few narrow and intricate paths. But this strip of land is very fertile, densely peopled, and rich in gold-dust. The inhabitants belong to the same family and speak nearly the same language as the Ashantees, though they are inferior to them both in skill and vigor. They succeeded, however, in defending their independence. They started an individual civilization. They built large cities, such as Yankumasi, Abrah, Annamabu, etc., and they began trading and manufacturing. But early in this century they came in contact with the English, who built a fort and established a commercial station at Cape Coast Castle. Their labor became subservient to English enterprise and speculation. Their political organization became weakened and almost dissolved under English influence and authority. Their civilization faded away, and they became a prey for the Ashantees, who in their turn were conquered by the English. (See ASHANTEE.)

**Fantoccini.** See PUPPETS.

**Fan-tracery**, a species of vaulting peculiar to the English Gothic of the fifteenth century and later times, characterized by divergent ribs, which spring from the cap of the shaft and radiate at equal intervals with a uniform curvature, and terminate in the ribs of the roof. Between the divergent fan-ribs there are cusps and foils, forming a rich tracery, whence the name. Thus is produced a striking resemblance at once to the tracery of the Gothic window and to the fan. The finest specimens of fan-tracery vaulting are found in the chapel of Henry VII. at Westminster, the chapel St. George at Windsor, and the cloisters of Canterbury.

**Farad** [from *Faraday*], the unit of quantity in electrometry. It is the quantity of electricity with which an electro-motive force of one volt would flow through the resistance of one megohm in one second. One farad per second is the British Association's unit of current. A million farads equal one megafarad. One farad contains a million microfarads. Some electricians name the common farad *microfarad*, and call the ordinary megafarad by the name of farad.

**Faraday** (MICHAEL), D. C. L., F. R. S., was b. at Stoke Newington, a suburb of London, Sept. 22, 1791. He d. on Hampton Court Green, in a house presented to him for his lifetime by the queen, on Aug. 25, 1867. His education he describes as being "of the most ordinary description, consisting of little more than the rudiments of reading, writing, and arithmetic." His hours out of school were passed at home or in the streets. The love of nature, which was with him so deep, was ancestral instead of individual. In 1804 he went as an errand-boy to a bookbinder named Ribeau, his father's homely dwelling being in Jacob's Well Mews, close by. In 1805 he was taken as an apprentice. One line of his indentures reveals the moral stuff out of which the future philosopher and gentleman was made: "In consideration of his faithful service no premium is given." He read many of the books he bound. He mentions specially Mrs. Marcet's *Conversations on Chemistry* and the articles on electricity in the *Encyclopædia Britannica*. He also made electrical experiments, and went occasionally to evening lectures on natural philosophy given by a Mr. Tatum at 53 Dorset street, Fleet street. The charge was a shilling a lecture, and his elder brother's purse often helped him here. To enable him to draw the apparatus employed by Mr. Tatum he took lessons in perspective. It was his habit to enter in a note-book jottings of such volumes, papers, and magazines as interested him. This he called his "philosophical miscellany." It was intended "to promote both amusement and instruction, and also to corroborate or invalidate those theories which are continually starting into the world of science."

His letters to his friend Benjamin Abbott show him to be occupied during his leisure hours with electrical experiments. The friends work at the same subject and discuss their results. Alertness and tenacity are the traits which mark Faraday. He holds his convictions resolutely and defends them cleverly. But his letters are even less remarkable for the keenness of his logic than for the courtesy of his style. Nature sends into the world beings

physically beautiful and physically ugly, subsequent culture making but comparatively small impression upon her firm outlines. So it is in the intellect and morals; in respect to which beauty and nobleness were potential in Faraday at his birth, requiring but the smallest stimulus from favoring circumstance to unfold them into actual life.

After his apprenticeship he worked for a time as a journeyman bookbinder. And now we come to the hinge of circumstance on which his life turned. Davy was giving his last course of lectures at the Royal Institution. Faraday was taken to hear them by a Mr. Dance, to whom and to the event he thus subsequently refers: "Under the encouragement of Mr. Dance I wrote to Sir H. Davy, sending as a proof of my earnestness the notes I had taken of his last four lectures. The reply was immediate, kind, and favorable. After this I continued to work as a bookbinder, with an exception of some days, during which I was writing as an amanuensis for Sir H. Davy."

On Mar. 18, 1813, Davy reported to the managers of the Royal Institution his engagement of Faraday at weekly wages. He travelled subsequently with Davy on the Continent, returning to the institution in 1815. On the Continent he saw many interesting experiments and made the acquaintance of many distinguished men. Even in those days, when he was fresh from the press of the bookbinder, there must have been something remarkably cultivated in his demeanor. During the journey, however, the independence of his character often blazed out into resentment against Lady Davy, who wished to treat him as an underling. Davy himself, though yielding for the sake of quietness to the caprices of his wife, was always considerate and kind. After his return, Faraday became connected with the City Philosophical Society, where he sometimes lectured to the delight of all hearers.

Three years after his appointment in the Royal Institution he made his first published contribution to science: it was an analysis of some caustic lime from Tuscany. Under Davy's advice and encouragement he thus began. Both skill and insight are revealed by a short paper on sounding flames published in 1818. Other smaller contributions followed. Mr. Brande was at that time lecturer on chemistry, and his occupation was described by his hearers as "lecturing on velvet," so skillfully, quietly, and effectively was he assisted by Faraday. In 1820 a chemical paper opened the long series with which Faraday subsequently enriched the *Philosophical Transactions*. On June 12, 1821, he married, and an entry made by himself six and twenty years subsequently shows how he regarded the most important occurrence of his life: "Amongst these records and events I here insert the date of one which, as a source of honor and happiness, far exceeds all the rest. We were married on June 12, 1821. M. FARADAY."

Ersted's discovery in 1820 directed all minds to the interaction of magnetism and electricity. In 1821, Faraday wrote *A History of the Progress of Electro-Magnetism*, and thus prepared, he succeeded on Christmas morning, 1821, in making a magnetic needle rotate round a wire carrying an electric current. To Faraday's intense annoyance, it was whispered that he had plagiarized the experiment from Wollaston, but he completely cleared himself of this charge. Jointly with his friend Mr. Stodart he conducted experiments on the alloys of steel; and I still possess a razor given to me by Faraday, formed from one of his alloys. In 1823 he liquefied chlorine and other gases, and hence originated a difference between him and Davy which everybody must regret, but which, in my opinion, involved not a shade of dishonor on either side. In 1824, Faraday was elected a fellow of the Royal Society. In 1825 and 1826 he published chemical papers in the *Philosophical Transactions*. In one of these he announced the discovery of benzol, which afterward became the basis of our splendid aniline dyes. From 1825 to 1829, in conjunction with Herschel, he tried to improve the manufacture of glass for optical purposes. Practically considered, this investigation was a failure, but the "heavy glass" they produced led afterward to two of Faraday's greatest discoveries. It was at this period that the respectable artilleryman, Anderson, who subsequently became such a prominent figure in Faraday's lectures, was engaged as an assistant.

Disciplined and strengthened by his previous work, Faraday, in 1831, made his great discovery of magneto-electric induction, opening thereby a vast and novel electrical domain. Enigmas which had previously challenged and defeated the efforts of the greatest men ceased to be enigmas. The magnetism of rotation, for example, discovered by Arago and experimented on by Babbage and Herschel, was shown to be due to a special manifestation of Faraday's induced currents. It is needless to say that all our induction coils, our medical machines, and the electric light so far as it has been applied to lighthouses, are the direct

progeny of Faraday's discovery. In the paper here referred to he for the first time calls the "magnetic curves" formed when iron-filings are strewn around a magnet "lines of magnetic force." All his subsequent researches upon magnetism were made with reference to those lines. They enabled him to play like a magician with the magnetic force, guiding him securely through mazes of phenomena which would have been perfectly bewildering without their aid. The spark of the *extra current*, which I believe was noticed for the first time by Prof. Joseph Henry, had been noticed independently by Mr. William Jenkin. Faraday at once brought this observation under the yoke of his discovery, proving that the augmented spark was the product of a secondary current evoked by the reaction of the primary upon its own wire.

The desire to refer diverse natural energies to unity of principle is the strongest of the scientific mind, and soon after the period at which we have now arrived Faraday illustrated this desire by his attempt to prove experimentally the "identity of electricities." He operated upon the electricities of the machine, the pile, the gymnotus, the torpedo, thermo-electricity, and magneto-electricity, examining and comparing their phenomena in various ways, and finally deciding in favor of their identity. He then passes on to electric decomposition, both by the machine and the pile. The amazing difference in point of "quantity" and "intensity" is strikingly brought out; Faraday concluding, though he is almost afraid to publish the conclusion, that the amount of electricity involved in the decomposition of a single grain of water equals that produced by 800,000 discharges of his large Leyden battery. In May, 1833, he published a paper on a *New Law of Electric Conduction*, in which he forcibly shows the influence of the "state of aggregation" on the transmission of the current. Water, for instance, allows the current to pass—ice does not. Why? This leads him to a profound consideration of the subject of electrolysis. Again, in June, 1833, he published a paper on this subject, profoundly thoughtful and profoundly skilful at the same time. While holding fast to his general line of thought, he did not close his eyes to the smaller offshoots from his great inquiries: with such an offshoot, *On the Power of Metals and other Solids to Induce the Combination of Gaseous Bodies*, he closed his labors in 1833.

But these researches, considered in the light of subsequent achievements, take rank as mere preliminary disciplines, leading him to the final establishment of the great doctrine of "definite electro-chemical decomposition." He measures the strength of his currents by their chemical action in his voltameter, comparing the quantity of this action with that of other chemical actions in his circuit. He includes in the same circuit water and fused chloride of tin, and finds that for every atom of hydrogen and oxygen liberated in the one cell, there is an atom of tin liberated in the other. "Both the water and the chloride were broken up in proportions expressed by their respective chemical equivalents. The amount of electricity which wrenched asunder a molecule of water was competent, and neither more nor less than competent, to wrench asunder the constituents of a molecule of the chloride of tin." The fact is typical. With the indications of his voltameter he compared the decompositions of other substances, both singly and in series. He submitted his conclusions to numberless tests; he purposely introduced "secondary actions;" as a true son of science, he endeavored to hamper those very laws which it was the intense desire of his mind to see established. From all these difficulties, however, emerged the truth, "that under every variety of circumstance the decompositions of the voltaic current are as definite in their character as those chemical combinations which gave birth to the atomic theory."

With regard to the origin of power in the voltaic pile scientific opinion had been divided. Volta found the source of power in the contact of heterogeneous metals, and he proved beyond a doubt that electricity arises from such contact. But it would be difficult at the present day to enter into the state of mind which could accept simple contact as the origin of the floods of energy obtainable from the pile. Faraday could not help taking a side here. His experience had showed him that chemical action was the invariable accompaniment of the current; it had led him to conclude that the one was proportional to the other, and therefore forced upon him the conviction that the "contact theory," as maintained by Volta, was a delusion. The origin of power in the pile he referred to its chemical actions. He thus became the strongest pillar of the "chemical theory," which had been previously enunciated by Fabroni and Wollaston. His researches in frictional electricity occupied him from 1836 to 1838. Here he enters with keen insight into the subject of conduction and induction, regarding both from a wholly original point of

view. To this hour these questions, to the advantage of Faraday's notions, engage the attention of experimental philosophers. One of his principal results here is the establishment of the specific inductive capacity of insulators—a subject of supreme importance in connection with submarine cables. As a striking illustration of Faraday's insight, it may be mentioned that as early as 1838 he had virtually foreseen and predicted the retardation produced by the inductive action between the wires of submarine cables and the surrounding sea-water.

Toward the close of 1840 he suffered the penalty of all great workers, who first learn the limits of their powers by transgressing them. Faraday broke down, and for two years was prohibited from working. He went to Switzerland in 1841, and slowly improved after his return. He knew that polarized light was a most subtle investigator of molecular condition, and he had tried it frequently in investigating the state of electrified bodies. Though baffled oft, his thoughts on his return from Switzerland returned to the subject. He placed a piece of his heavy glass between the poles of an electro-magnet. Including both magnet and glass between two Nicol's prisms, he sent a beam of light through the system. When the Nicols were parallel the light was transmitted—when they were crossed the light was cut off. On exciting the magnet in the case of the crossed Nicols, the light was instantly transmitted, and one of the Nicols had to be turned through an angle depending on the strength of the magnet and the length of glass traversed to again quench the light. The experiment proved that by the act of magnetization "the plane of polarization" is caused to rotate. Faraday proved the direction of the rotation to be determined by the polarity of the magnet, being reversed when the polarity is reversed. He also proved that the voltaic current exercised a similar power. He pointed out the difference between this effect and the rotation of the plane of polarization by quartz and certain other bodies, and entitled his discovery "the magnetization of light."

This was the first reward of Faraday's long and apparently futile inquiry on the manufacture of optical glass. His second reward was the discovery of diamagnetism, the name given to a force of repulsion exerted by a magnet on the great majority of known bodies. He called it diamagnetism because an elongated diamagnetic body acted upon by a magnet sets *across* the lines of magnetic force, while a paramagnetic body, like iron, sets parallel to the lines of force. He pushed his inquiries in diamagnetism into the heart of the subject, exploring it experimentally in all directions. Faraday's antecedent culture and his notions regarding molecular force are strikingly illustrated by this inquiry and the subsequent one on magno-crystalline action.

To these discoveries succeed his investigations on the magnetism of gases, his elaborate papers on atmospheric magnetism, his speculations on the nature of matter and force, and his researches on "lines of magnetic force, their definite character, and their distribution within a magnet and through space"—inquiries marked by profound insight and illustrated with refined experimental skill. "Taking him for all in all, it will, I think, be conceded that Faraday was the greatest experimental philosopher that the world has ever seen; and I would hazard the opinion that the progress of future research will tend not to diminish but to enhance the labors of this mighty explorer."

It might perhaps be considered culpable on my part if I omitted to state that this extraordinary man, in whom force of intellect and beauty of character were so wonderfully united, drew his spiritual nutriment from his faith as a Christian. In reply to a question of Lady Lovelace (Byron's "Ada"), Faraday thus renders an account of his religious position: "There is no philosophy in my religion. I am of a very small and despised sect of Christians, known, if known at all, as *Sandemanians*, and our hope is founded on faith that is in Christ. But though the natural works of God can never, by any possibility, come in contradiction with the higher things that belong to our future existence, and must, with everything concerning Him, for ever glorify Him, still, I do not think it at all necessary to tie the study of the natural sciences and religion together; and in my intercourse with my fellow-creatures that which is religious and that which is philosophical have ever been two distinct things."

JOHN TYNDALL.

**Faradiza'tion**, in medicine, the application to the animal frame of the Faradic or induction electricity. Faradic electricity (named from Faraday, who thoroughly studied this force) is obtained from a variety of apparatuses called batteries—some magneto-electric, composed of a revolving magnet and coils of wires, others of a "cell" (giving a galvanic current) and coils. In cell-batteries the current of the cell never reaches the patient; each current delivered by the battery is distinct (not continuous with any

other), and is the result of induction—i. e. the production of electricity in a conductor by its adjacency to another current. The batteries in common use give primary, secondary, or ternary currents (so named because of their derivation from a first, second, or third coil). The coils added to the first are progressively made of finer and longer wire, and yield currents not essentially different, but stronger. We owe to Dr. Duchenne of Paris the best methods for making use of Faradism in therapeutics. It is used for two purposes: (a) to produce muscular contractions (passive exercise); (b) to excite the nerves of sensation. The first object may be attained in two ways—first, by placing both electrodes (ends of insulated conductors armed with sponge, of various shapes) upon the moistened skin covering the muscles we wish to cause to contract; or, second, by placing one electrode as above and the other over the nerve-trunk which sends branches to that muscle. To excite the nerves of sensation, a portion of skin should be made dry by means of starch-powder, a wire-brush electrode held upon or drawn lightly over this dry skin, while the other sponge electrode is held (wet) on the integument not far away. The current can be made to reach the internal organs (bladder, uterus, etc.) by means of peculiarly shaped electrodes. The popular use of Faradism by holding both electrodes in the hands is worthless. E. C. SEGUIN.

**Farallone Islands**, a group of six small lofty and rocky islands of the Pacific, lying 30 miles W. by S. of the Golden Gate, or entrance to San Francisco Bay, Cal. They are owned by a company, which here collects the eggs of the gull and the murre, a sea-bird of the auk family. These eggs are furnished in great numbers for the San Francisco market. The south-easternmost and largest island (lat. 37° 41' 49" N., lon. 122° 59' 5" W.) has a lighthouse, with a flashing white light of the first order, 360 feet above the sea. The islands breed great numbers of rabbits, and their coasts abound in sea-lions. They are in San Francisco co., Cal.

**Farce** [Lat. *farcio*, to "stuff," so called from its varied ingredients] is the name of a peculiar kind of comedy in which the characters are without psychological truth and the plot without moral impression. When in a comedy the *dramatis personæ* are not characters representing complete mental organisms, but figures representing only one single feature of the human mind, and when the situations of which the plot consists are formed without any intention of imitating life, but so as to show off this single mental feature in its most extravagant appearance, a high degree of comical effect can be attained; and there is in the principle itself on which the farce rests no reason why its comical effect should not be accompanied with perfect elegance and gracefulness. The farce originated in the southern European countries from rustic festivities, in which masks and every other description of disguise were used. There are traces of it in the so-called *Fabulæ Atellanæ*, far back in the days of the old Roman republic, and we meet it every now and then during the Dark Ages, until in the sixteenth century it enters the stage, where it led a brilliant life under the name of *commedia dell' arte*, as a kind of improvised drama. Molière introduced it among the arts. Many of his plays are simply farces. But after his time it was utterly neglected, and sank down to be low comedy, comedy for the mob, and it showed no signs of revival until the middle of the nineteenth century. But at our time it seems once more to come to the foreground. The present French farce is often indecent, but its mirthfulness cannot be denied. It needs only some purification to be brilliant art. And here in America the "minstrels" often perform small farces which are exceedingly comical, without indulging in improprieties. CLEMENS PETERSEN.

**Far'cy**, the more chronic form of glanders, a disease attacking horses, asses, and mules, and from them transmissible to men. This disease is highly contagious, and thus far generally incurable. Far'cy differs from glanders in having a slower course, and is characterized by the formation of tumors involving the glands of the lymphatic system alone ("button far'cy"), the glands and the adjacent areolar tissue ("bud far'cy"), or the lymphatic vessels ("farcy pipe"), and is followed by fever. Where far'cy runs a somewhat rapid course it is generally fatal; while if its course proves very slow, a recovery may be looked for, at least in man. Glanders, however, which is the same disease, primarily attacking the nasal mucous membrane instead of the lymphatics, is almost always fatal. The treatment of acute cases is palliative chiefly; that of very chronic ones is expectant, the strength being maintained by nutritious food. In horses the disease is most common in those which are overworked, exposed to the weather, and kept in ill-ventilated stables. Far'ced horses should be killed at once, without any attempt at treatment. (See GLANDERS.)

**Far'del-bound**, a disease of sheep and neat cattle,

known in its milder form as "loss of cud." The animal refuses to chew the cud, is stupid, feverish, has a dry nose, and sometimes grunts as if in pain. The disease is an irritation or inflammation of the third stomach (*omasum*, manyplies, or fardel), the folds of which are dry and often inflamed. Sometimes this organ is impacted with food. The treatment is gentle purgation, as with Epsom salts, followed by liquid food, such as mash sweetened with molasses and flavored with a little ginger. As a preventive, avoid the use of coarse and overripe hay. The animal will generally recover within three weeks.

**Fareham**, town and sea-bathing place of England, in the S. of Hampshire, on a creek of Portsmouth harbor. Pop. in 1881, 7171.

**Farel** (GUILLAUME), the boldest of the French Reformers and father of Swiss Protestantism, was b. in 1489 in a little hamlet near Gap in Dauphiny. His parents, of noble descent and pious Romanists, subjected him to rigid religious training, and intended him for the army. But William gave himself to study, and when all opposition seemed fruitless he was suffered (about 1500) to set out for Paris, there to study philosophy, Greek, and Hebrew at the university. The shining light of the Paris school was, at that time, the brilliant Lefèvre d'Étaples, around whom were gathered disciples from every country. Young Farel became one of the most devoted of these. This illustrious connection was, moreover, the means of withdrawing Farel from obscurity, and securing him a large circle of acquaintance, and a chair in the College of Cardinal le Moine. Gradually, however, Lefèvre's influence declined and Farel's hold weakened. Lefèvre had espoused the doctrine which became the corner-stone of the Reformed structure—justification by faith—and had dared to declare the Bible the sole guide of the Christian. The Sorbonne condemned these innovations, and Parliament pronounced against them. Farel had accepted the views of his instructor, and was therefore in danger from persecution. In 1521, Lefèvre retreated to Meaux, but Farel remained in the capital, and for a time boldly continued to maintain his cause with professors, priests, students, and citizens wherever he could do so, in the university and in the city. The doctors of the Sorbonne, however, proved the stronger party, and Farel soon found it expedient to join Lefèvre at Meaux. Here, also, persecution found them out, and "the heretics of Meaux" were obliged to quit the town. Farel dared to return to Paris, but, finding himself in great danger, retired to Dauphiny. His three brothers became converts, and many adherents were gathering when the authorities, civil and ecclesiastical, combined against him, and he was obliged to quit the vicinity of Gap. He now visited other parts near the foot of the Alps and labored successfully. His life becoming endangered, he crossed over, early in 1524, into Switzerland, where he was warmly welcomed by the Reformers. He tarried for a while at Bâle, making his home with the learned Œcolampadius, who was charmed "with the learning, piety, and courage of the young Frenchman." Bâle was at this time much exercised by the religious innovations prevalent there, but officially no action had been taken in favor of the Reformed doctrines. Farel published thirteen theses covering the chief points of dispute, and defended them publicly without answer from the Romanists. In consequence, the Reformed doctrines became quite popular, and their success might have been established had not Farel fallen into angry dispute with Erasmus, who heaped such abuse upon the young Frenchman that he left Bâle in May, 1524, and repaired to Schaffhausen, Zurich, and Constance. On his return to Bâle he was ordered to leave the place. He retired to Strasburg, and there enjoyed the companionship of Capito and Bucer until secretly recalled to Bâle to be set apart by Œcolampadius for the ministry at Montbéliard. Farel had from the first been rather turbulent. Made priest, he by intemperance in language and conduct soon made himself an object of much hatred. He was driven from his parish in 1525. His friends were disappointed, yet would they not forsake him, for they knew well that he was as honest as he was fearless. After a brief visit to Œcolampadius, Farel joined Capito and Bucer at Strasburg, where he had another meeting with his beloved teacher, the saintly and now aged Lefèvre. In 1527 he went to Aigle, where he taught school, at first under an assumed name (*Ursinus*), but no sooner had he secured a sufficient hold on the people to warrant his safety than he boldly made known his real mission, and when Berne became Protestant (1528) extended his labors throughout its territory. "Honest and fearless," says Fisher, "Farel fulminated against the tenets and practices of Rome in city and country, in the church and by the wayside, wherever he could find an audience." "To this gospel missionary," writes D'Aubigné, "every place was a

church; every stone, every brick, every platform, was a pulpit. . . . No sooner did this man of small stature rise up in any place, with his pale yet sunburnt complexion, with red and unkempt beard, with sparkling eye and expressive mouth, than the monks' labor was lost: the people collected around; . . . all eyes were fixed on him; with open mouth and attentive ears they hung upon his words." He communicated his zeal to the Switzers, and by 1531 secured the reformation not only of the western cantons, but also "caused the balance to incline in favor of the new doctrines throughout the confederation." Sent to the Waldenses, then in synod in the valley of Angrogna, he returned in 1532 by way of Geneva, which was at this time agitated by great religious strife. Though a stranger, he dared to preach while in the city. In consequence he was driven from the place, and only escaped with his life by the bursting of a gun that was aimed at him. He returned again in the next year, and was again expelled. Still undaunted, he returned a third time, and was successful. The new doctrines were now largely heard and accepted. Farel was full of toil, and his triumph came Aug. 27, 1535, when the city council, by special edict, proclaimed Geneva as an adherent to the Reformation. In 1536 his cause was strengthened by a visit from Calvin, who was persuaded by Farel to take up his residence at Geneva. Farel and Calvin henceforth labored unitedly for the good of the Genevese; Calvin, by common consent, assuming the leadership in ecclesiastical organization. An able assistant these men found in Viret. In consequence of their bitter attack on the sensuality which many of the Genevese had fallen subject to under Savoyard rule, and the strict enforcement of ecclesiastical discipline, the Reformers became unpopular, and (Apr., 1538) were expelled from the city. They went together to Berne, Zurich, and Bale, where they separated, Farel going to Neuchâtel, whose Reformed society was then in deplorable disorder. Farel soon restored harmony (1542). Went to Metz to organize a society, but was persecuted, and finally obliged to retire to the neighboring town of Montigny, and afterwards to Gorze, where he enjoyed the protection of Count Fürstemberg. Attacks upon his life caused his removal to Strasbourg, and ultimately his return to Neuchâtel, where he married, when sixty-nine years old, a young wife, very much to Calvin's disgust. In 1560 he visited his native Dauphiny, and by his bitterness excited the roughs of Gap, who put him in prison, from which he was rescued by his friends. He now returned to Neuchâtel, and d. Sept. 13, 1565. "Of all the Reformers," says D'Aubigné, "Farel and Luther are the two most memorable for the struggles they had to pass through. . . . Farel is the pioneer of the Reformation in Switzerland and in France. He threw himself into the work, and with his axe cleared a passage through a forest of abuses. Calvin followed, as Luther was followed by Melancthon, resembling him in his office of theologian and 'master-builder.' And yet if Farel reminds us of Luther, we must allow that it is only in one aspect of the latter that we are reminded of him. Luther, besides his superior genius, had, in all that concerned the Church, a moderation and prudence, an acquaintance with past experience, a comprehensive judgment, and even a power of ardor, which were not found in an equal degree in the Reformer of Dauphiny." Farel was certainly a learned man, though he showed more skill as a speaker than writer. He was a missionary rather than an organizer, an iconoclast rather than a theologian. He may be called "the Swiss John Knox," and, like the renowned Scotchman, moved the world by his eloquence, intensity of zeal, and honesty of purpose. His writings are of interest only to the student of the Swiss Reformation. (See KIRCHHOFFER, *Life of Farel* (in German, 2 vols., Zurich, 1831-33; in English, London, 1837); GOGUEL, *Vie de Farel* (1841); SCHMIDT, *Études sur Farel* (1834); SCHMIDT, *Farel und Viret* (1860); BLACKBURN, *Farel and the Story of the Swiss Reformation* (Philadelphia, 1865).) J. H. WORMAN.

**Fa'rey** (JOHN), English civil engineer, b. in London Mar. 20, 1791, obtained a silver medal from the Society of Arts in 1807 for making perspective drawings, and in 1813 a gold medal for a machine for drawing ellipses. He was employed in Russia in 1819, and died in London July 17, 1851. His treatise on the steam-engine was published in 1827.

**Far'go**, R. R. junction, capital of Cass co., Dak. (see map of Dakota, ref. 3-G, for location of county), on the Northern Pacific R. R. and the W. bank of the navigable Red River of the North, opposite Moorhead, Minn., 254 miles W. of Duluth. It is an important wheat-market and has a U. S. land-office. Pop. in 1880, 2693; in 1885, 3201.

**Fa'ria Sou'za** (MANOEL), a Portuguese historian and poet, b. at Pombreiro, or Souto, Mar. 18, 1590, studied at Braga, entered the service of the bishop of Oporto, was en-

voy to Rome 1630-34, and spent the rest of his life in Madrid, where he died June 3, 1649. He was a very industrious and prolific writer. As a poet he was a pupil of Gongora's *estilo culto*, and his four volumes of poems (published in Madrid 1644-46) have very little interest. The principal of his prose works are his *Epitome de la historias Portuguezas* (Madrid, 1628); a commentary on the *Lusiad* (Madrid, 1639, 2 vols.), a passage of which aroused the suspicion of the Inquisition and cost him his official salary, and even a temporary imprisonment; and *Europa Portuguesa* (3 vols.), *Asia Portuguesa* (3 vols.), and *Africa Portuguesa*, published posthumously at Lisbon, and, though unfinished, of great value.

**Faribault**, R. R. junc., capital of Rice co., Minn. (see map of Minnesota, ref. 10-F, for location of county), at junction of Straight and Cannon rivers, 53 miles S. of St. Paul. It contains the State asylum for the deaf, dumb, and blind, an Episcopal divinity college, 5 seminaries, a public reading-room and library, 2 parks, several flouring-mills, and a number of manufactories. It is lighted by gas and provided with a steam fire-engine. Pop. in 1870, 3045; in 1880, 5415.

**Fa'rina** [Lat. "meal"], a name applied to powdered cereal grains, and even powdered pulse (peas, beans, etc.). In a still wider sense it includes the starchy foods prepared from various roots and stalks, such as arrow-root, sago, tapioca. From the fact that such substances abound in starch, starchy food is often called farinaceous.

The pollen of flowers, after it has been gathered by bees, is also called farina. This is made into bee-bread, to serve as food for the larvæ, and probably enters into the paste which covers the larva-cells of honeycomb.

**Farina'to** (PAOLO), Italian painter, b. at Verona 1525, was pupil or imitator of Titian and Giorgione, painted in oil and fresco, excelled in design, and d. in 1606. *The Miracle of the Loaves and Fishes* is one of his best works.

**Farinel'li** (CARLO), Italian soprano singer (proper name CARLO BROSCI), b. at Naples Jan. 24, 1705, studied under Porpora, performed with applause in London 1734-35, and in 1737 went to Madrid to sing to and soothe King Philip V., and, succeeding, became his favorite, as also the favorite of Ferdinand VI., Philip's successor. He spent the last years of his life in great splendor, but lonesome and melancholy. D. at Bologna July 15, 1782. He was a eunuch, and not only the best singer of the eighteenth century, but a complete marvel with respect to voice, and possessed of fine musical education. He displayed brilliant talents for court-intrigue at Madrid, but possessed many amiable and even generous traits.

**Fari'ni** (CARLO LUIGI), Italian statesman, historian, and orator, b. at Russi, in the Roman States, Oct. 22, 1822, studied medicine and wrote medical treatises. Proscribed for political offences in 1843, he returned after the amnesty proclaimed by Pope Pius IX. in 1846, and was chosen a member of Parliament for Faenza; then exiled again 1848-49, but was minister of the interior in Piedmont in 1850. He took part in negotiations with Napoleon III., and was named dictator of Modena 1859. In 1860 he was commissioner extraordinary to the court of Naples. In the last cabinet of Cavour he was minister of commerce, and was president of the cabinet Dec., 1862, holding the position until Mar. 24, 1863, when he retired on account of ill-health, and died Aug. 1, 1866. *Storia della Stato Romano dal anno 1815 al anno 1850* (1850), of which the first part has been translated into English by Mr. Gladstone, and the second, under his superintendence, by a lady, *Letters to Lord John Russell* (1859), and *Letters to Mr. Gladstone* (1856), are among his works. His remains were originally buried at Turin, but were in 1878 removed to his native town, and monuments have been erected to his memory both there and at Ravenna.

**Farley** (HARRIET), American writer, b. at Claremont, N. H., edited and contributed to the *Lowell* (Mass.) *Offering*, sustained by factory-girls. *Shells from the Strand of the Sea of Genius* (1847) and *Mind among the Spindles*, issued in London in 1849, are her publications.

**Farley** (JAMES LEWIS), Irish correspondent and author, was b. at Dublin Sept. 9, 1823, and in 1860 was accountant-general of the State Bank of Turkey at Constantinople. In 1863 he was correspondent of the *London Daily News*. In Mar., 1870, he became Turkish consul at Bristol, England. *Two Years in Syria* (1858), *The Druses and Maronites* (1861), *The Resources of Turkey* (1862), *Banking in Turkey* (1863), and *Turkey* (1866), have been published by Mr. Farley.

**Farlow** (WILLIAM GILSON), M. D. See APPENDIX.

**Farm**. See AGRICULTURE, by HORACE GREELEY, LL.D.

**Farmer** (HENRY T.), M. D., physician and poet, was b. in England, emigrated to Charleston, S. C., and after his medical education in New York settled there in the



practice of medicine. He published *Imagination, The Mariner's Dream, and Other Poems*, 1819, and d. in 1840, forty-six years of age.

**Farmer** (Rev. HUGH), an English dissenting clergyman of great learning and ability, b. near Shrewsbury in 1714, studied under Dr. Doddridge at Northampton, and from about 1746 was pastor of a congregation at Walthamstow, where he d. Feb. 6, 1787. Published *Inquiry into the Nature and Origin of our Lord's Temptation in the Wilderness* (1761), designed to show that the temptation was not objective and real; *A Dissertation on the Miracles* (1771); *Essay on the Demoniacs of the New Testament* (1775; 3d ed. 1818); *Prevalence of the Worship of Human Spirits in Ancient Heathen Nations* (1783). R. D. HITCHCOCK.

**Farmer** (JOHN), American genealogist, born at Chelmsford, Mass., June 12, 1789, was a founder and the corresponding secretary of the New Hampshire Historical Society, and published an edition of Belknap's *History of New Hampshire, Genealogical Register of the First Settlers of New England* (1829), *History of Billerica* (1806), *History of Amherst* (1820), *Gazetteer of New Hampshire* (1823), etc. He died at Concord, N. H., Aug. 13, 1838.

**Farmer** (RICHARD), the famous Shakspearean scholar, b. at Leicester in 1735, d. at Cambridge Sept. 8, 1797. He was educated in the free grammar school of his native town and Emmanuel College, Cambridge; became a classical tutor in the latter institution in 1760, and a master in 1775; and was appointed librarian at the university in 1778. He held various benefices, at Lichfield, Canterbury, and St. Paul's, but he twice declined the offer of a bishopric, unwilling to give up the free-and-easy life he was used to. The only monument of his learning and industry he has left is his *Essay on the Learning of Shakspeare*, published in 1766, and afterward often reprinted. It could not be doubted that Shakspeare was well acquainted with ancient history and mythology, but the question was raised, and caused much debate, whether he had his knowledge at first or at second hand. Farmer's essay shows with irrefragable evidence that Shakspeare had his knowledge from translations, and from translations only; for he copies even their blunders. (See JOHN NICHOLS, *Literary Anecdotes*.)

**Farmer City**, R. R. junction, De Witt co., Ill. (see map of Illinois, ref. 6-E, for location of county). It is on Springfield division of Illinois Central R. R., and has a large lumber business. Pop. in 1870, 537; in 1880, 1289.

**Farmers' Clubs** are associations of agriculturists, generally those of some one community or neighborhood, who meet at stated times for the discussion of questions affecting the interests of agriculture, and more especially for considering the methods of practical farming—the relative values and uses of different fertilizers, the adaptation of special crops to particular soils, the choice of breeds of live-stock and of varieties of cultivated plants, and the like. Mr. Solon Robinson and the late Hon. Horace Greeley were among the early and influential advocates of farmers' clubs. They were associated with the Farmers' Club of the American Institute in New York, the discussions of which were for many years printed weekly in the *New York Tribune*, and widely read. Some farmers' clubs have libraries and invested funds, and sustain regular courses of lectures in the winter season, and in general ladies are admitted. The constitution and by-laws are, or should be, simple in plan, and the meetings are social rather than formal. In many places, besides the regular discussion, there is the reading of one or more original papers, usually agricultural; and music adds variety to the exercises. To some extent the old farmers' clubs have recently been converted into, or replaced by, the granges of the Patrons of Husbandry. (See GRANGE, by L. P. BROCKETT, A. M., M. D.)

**Farmers-General**, an association of persons in France, under the old monarchy, to whom the privilege of levying certain taxes, as imposts on salt or tobacco, or town-dues in particular districts, was farmed or let out for a given sum paid down. This system of raising the public revenue was employed by the Roman state. (See PUBLICANS.) It was introduced into France in the thirteenth century, when Philip the Fair gave to Lombard Jews and brokers the privilege of collecting the *gabelle*, or tax on salt, to provide means for carrying on war against the English. It continued to be employed under various modifications down to the Revolution of 1789. The system involved such extortions and cruelties to the people, and such frauds on the government, that it excited general odium. Great financial ministers like Sully and Colbert had to grapple with it for the temporary correction of evils, but it could not be dispensed with till the old order of things passed away. In 1720 the farmers of the taxes formed a regular association, called the *ferme générale*. It

included originally forty, and afterwards sixty, *fermiers généraux*, who held, for a specified number of years, the exclusive management of the *gabelle*, the tax on tobacco, the *octrois* of Paris, and other excise duties. These men accumulated enormous wealth, and by bribing ministers of state, courtiers, and functionaries of all classes had influence enough to keep up the ruinous system. Turgot and Necker, in the reign of Louis XVI., attempted to change the arrangement, but the nobility, clinging to their privilege of exemption from taxation, effectually resisted their efforts. By the revolutionary constitution of 1791 the system was swept away, and many of the farmers-general were executed. A. L. CHAPIN.

**Farmersville**, capital of Union parish, La. (see map of Louisiana, ref. 6-C, for location of parish). Pop. in 1870, 272; in 1880, 712.

**Farming**. See AGRICULTURE, by HORACE GREELEY, LL.D.

**Farming Class, The, in America.** In the U. S. the word *farming* has a meaning quite unlike that given to it in Europe. In England, the farmer is a tenant paying rent, generally to some holder of entailed lands. In France, the census shows that 36,000,000 acres of land are divided into farms, none of them of more than eight acres in extent. (*Mark Lane Express*, Apr. 13, 1874.) In England, the farmer has little influence in directing society, for he has no permanent interest in the land. In France, his ownership is of so small a possession that it is virtually a garden—too small to permit the raising of cattle or sheep, to produce manure; and where chemical manures must be depended upon to sustain the three-course system, consisting of two crops of cereals and a bare fallow, and where the cows that supply milk, butter, and cheese must be made to do the work of tillage, the fact that the cultivator is the owner gives him no political importance.

Here the cultivator of the soil almost always is the owner, and except in the vicinity of great cities less than fifty acres would hardly be called a farm. Thus, the American farmer generally possesses the advantages that follow combined occupancy and ownership of landed estates, not too large to be directed by one man, and yet large enough to employ all the energies and ability of an active and enterprising mind.

The fathers of our government by law for ever swept out of our institutions all that had been for ages crystallizing in the countries from which we sprung into impassable walls between different orders of society, and not only provided against hereditary government, but against the establishment of families upon foundations of wealth in real estate that they cannot alienate. Equal political and social rights create an active condition of society, for each youth feels that there is no place so high as to be beyond the possibilities that are before him.

A century has not elapsed since we commenced our career as a nation under our own institutions. With a population of scarcely 3,000,000, inhabiting a narrow belt along the sea-coast, with no accumulated capital, with a heavy national debt, the future was bravely faced, and the line of settlements was extended into the interior, where fertile lands covered with forests invited the enterprising to leave the granitic soils of the coasts. Along the only river that reached by its navigable waters through the mountain-range next the sea the lands were largely held in great estates, upon which it had been attempted to plant the institutions of the Old World. The manors of the Livingstones and the Van Rensselaers and their compeers, stretching along the Hudson River, are sufficient illustrations of the influence of such estates upon the public interests.

Immediately after independence was established armies were sent beyond the ranges of coast-mountains to terminate the war with the Indians, that by the treaty with England had been left unsettled. The return of the soldiers brought news of a wonderful country in Central and Western New York, which speculators grasped in large part; but they were wise enough to invite purchasers on liberal terms, and in a wonderfully short time the far-famed Genesee county was settled and brought into cultivation. The State of New York constructed a canal connecting the waters of the interior lakes with the Hudson, and the tide of moving pioneers carried agriculture to Ohio, to Michigan, and finally to the great prairies of the West.

The government of the U. S. adopted a wise policy in regard to its lands lying in the North, and sold at low prices, but for pay down except in cases of settlement before survey, when pre-emption privileges were given.

The general law of emigration is, that the most energetic take the lead, leaving the less enterprising to stay behind and enjoy the old home. To this native energy, that first prompted the movement, in due time is added the self-reliance and quick use of all the powers of body and mind

that comes of frontier life. Those who escape death in becoming injured to the change in climate and habits become men of great deeds if occasion calls out their powers. To realize this discipline we have only to consider the hardships that must be encountered by an early settler of such a country as was Central New York three-quarters of a century ago. A man from New England starts on horseback, and following a scarcely passable road, lodging in the wayside cabins of the early settlers, who at distances of a few miles apart furnish entertainment for man and beast, he, after a month or so of travel, finds himself on the long-sought "lot" that he had perhaps purchased unseen. Here, cutting away a few trees, he clears a space for a hut of logs, that the pioneers who have come before him help to raise. Planting, if the season is right, some important seeds, he leaves for home, in due time to return with his family and a few domestic animals. Once settled, the work of removing the trees commences, and many lofty ones fall before the axe and are destroyed. For food, the new-comer must depend upon the nearest settlement and his own skill with the rifle, aided by the fish that the lakes and streams furnish.

The second year gives a crop of corn and potatoes, and perhaps some other food. The work of clearing goes on, and each added year sees new acres producing crops; and soon this pioneer has become, in the language of the place and times, "an old settler," and has food to sell to new-comers, and is possessed of flocks and herds. He is now a man of consequence, called upon to organize new counties, towns, school districts, to lay out roads, to bridge the streams, to construct school-houses and churches—to organize society and to make and enforce the laws. In the mean time, sons and daughters have been born, grown up, and now demand more of education than the little district school can give. There must be an academy established and in active operation. When this high school is doing its work the pioneers feel that they are living in an old country, and ready to send their sons farther on into the wilderness to repeat the work. This is the way in which the timbered lands that reached from the sea-coast to the Prairies have been converted into fruitful farms, owned by the men who cultivate them.

We must not forget that the hardest part of the task devolved upon the women, and that the greatest obstacle in the way of rapid progress were the diseases incident to the cultivation of the new soil. Malaria was everywhere, and fever wasted and destroyed. The women must prepare the food, manufacture cloth, and make garments for the family, nurse the sick, and bear and rear the children. Both men and women by this stern education received an energy and power of execution unknown in more elegant life. Self-reliance, personal independence, and manhood proud of its muscular prowess were the result. From this training has come the American farmer of the grain-growing States.

What influences and results such a body of men, thus nurtured, may produce on the policy of our nation is an interesting matter of inquiry. Society has been so long in the habit of receiving its leadings either from an hereditary aristocracy, or from some class especially educated and trained to execute the governing powers, that it is no easy task to break away from customs so firmly established. But causes are in active operation here that never before influenced society, and they are quite likely to materially change the old order of things. The means of universal education are more abundant than were ever before given any great people. The school-district library brings to every hamlet a collection of standard works that are too costly to be otherwise furnished for the people, and the newspaper is everywhere, and in no society is its influence more pervading than among the cultivators of the soil. By the newspaper every event of the least public importance is speedily known in the hut of the far-off pioneer, and as fully as in the great centres of wealth and commerce. The policy of the government, the decisions of the courts, and all the changes that are going on are discussed everywhere among the farmers, and they form and freely express opinions as to the influence of public measures upon their own special interests and those of every other class.

Thus stands this body of industrious, active, and well-informed men, having many millions in their ranks, vast aggregate wealth in lands, and votes sufficient to dictate the policy of the country—generally not so ambitious of office as desirous of having wise laws honestly administered.

It would have been strange if such men had not required, as supplementary to the general newspaper literature of the country, a press devoted to their own special wants. The general tendencies of our times to accurate and scientific knowledge in regard to the things in which we have the greatest interest have nowhere had more influence than

among farmers. The laws of life in animal or vegetable are to the farmer matters of the greatest importance. The chemistry of vegetation—how plants grow, and how to make them grow at the least cost—is a matter of vital interest. Scientific books especially devoted to agricultural matters soon followed the agricultural newspaper, and no class of men entertains higher respect for the really scientific writer than the practical farmers of our country.

The old men insist upon their sons having advantages of education greatly in advance of anything known in their school-boy days. They demand that their sons' time shall not be consumed in the acquisition of a learning that, however well it may be adapted to other pursuits, is of little value on the farm; they demand that the education of their children shall be directed in such a way as will make it of actual practical value in their future work. Out of this feeling has grown the attempt to establish colleges especially devoted to agricultural education. Experience had shown that to send a farmer's son through the usual collegiate course, devoting most of his time to the study of the languages of nations that no longer influence public affairs, was the almost certain way to create a distaste for life in the fields, and generally landed him in the pulpit, the bar, or among the doctors of medicine. The slow processes that had led his father to independence and public consideration were connected with an amount of physical exertion that the softened muscles revolted from. The liberal grant made by the nation to promote agricultural education has in many cases been so perverted as to strengthen institutions established for other ends. In some States new colleges have sprung into being on this endowment that are somewhat improved in their course of study, but thus far the result of this effort has been anything but satisfactory to the farmer. A college in Michigan, founded before the national grant was made, has perhaps come nearer the end aimed at than any other. That State wisely gave the lands that came to it under the national grant to its agricultural college, that had already become well started. There each student is required to perform a considerable amount of manual labor every day, for which he is paid in proportion to its value, and all are required to live on the farm. The course of study is well adapted to the supposed special wants of farmers and to active life generally, and the habit of labor is preserved; and the graduates, thus far, have shown a marked willingness to adopt farming as a business.

It is an unsettled question whether special agricultural education can be successfully had in connection with other courses of study—in fact, whether actual manual labor on the farm is not a condition without which there can be no marked success. The various plans adopted by the several institutions that have received the national grant will ultimately solve these questions in a practical way. And when a large part of this national fund has been wasted on old institutions in vain efforts to give them adaptation to a special end, it may at last come to pass that there will be several real agricultural colleges. When this is the character of a half score or more institutions, situated in unlike climates, and dealing with unlike soils, but all acting in concert, the real wants of our agriculture will be found out, and some of the questions that so much perplex the individual farmer may find a solution, and the labor of food-production may become vastly lessened and the fruits of the earth greatly multiplied.

To further aid in the advancement of the agriculture of the country, Congress has established what is called a department of agriculture, but the practical results of this undertaking have thus far been unimportant.

Agricultural interests have been greatly aided in the several States by appropriations of money made by them to assist the local agricultural societies. The State of New York has taken the most prominent position in this work, and for something more than thirty years has had in successful operation a State society, and county and town societies auxiliary thereto. The policy of the State society has been from the day of its first fair, held at Syracuse (1841), to instruct rather than amuse the immense multitudes who attend these annual meetings. All "side shows" are excluded, and there has never been on the grounds during a fair the least attempt to test the speed of horses, or any other thing to draw the public attention from the objects that the society had in view. These fairs have been held at points far apart, and never two successive years in the same place. From the city of New York to Buffalo, Poughkeepsie, Albany, Utica, Syracuse, Auburn, Rochester, on the central line of travel, and on each side Saratoga, Watertown, and Elmira, have in their turn been visited, and now the society has become firmly established in three central positions—Albany, Elmira, and Rochester. The railroads centering at these places give such advantages of transportation that the society has determined,

for at least twelve years, to test the policy of having more permanent buildings, better accommodations for both exhibitors and spectators, than could formerly be secured. The State has provided at Albany a building to be used jointly by the Agricultural Society and the Museum of Natural History. In this building are the library, lecture-room, and offices for the secretary and for all the business of the society not connected with the field-operations of its annual shows. The secretary is employed all the time, and makes his head-quarters at this centre, and keeps up a correspondence with like institutions in all countries, and has the doors open to all visitors to the rooms devoted to the exhibition of objects of interest to farmers, embracing, among other things, tools used many hundreds of years ago alongside the most improved of modern genius. Thus, this department of agriculture of New York exercises an important influence in the education of, and interchange of information among, the farmers of the whole country. No influences of political parties have ever disturbed its councils, and leading men have given their best efforts to the organization. The volumes of its *Transactions* now published constitute the most valuable collection of agricultural information extant.

The settlement of the timbered country was attended with so much labor that agricultural development did not so rapidly advance as to entirely outstrip the other industries. Manufactures and commerce kept nearly even march with agriculture; and the connection of the great lakes with the sea by the Erie Canal gave a very cheap line of water-communication with the commercial world for the surplus land-products. The result was a healthy growth of all the great industries, without any very great or undue stimulus to any one of them. The pioneers found a market for their surplus food in supplying such as came immediately after them, and mills and factories followed in regular sequence. These remarks are measurably true of the settlement of all the country lying E. of Lake Michigan and between the lakes on the N. and the Ohio River on the S., but not of the prairie countries beyond.

The locomotive steam-engine and the facility of rapidly turning the treeless prairies into productive fields, pastures, and meadows have caused a more rapid development of agriculture beyond Lake Michigan than was possible under the circumstances that were connected with the settlement of the lands E. of that lake, and the production of food has greatly outstripped other important branches of industry. Thus, agriculture there has become comparatively unprofitable for want of a home-market for its surplus productions. The true balance of the great industries must be brought about in order to secure real prosperity. The coal that underlies so large a proportion of the great West, and the minerals that abound, furnish raw material for a vast manufacturing interest that must in time give employment to many millions of consumers of the fruits of the soil. Though the Mississippi, with its navigable branches, and the lakes and rivers and canals of the North and East, give a way to market, and though railroads have been so extended as to reach nearly every hamlet, yet the vast distances that intervene between the wheat-fields of the West and the workshops of the Eastern States and Europe will for ever remain, and real prosperity can only come when producer and consumer are brought much nearer together.

The balance between the several great branches of industry is already being restored. The tendency of our people to city and village life, and the necessities of all parties, will, very soon it is to be hoped, correct the evils under which the grain-growers of the West are suffering so severely, and give them a home-market. The resources of the North-western States, the fertility of the soil, and the small proportion of waste or untillable lands, together with the minerals that underlie them, must soon support in affluence a great number of people. Already 12,000,000 persons are engaged in advancing the great interests of these ten States, and the tide of immigration from the Old World is so established in that direction that prosperous times must be near at hand.

The settlement of the country has been so rapid that it has not been possible to establish any systematic methods of cultivating the soil. When the country took its place among the nations less than one hundred years ago, it was poor in everything but the undeveloped capacities of the land. There was very little accumulated capital, and men cleared away the forests to find a place on which they could raise their food, and from which they could raise the wool and flax to be wrought in their own houses into clothing. Almost necessarily these first-cleared fields were cultivated with very little attempt at keeping up their fertility, until they were exhausted of those stores that Nature had been ages in accumulating. This policy was continued until the crops became so small as to no longer pay for the labor be-

stowed. Then followed a more rational system, in which herds of cattle and flocks of sheep were combined with grain-raising. Cities and villages had grown up, and manufacturing centres made a brisk demand for all that the tillers of the soil had to sell; and in the Eastern States the increase of consumers was such that very soon food had to be imported from the fast-settling West. The cost of transportation from these Western fields gave the food-producers of the East such advantages that they found it profitable to resort to improved methods of cultivation, to which their lands responded by giving them abundant crops. The city and village markets all around them enabled them to produce the crops that would not bear long and expensive transportation.

In localities especially adapted to certain crops, like hops, tobacco, potatoes, beans, fruits, or to the feeding of animals, these special branches have had, under favoring circumstances, extraordinary attention, while the cereals have perhaps been raised in only sufficient quantities for supplying the family and dependants. This change in the character of the crops raised in the older parts of the country has led superficial observers to think that the total agricultural product has greatly fallen off, and that the owners of the farms are gradually destroying them. Census tables have helped to spread this opinion, and statisticians have been predicting speedy ruin. The answer to all this is the fact that the Eastern cultivators of the soil are enlarging their barns and giving every indication of prosperity, convincing an observing traveller that they are well rewarded for their labor. Taking the State of New York as representing a fair mean between the older States of the East and the newer of the West, we find that while this State does not raise much more than one-quarter of the bread consumed within it, the farming lands have risen in selling value to twice or more the prices they bore in the days when millions of bushels of wheat were annually produced. Leaving out of a survey of this State the old counties, and not considering that vast forest that lies in its north-eastern part, where the climate forbids profitable cultivation, we shall find that prosperity based upon fertility is the almost universal law, as is shown by the fine houses and capacious barns that are everywhere being constructed out of the profits derived from the land.

The question is constantly asked, Does farming pay? It would be a short way of answering this question to say that within a time that would not average more than the lives of two generations all the capital in that part of New York under consideration has been created out of the land by its owners' industry; and if we were to find the cost of the buildings, fences, roads, farm-stock, tools, and machinery, and add to this the reasonable cost of clearing the land from its forests, we should have a sum so vast, representing the earnings of only two generations, that we could form some just opinion upon this oft-repeated question, and our minds would be ready to grasp in some measure the probabilities of the future of the descendants of the people who, in addition to raising and educating families and living in luxury, have accumulated this vast capital in so short a time.

The facilities for acquiring lands have been so great that the sons of farmers, if they intended to follow the avocations of their fathers, have generally themselves become owners soon after arriving at man's estate; thus the labor on farms has commanded very high prices, and the demand has very generally been supplied by persons of foreign birth. Out of this scarcity of men who would work for wages has grown a demand for improved machinery and implements. The old hand-winnowing fan, made of willows and shaped like a clam-shell, used by expert hands to throw grain into a current of brisk wind, has been superseded by a machine that threshes and cleans a bushel of wheat in a minute. The cast-iron plough has been perfected from inventions of our own farmers by our own mechanics, so as to take the highest prize at the World's Fair in England in 1851. This has been followed by the cast-steel plough; and the old wooden plough, having a wrought-iron share and point, that was fifty years since considered to be a good implement, can now only be found in collections of curiosities. With the great improvement of the plough came in rapid succession improvements in harrows, cultivators, and machines for sowing grain and harvesting it. The first successful mowing-machine was the beginning of a revolution in the management of farms. In 1852 the New York Agricultural Society had a trial of farm implements at Geneva, and there and then were brought face to face the various manufacturers of implements used in hay and grain raising. The trial was full and exhaustive, and from it the great advance in perfecting these implements may be dated. The mowers there used far surpassed in quantity and quality of work anything that could be done by hand-labor. But since that

time the improvements have been so decided that no progressive farmer could now be induced to use the premium machines of 1852 if given to him. It has been computed (JOHN J. THOMAS, *Farm Implements and Farm Machinery*, p. 8) that the reaping-machines introduced throughout the country up to the beginning of 1861 performed labor, while working in harvest, equal to that of 1,000,000 men with hand-implements. Since that estimate was made the mower and reaper have been greatly improved, so that it is safe to say that in cutting, raking, and housing hay and grain the labor performed by men has been reduced, except in binding grain and loading grain and hay, so as not to exceed one-quarter the amount required before the introduction of modern implements. The authority before quoted says, "The reaper filled the void caused by the demand on the workmen for the army. An earlier occurrence of the war must have resulted in the general ruin of the grain interests, and prevented the annual shipment of the millions during that gigantic contest."

The threshing-machine, driven by a steam-engine, that by one process threshes the grain, taking from it the chaff and delivering the straw on top, if required, of high stacks, enables the grower to hasten his crop to market, and dispenses with much barn room that would be required to keep the crops while the old ways of threshing and winnowing had to be employed. The wheat-grower ploughs his land with a plough that takes less than half the power once required, and that does the work as perfectly as it can be done by hand-spading. Improved harrows and wheel-cultivators, on which he rides, fit the ground for the seed, which is sown with mathematical accuracy by a drill drawn by horses. The grass-seeds are sown at the same time and by the same machine, and the gypsum or other fertilizer is distributed by the power of horses, and with a precision unattainable by hand-labor. The grain is cut and cast off the harvesting-machine by the power of two horses driven by a boy, and the work is better done than by hand; and this one machine, boy, and horses can go over as many acres as could six ordinary laborers with the tools of the olden times. The bundles must be cared for in the old way, but the steel-toothed wheel-rake, driven by the boy, goes over the field and gathers gleanings that formerly were lost to an amount often sufficient to pay for harvesting the crop. The cost of making and housing the hay-crop is lessened by modern implements more than is that of grain, for the hay is spread by a tedder that is drawn by horses, the driver riding, and which goes over more ground and does the work better than could six men in the old way. The wheel-rake gathers the hay when made and gleans all scatterings. The horse-pitchfork takes it off the wagon and carries it to the back side of the deepest bay in the barn. The advantages growing out of the improved implements are not so decided in some other branches of farming. The expenditure in human labor in feeding and caring for animals, and in making butter and cheese, is not materially lessened, and in the management of sheep very little has been gained except in providing forage for their winter's consumption. The census tables show that there are about one-third less men now employed in proportion to the whole population in producing food than there were twenty years ago. This may be accepted as indicating that the manual labor employed in farming has been lessened 33½ per cent.; and this, all branches being considered, is probably very near the truth.

Who is most benefited by this lessening of the labor necessary to produce food and raw material for clothing the people? The price paid for manual labor on the farm, when reduced to gold, is fully double the price paid for like service thirty years ago. So the first benefit of the improvements in machinery inures to the laborer. The employer pays more to his men than is saved by the improved implements. If three men, at \$1 each per day, did the work now accomplished by two men, each receiving \$2 per day, then the sum paid is \$3 against \$4, the extra dollar going to the laborer. The prices of farm products are higher than they were thirty years ago, or the employer could not pay the present prices of labor. The liberating of one-third of the agricultural laborers, and setting them free to engage in other occupations, is felt in all branches of business. The laborer now has money to provide his family with comforts unknown in his mode of life thirty years ago. The immediate consequences of this plenty, with people who will work, are better education and more independence and elevation of character. Savings banks have larger deposits, merchants sell more goods, and all branches of business are quickened. Mr. Thomas estimates the value of the implements of American farming at more than \$500,000,000. Our mechanics have not only to keep good this supply, but, because of superior materials and workmanship, they export largely to Europe.

The tendency of the improvements in implements has

been in favor of large farms, as it is only a large farm that will justify the outlay of capital necessary to have a full supply and to keep up with the latest improvements; and the large farm justifies the construction of comfortable houses for the accommodation of families, which find permanent homes and employment. Systematic and organized labor comes next. Rotation, draining wet lands, removal of all stones and other obstructions to the use of machinery, the careful preservation of manure, the raising of livestock with grain and the dairy-products,—these things bring the whole into harmony, and the use of green crops, stimulated by special manures when necessary, gives large returns and constantly increasing fertility. The first settlers, partly from necessity, partly from ignorance of their own interests, do indeed impoverish their lands, but they are succeeded by men who follow the rational system, under which the lands are made to produce crops far more remunerative than were raised by those who went before them. In the new States the farming of to-day must generally be classed as of the exhaustive kind. The farming of the older States is fast assuming the most healthy condition.

Aside from the labors that have been described as having been performed by the farmers of our country, and their advance in wealth, they have not failed to give their attention to the improvement of their animals. The horse in the hands of our breeders has had his useful powers developed beyond anything done elsewhere. The more practical American mind has discarded the running horse, and tried to produce one "of all work," good for the plough, the carriage, or the saddle. Substance, endurance, strength, and speed in the useful movements of the walk or trot have been the objects aimed at, and the result has been a better horse "for all work," and for any work except profitless racing, than has before been known. The American farmer has purchased the best neat-cattle of the Old World and brought them here, and by his skill in breeding has given them a reputation so high that at public sales their descendants have sold to men representing breeders of England at prices ranging from four to eight times as much as has been paid at any time in England. The sheep that a short time ago produced the clothing of Europe have been brought from their native hills of Spain to this country, and by the skill of our farmers their fleeces have been fully doubled in quantity to any raised elsewhere, without any deterioration in quality; and there appears to be no point yet reached in this improvement beyond which it may not go.

These victories are proofs that men who combine in themselves the interests of both cultivator and owner of the lands have inducements that must lead to thorough knowledge of the laws of production of both animal and vegetable food, and that must ultimately lead them to the highest social and political position.

The next generation, with its increased capital and more cultivated tastes, will devote more means and attention to making the homes of farmers attractive. Carefully cultivated ornamental trees and shrubberies, flowers, and walks will add to the charms of country life, and increase self-respect and public consideration. GEORGE GEDDES.

**Farmington**, Hartford co., Conn. (see map of Connecticut, ref. 4-D, for location of county), on Farmington River and on the New Haven and Northampton R. R., 31 miles N. of New Haven. It has a ladies' seminary and important manufactures. Pop. of township in 1870, 2616; in 1880, 3017.

**Farmington**, town and R. R. junction, Van Buren co., Ia. (see map of Iowa, ref. 7-J, for location of county), on the Des Moines River. Pop. in 1880, 781; in 1885, 839.

**Farmington**, on R. R., capital of Franklin co., Me. (see map of Maine, ref. 7-B, for location of county), 80 miles N. E. of Portland. It has a State normal school, Abbott's Family School for boys, Wendell Institute for boys and girls, "The Willows" school for young ladies, a library, an iron-foundry, grist and flour mills, several saw, shingle, and clapboard mills, drum-manufactories, a box-factory, a steam sash, door, and blind manufactory, a cheese-factory, etc. Its schools make it one of the best educational centres in the State. Principal business, mercantile, farming, and dairying. Several valuable slate-quarries have been discovered here, and charters to companies for opening and manufacturing have been granted. The slate is a superior quality for mantels, billiard-tables, etc. Pop. of tp. in 1870, 3251; in 1880, 3353.

**Farmington**, R. R. junction, Dakota co., Minn. (see map of Minnesota, ref. 10-F, for location of county). It is in an almost exclusively farming country, mainly devoted to wheat-raising. It has a flouring-mill, shoe-manufactories, several manufactories of carriages, and a large wheat-elevator. Pop. in 1880, 688; in 1885, 721.

**Farmington**, capital of St. François co., Mo. (see map of Missouri, ref. 5-J, for location of county), 2½ miles from the St. Louis and Iron Mountain R. R., on the turnpike leading from Iron Mountain to Ste. Genevieve. Pop. in 1870, 393; in 1880, 608.

**Farmington**, Stafford co., N. H. (see map of New Hampshire, ref. 8-G, for location of county), on R. R., 10 miles S. E. of Alton Bay. It has a high school, and manufactures of boots, shoes, and lumber. Pop. of tp. in 1870, 2063; in 1880, 3044.

**Farmington**, capital of Davis co., Ut. (see map of Utah, ref. 2-G, for location of county), on R. R., 21 miles S. of Ogden and 16 miles N. of Salt Lake City. Pop. of precinct in 1870, 976; in 1880, 1073.

**Farmville**, capital of Prince Edward co., Va. (see map of Virginia, ref. 7-G, for location of county), on R. R. and the Appomattox River, 70 miles S. W. of Richmond and 7 miles N. of Hampden-Sydney College and the Union Theological Seminary. It has one female college, and several large tobacco-factories and warehouses. Principal business, tobacco-trade. Pop. in 1870, 1543; in 1880, 2058.

**Farnaby**, or **Farnabie** (THOMAS), b. in London 1575, d. at Oxford in Sussex 1647. He was educated at Oxford, but embraced Romanism and went to Spain, where he entered a Jesuit College. He was disappointed, however, and soon left it. After his return he first enlisted under Drake and Hawkins, then fought in the Netherlands, and finally settled at Martock, in Somersetshire, where he opened a school. This undertaking proved so successful that after the lapse of a few years he was able to remove the institution to London, where his success was still greater. His school contained more than 300 pupils, most of whom were sons of noblemen, boarding in his house, and more churchmen and statesmen issued from it than from any other in the country. He finally removed the institution to his estate, Oxford. He published annotated editions of a great number of ancient authors and a *Systemo Grammaticum* (London, 1641).

**Farne** (or **Fern**) **Islands**, a group of seventeen islets and rocks, some of which are visible only at low tide; they are situated 2 to 5 miles off the E. coast of England, opposite Bamborough, Northumberland. On two of the islands lighthouses have been built, as navigation is extremely dangerous in these waters. On another of the isles is a tower raised in honor of Saint Cuthbert, who lived there during the last two years of his life. Lat. of Farne lights, 55° 37' N., lon. 1° 39' E.

**Farnese** is the name of a noble Italian family, many of whose members have played quite conspicuous rôles in the history of Europe. For the greater part, the family owed its prominent position and immense wealth to the circumstance that one of its members, Alexander Farnese, became pope (Paul III., 1534-49) and in the most shameless manner misused the influence and revenue of his position for the advancement of his family. He made his son Pierluigi (1493-1547) duke of Parma and Piacenza, and he provided in an equally lavish manner for his four grandsons, two of whom, Alexander and Ranuccio, were made cardinals when they were fourteen years of age; while a third, Ottavio Farnese (1520-86), was married in his twelfth year to Margaret of Austria, better known under the name of Margaret of Parma, a natural daughter of Charles V., and succeeded his father as duke of Parma; and the fourth, Orazio, was made duke of Castro and married to Diana, a natural daughter of Henry II. of France.

The most celebrated member of the family was ALEXANDER FARNESE (1546-92), prince of Parma and governor of the Low Countries. He was a son of Ottavio Farnese and Margaret of Parma, was educated at Alcala and Madrid, fought with great distinction in the battles of Lepanto and Gembloux, and succeeded his uncle, Don Juan of Austria, as governor of the Low Countries. He was one of the greatest generals of his age. The conquest of Antwerp, the raising of the siege of Paris, etc., were brilliant feats of courage and skill, and the failure of the invasion of England was due to no fault of his. But he was also one of the greatest diplomats of the age; he conquered as many cities by his tongue as by his sword. He created a party in the Low Countries in favor of the union with Spain; and when the Armada was about to sail, neither Elizabeth nor Raleigh had the least suspicion of what the movement really meant. But he was ill rewarded by Philip II., who recalled him in the midst of his career. He was on the way to Spain when he died.

In 1731 the male line of the house became extinct by the death of Antonio Farnese. But Antonio's daughter, Elizabeth Farnese, married to Philip V. of Spain, succeeded in securing all the Farnese fiefs for her sons, Philip, duke of Castro, and Charles, king of Naples, and afterward king of Spain.

**Farnham** is a town of England, in the W. of Surrey, on the left bank of the Wey, 40 miles from London. It contains the fine old castle of the bishops of Winchester, first built by Bishop de Blois, brother of King Stephen, but razed by Henry III., then rebuilt by Charles I., and, having been dismantled, it was restored to its present state in 1634. It is principally noted for the superior hops which are cultivated in the surrounding country; is abundantly supplied with water from neighboring springs, and was formerly famous for its cloth manufacture, which is now wholly abandoned. The parish church is spacious and of the later Gothic style. It was once a chapel of ease to Waverley Abbey, now in ruins, which was founded in 1128. Pop. in 1881, 4530.

**Farnham** (ELIZA WOODSON), MRS., authoress and philanthropist, was b. at Rensselaerville, N. Y., Nov. 17, 1815, went to Illinois in 1835, and in 1836 married Thomas J. Farnham. In 1841 she returned to N. Y., visited prisons and lectured to the women convicts until 1844, and was four years matron of the Sing Sing (N. Y.) State prison. In 1848 she was connected with the Boston (Mass.) Institution for the Blind. In California 1849-56. She published *Life in Prairie-Land, California, Indoors and Out, My Early Days, and Woman and her Era*, and edited Samson's *Criminal Jurisprudence*; organized in 1859 a society to aid destitute women in emigration to the West. D. Dec. 15, 1864.

**Farnham** (NOAH L.), an American officer of volunteers, b. at Haddam, Conn., June 6, 1820, removed to New York at an early age, and soon became an active member of the City Guard, being on duty at the Astor Place riot. On the outbreak of the civil war he left for Washington with the Seventh New York, but soon after his arrival accepted the appointment of lieutenant-colonel of Ellsworth's Zouaves, succeeding as colonel on the death of Ellsworth. Though confined to a sick bed at the time of his regiment being ordered to Manassas, he insisted upon leading his regiment, and while gallantly fighting at the head of his men he received a wound which resulted in his death, Aug. 14, 1861.

GEORGE C. SIMMONS.

**Farnham** (RALPH), American Revolutionary soldier, b. at Lebanon, Me., July 7, 1756; d. at Acton, Me., Dec. 26, 1861, the last surviving soldier of the Bunker's Hill fight. In 1780 he was at Acton, its first inhabitant.

**Farnham** (ROSWELL), b. at Boston, Mass., July 23, 1827; removed in 1840 to Bradford, Vt.; graduated with honors at Vt. Univ. in 1849; taught school for several years; admitted to Orange co. bar in 1857; State atty. 1859-61; lieutenant of First Vt. Regt. 1861; provost-marshal at Newport News, Va., 1861; capt. of Bradford Guards 1862; lieutenant 12th Vt. Regt. during its service in the field; member of Vt. senate from Orange co. 1868-69; delegate to Republican National Convention at Cincinnati in 1876, and also one of the Presidential electors the same year; trustee of Vt. Univ.; governor of Vermont 1880-82.

**Farnham** (THOMAS JEFFERSON), a traveller, husband of Eliza W. Farnham, b. in Vermont 1804; in 1839 organized and led a small expedition across the continent to Oregon. In California in 1839 he procured the release of a large number of American and English prisoners from the Mexican government; published *Travels in Oregon Territory, Travels in California, and Scenes on the Pacific, a Memoir of the North-west Boundary Line, and Mexico, its Geography, People, and Institutions*. D. in California Sept., 1848.

**Farnsworth** (BENJAMIN FRANKLIN), D. D., American clergyman and educator, b. at Bridgeton, Me., Dec. 17, 1793, graduated at Dartmouth College 1813; was Baptist pastor at Edenton, N. C.; principal of the Bridgewater (Mass.) Academy from Sept., 1821, to 1823, then of a female high school at Worcester, Mass. He was professor of theology at the New Hampton Theological Institute from May, 1826, to 1833, and in 1836 president of Georgetown College, Ky., subsequently of Louisville (Ky.) University from 1837 to his death, June 4, 1851.

**Farnsworth** (ELON J.), American brigadier-general of volunteers, b. in Livingston co., Mich., 1835, was killed at the battle of Gettysburg, July 3, 1863. In the summer of 1861 he was battalion quartermaster of the Eighth Illinois Cavalry, then captain. Was in the Peninsular and in Gen. Pope's campaigns, aide to Gen. Pleasanton in May, 1863, and brigadier-general June 29, 1863.

**Farnsworth** (JOHN F.), American Congressman and soldier, b. in Eaton, Lower Canada, Mar. 27, 1820, a lawyer, and was a representative from Illinois in the 35th, 36th, 38th, 39th, and 40th Congresses. In 1861-63 he served in the civil war, at first commanding the Eighth Illinois Cavalry. In 1863-64 he raised the Seventeenth Illinois Volunteers, having been brevetted brigadier-general in 1862.



**Farn'worth**, town of England, in the county of Lancaster, manufactures sail-cloth, watches, files, and all kinds of iron tools. Pop. in 1881, 20,701.

**Fa'ro**, the capital of the province of Algarve, Portugal, is situated at the mouth of the Ferosa, where three small islands form a somewhat confined but otherwise convenient and safe harbor. Faro exports considerable quantities of oranges, figs, anchovies, and cork, and is a bishop's see. Pop. in 1881, 8561.

**Fa'ro**, a game at cards, used only in playing for money. It is played in different ways in different countries, but in all the player contends against a bank, represented by a professional fa-ro-banker; and the chances, though apparently only slightly in favor of the bank, are in reality quite strongly so. The game is illegal in many cities and in some of the States.

**Farochon** (JEAN BAPTISTE EUGÈNE), b. at Paris in 1807, was a pupil of David, attained fame as a sculptor and medallion-cutter, and in 1863 attained a professorship in the Paris School of Fine Arts.

**Fa'røe**, or **Færø** [Dan. *Færøerne*], a group of islands, twenty-two in number, of which only seventeen are inhabited, belonging to Denmark, and situated in the North Atlantic, nearly midway between the Shetlands and Iceland, between lat. 61° 20' and 62° 20' N., and between lon. 8° and 8° W. Their entire area is about 500 square miles; the population, 11,221. The principal island is Stromø, with the cap. Thorshavn. All these islands are basaltic formations, rising conically to a height of 3000 feet, with steep and lofty coasts, abruptly broken by deep inlets, which often afford the safest and most convenient anchorage, but which sometimes cause whirlpools or form currents, thereby making navigation very dangerous. The trap-rock is covered with a thin layer of vegetable soil, which yields a superb pasturage. Of trees there are none, on account of the furious gales which always prevail here; peat and miocene coal, of which a seam of good quality has recently been discovered on Sudørø, are used as fuel. Of the common cereals and vegetables, only barley, turnips, and potatoes can be raised, on account of the high northern latitude; yet the oceanic influences modify the climate so greatly that snow rarely lies long on the ground, and the cattle graze the greater part of the year in the open air. Cattle and sheep are not the only resources, however, of the inhabitants. The waters abound with fish, and the feathers and eggs of the myriads of fowls which swarm around these coasts are often sources of considerable wealth. The inhabitants are of Norwegian origin. In the ninth century the islands were discovered by the Norwegians and peopled by Norwegian settlements, but during the long connection between Denmark and Norway the islands passed into possession of the Danes.

**Fa'rquhar** (GEORGE), Irish dramatist, b. at Londonderry, 1678, was educated at the University of Dublin, settled in London, and died there Apr. 29, 1707. *Love and a Bottle* (1698), *Twin Rivals* (1703), and *The Beaux' Stratagem* (1707), comedies, were among his productions. His works have been recently published in the same volume with those of Wycherley, Congreve, and Vanbrugh, London, 1849, by Moxon.

**Farquhar** (NORMAN H.), U. S. N., b. Apr. 11, 1840, in Pennsylvania, graduated at the Naval Academy in 1859, became a lieutenant in 1861, a lieutenant-commander in 1865, a commander in 1872. Served as executive officer of the steamer Mahaska, North Atlantic blockading squadron, in 1862-63, during which period he was frequently under fire afloat, and several times engaged, in co-operation with the army, in expeditions on shore. His character and services are thus honorably mentioned by Commander Foxhall A. Parker in an official report dated Nov. 26, 1862: "I should do injustice to my own feelings and to the service were I to close this report without making special mention of Lieut. Farquhar, upon whom the major portion of the labor attending our little enterprises devolved. Always reliable and always efficient, his high standard of professional character is apparent in everything he undertakes." As executive officer of the Santiago de Cuba, Farquhar participated in both attacks on Fort Fisher, and led the men of that vessel in the assault on the fort of Jan. 15, 1865, when he behaved with his usual coolness and intrepidity. In command of the Quinnebaug, European station; in 1881 became commandant of cadets at U. S. Naval Academy.

FOXHALL A. PARKER.

**Farr** (WILLIAM), M. D., F. R. S., D. C. L., English writer and superintendent of the statistical department of the registrar-general's office at Somerset House, b. at Kenley, Shropshire, 1807, was educated at Dorington and Shrewsbury and at the Universities of Paris and London. Practising medicine in London, he edited the *Medical Annual*

and the *British Annals of Medicine*. He wrote much for medical journals, the "Vital Statistics" in McCulloch's *Statistics of the British Empire*, official reports on the public health, and on the *Causes of Death in England* (1837-70), reported in detail the cholera epidemic of 1849, framed a new *Statistical Nomenclature*, etc. D. Apr. 14, 1883.

**Far'ragut** (DAVID GLASCOE), America's great admiral, was b. at Campbell's Station, East Tenn., July 5, 1801. Descended, on his father's side, from Don Pedro Ferragut, one of the "conquerors" of Majorca, he inherited from him, in all likelihood, that love of adventure and fearlessness of danger which, according to the Aragonese troubadour of the thirteenth century, Mossen Jaime Febrer, were the distinguishing traits in the character of the renowned Don Pedro. On his mother's side he came from the good old Scotch family of McIven.

Entering the navy as a midshipman Dec. 10, 1810, he had the good fortune to serve first under Capt. David Porter, who had procured him his appointment, and who now instilled into his youthful mind those ideas of devotion to duty from which he never swerved during his long and eventful career. "The boy is father to the man," and on the quarter-deck of the Essex, under the watchful eye of her commander, was formed the hero who was to lead his country's fleets to victory up the "River of Death," and by Forts Morgan and Gaines into Mobile Bay.

In 1823, Midshipman Farragut took part in the severe fight between our naval forces under Com. Porter and a large band of pirates strongly entrenched at Cape Cruz, Cuba, which lasted twelve hours, and resulted in the utter defeat of the latter and the suppression of piracy in the West Indies. This was his last battle-service as a young man, and he now entered upon the regular routine duties of his profession, broken only by a year's residence in Tunis with our consul, Mr. Charles Folsom, afterward a distinguished professor of Harvard, who kindly directed his studies and gave him that "thirst for information," says Mrs. Farragut in a letter to the writer, "which, as his eyes were not strong, kept all his household busy reading to him." His knowledge was varied, and in matters relating to his profession profound, and he was one of the best linguists in the navy. Passing in succession through the grades of lieutenant and commander, the war of 1861-65 found him a captain and living in Norfolk, Va., where every inducement was held out to him to unite his fortunes with the seceding States. But, "intimately connected with the South as he was by birth, marriage, and residence, he was a son of the republic rather than a citizen of a State;" and so, leaving Norfolk on Apr. 19, 1861, he took his family to Hastings on the Hudson, and then hastened to offer his services to the government.

The capture of New Orleans being resolved upon, Farragut was chosen to command the fleet destined to effect this purpose, his force consisting of the West Gulf blockading squadron and Porter's mortar flotilla. In Jan., 1862, he hoisted his broad pennant on board the Hartford at Hampton Roads, and sailing thence on Feb. 3d, reached Ship Island on the 20th, where he at once began his preparations for the work before him.

On the 20th of April, after a council of war had been held, Farragut issued a general order to his fleet, in which he gives his views at length as to the proper mode of attack to be adopted by it, and adds: "The flag-officer having heard all the opinions expressed by the different commanders, is of the opinion that whatever is to be done will have to be done quickly. When, therefore, the propitious time has arrived, the signal will be made to weigh and advance to the conflict." In accordance with this order, at 5 minutes before 2 o'clock on the morning of Apr. 24th, two red lights were hoisted at the mizzen-peak of the Hartford, and immediately each vessel commenced heaving up her anchor. At half-past 3 the whole fleet was under way, and standing up the river in two columns, the right column being instructed to engage Fort St. Philip—the left, Fort Jackson. It is not our province here to relate the particulars of the battle that ensued—to describe the fire of hell rained upon the forts from Porter's flotilla; their fierce fire in reply; the sinking of two Confederate vessels by the Varuna, and her foundering, at the moment of victory, almost by their side; the duel between the Mississippi and the ram Manassas; the silencing of Fort St. Philip by the Brooklyn; the Hartford in flames halfway up to her tops, and yet never for a moment relaxing her fire. Suffice it to say, that a great victory was won and New Orleans ours, and that, in recognition of his glorious services, Farragut received the thanks of Congress and was made a rear-admiral. In the summer of 1862 he "ran the Vicksburg batteries up and down the river," and on Mar. 14, 1863, passed through the fearful fire of the forts at Port Hudson, and opened communication with Flag-officer Porter, who commanded on the Upper Mississippi. On May 24th, in con-

junction with the army, he commenced active operations against Port Hudson, and when it fell, on July 9th, he turned over to Porter, who five days previously had been made a rear-admiral, the entire control of the Western waters above New Orleans. He now enjoyed a short respite from his labors, but on Jan. 20th of the following year we find him making a reconnaissance of Forts Morgan and Gaines, and expressing the opinion that "with a single iron-clad and 5000 men he could take Mobile."

At length, on the morning of Aug. 5, 1864, with four iron-clads and fourteen wooden vessels, the rear-admiral filled up the measure of his fame by the victory of Mobile Bay.

The fleet was in two columns, as at New Orleans, the iron-clads being on the right and a little in advance, with the *Tecumseh* leading, the wooden vessels, lashed together by twos, forming the port column, with the Brooklyn and *Octorara* leading. Next astern of the Brooklyn was the Hartford, carrying now, as at New Orleans, the flag of the commander-in-chief. In this order the attacking fleet steamed steadily up the main ship-channel, "the *Tecumseh* firing the first shot at 47 minutes past 6 o'clock. At 6 minutes past 7, Fort Morgan opened, and was replied to by a gun from the Brooklyn, and immediately after the action became general." Suddenly, however, the *Tecumseh* reeled as from an earthquake-shock, and went down almost instantaneously—sunk by a torpedo—while the Brooklyn, observing "a row of suspicious buoys directly under her bows," stopped and backed, thus arresting the advance of the whole fleet. A moment's hesitation now on the part of the rear-admiral and the battle is lost! But Farragut, high up in the main rigging, overlooking the whole scene of action, is equal to the emergency. "Go ahead at full speed!" he cries to Drayton, the captain of the Hartford; and the order being instantly obeyed, the Hartford dashes onward, and the other ships follow, "the officers and men believing they are going to a noble death with their commander-in-chief." At this supreme moment the gallant seaman raised his heart in supplication to the Almighty. "O Thou Creator of man! who gave him reason," he prayed, "guide me now. Shall I continue on, or must I go back?" "A voice then thundered in my ear," said he afterward in speaking of this battle, "'Go on!' and I felt myself relieved from further responsibility, for I knew that God himself was leading me to victory."

The rest is a tale we all know—how the forts were passed, the gunboats dispersed or captured, and the formidable ram Tennessee forced to strike her colors to the old flag she had so long set at defiance.

The fall of Mobile was now reduced to a mere question of time. Fort Powell was blown up Aug. 6th, and a few days thereafter Forts Gaines and Morgan surrendered. "The navy will do its whole duty," wrote the rear-admiral to Secretary Welles shortly before the great fight, and well had the navy justified his prediction.

In November, Farragut returned to his home, and on Dec. 22d he was made a vice-admiral. But the people demanded that the nation's hero should be further rewarded, and in July, 1866, the grade of admiral was created for him whose name had become a household word throughout the land. But he was not destined long to enjoy his earthly honors. His arduous services had greatly impaired his health, and in the summer of 1870, at Portsmouth, N. H., Aug. 14, after a long and painful illness, he died as he had lived—a Christian gentleman, and mourned by the whole nation. In battle he was as fearless as Nelson, in public virtue and patriotism not excelled by the greatest heroes of antiquity, while in his spotless purity of character he rivalled the illustrious Collingwood. There are many naval names dear to the American heart, but

"A brighter name must dim their light  
With more than noonday ray—  
The Viking of the river-fight,  
The conqueror of the bay!  
Shape not for him the marble form,  
Let never bronze be cast,  
But paint him in the battle-storm,  
Lashed to his flag-ship's mast."

FOXHALL A. PARKER.

**Farrar** (ELIZA WARE) was b. in Flanders, Europe, in 1791, and was the daughter of Benjamin Rotch of New Bedford, Mass. In 1828 she married Prof. John Farrar of Harvard University. *Congo in Search of his Master* was written and published in England. It was followed by *Children's Robinson Crusoe*, *The Story of La Fayette*, *The Life of Howard*, *Youth's Letter-writer*, *Young Lady's Friend* (1837), and *Recollections of Seventy Years* (1866). D. at Springfield, Mass., Apr. 22, 1870.

**Farrar** (FREDERIC WILLIAM), D. D., F. R. S., son of a clergyman, b. in the Fort, Bombay, in 1831; graduated at Cambridge in 1854; became assistant master at Harrow in 1855, and master of Marlborough College in 1871. He

is also chaplain in ordinary to the queen. He has published the following works of fiction: *Eric* (10th ed. 1858); *Julian Home* (4th ed. 1859); *St. Winifred's* (4th ed. 1863). His philological works are *The Origin of Language* (1860); *Chapters on Language* (1865); *Greek Grammar Rules* (6th ed. 1865); *Greek Syntax* (3d ed. 1867); and *Families of Speech* (1870). His more important theological works are *Seekers after God* (1869); *The Witness of History to Christ* (1871); *The Silence and Voices of God* (1873); *The Life of Christ* (in 2 vols., 1874); *The Life and Works of St. Paul* (2 vols., 1879); and *The Early Days of Christianity* (2 vols.). He has also contributed to Smith's *Dictionary of the Bible*, and is master of a singularly fresh and brilliant style. He delivered a eulogy on General Grant at Westminster Abbey, Aug. 4, 1885, and commenced lecturing in the U. S. the following October.

R. D. HITCHCOCK.

**Farrar** (JOHN), LL.D., American mathematician, b. in Lincoln, Mass., July 1, 1779, graduated at Harvard University, Mass., 1803. In 1805 he was Greek tutor at Harvard; 1807–31 prof. of mathematics and natural philosophy at the same institution. His *Elements of Algebra*, translated from La Croix, was published in 1818; in succeeding years he published eleven other translations of mathematical works, contributed to the *North American Review*, and d. May 8, 1853.

**Farrar** (JOHN), b. at Alnwick, Northumberland, July 29, 1802, was educated near Leeds, became a minister in Aug., 1822, was governor of Abney House Wesleyan Theological Institution in 1839, and subsequently of Headingley College (1868); has been secretary and president of the Wesleyan Conference, the latter in 1854 and in 1870. Wrote *Biblical and Theological Dictionary*, *Ecclesiastical Dictionary*, *Proper Names of Scripture*, etc.

**Farrar** (SAMUEL), b. at Lincoln, Mass., 1784, graduated at Harvard in 1797, and in 1800 became a tutor there. He afterwards was a lawyer at Andover, Mass., for thirty years was president of the Andover Bank, and for thirty-eight years treasurer of the Theological Seminary and Phillips Academy, of which institution he was a liberal benefactor. D. at Andover, Mass., May 13, 1864.

**Farrar** (TIMOTHY), LL.D., American judge, b. at Concord, Mass., July 11, 1747, graduated at Harvard University 1767, was a major in the American Revolution, and after its close a justice of the common pleas in New Hampshire for forty years. Feb. 22, 1802, he was appointed chief-justice. D. at Hollis, N. H., Feb. 21, 1849.

**Farrar** (TIMOTHY), LL.D., son of the preceding, b. at New Ipswich, N. H., Mar. 17, 1788, graduated at Dartmouth in 1807, was a law-partner of Daniel Webster from 1813 to 1816, from 1824 to 1833 judge of the New Hampshire court of common pleas, and vice-president of the New England Historical and Genealogical Society 1853–58. He has published the *Dartmouth College Case*, *Review of the Dred Scott Decision*, and articles in the *North American Review* and *New Englander*.

**Farrer** (HENRY), a younger brother of THOMAS C. FARRER (which see), a rising artist, working principally in water-colors. B. in London Mar. 23, 1843, and followed his brother to New York in 1863, where he has since continued to reside.

CLARENCE COOK.

**Farrer** (THOMAS CHARLES), an English artist, some time resident in New York, b. in London Dec. 16, 1838. His father was a radical of an extreme type, who, on principle, refused his son all means of education, and, as far as was possible, kept him from all companionship with his fellows. Farrer was seventeen years old before he learned to read or write. He early gravitated, however, to the light, and, encouraged by his mother, developed a love and aptitude for art, still further helped by the profusion of opportunity which London affords by the National Gallery, the British Museum, the Royal Academy, and, though last, not least, the print-shop windows. About 1855, Mr. Ruskin set up a free drawing-school in London, and here Farrer received his first and only definite instruction in drawing. In 1858, his father being dead, Farrer came to America, and after struggling for a considerable time he made the acquaintance of a number of young Americans of about his own age—artists, architects, and literary men, who, like himself, were enthusiastically devoted to the ideas and principles developed in the writings of Mr. Ruskin. This society welcomed Farrer as the ablest, and indeed the only, exponent of the faith that was in them, and they rallied so cordially about him as artist and teacher that his success was soon assured. He was a zealous and able teacher, and the influence he exerted through his classes at the Cooper Institute, his private pupils, his pictures in the Academy exhibitions, was very important. He insisted on close study from nature, on accuracy of drawing, on the importance of detail, and showed a prodigious industry and skill in execution far

from common. But more important was the moral influence he exerted in counteracting the mercenary, worldly, and mechanic spirit that prevailed in the artist-world here, and which was doing infinite harm to the artists themselves and to the public. Farrer's high personal character, his patient perseverance in poverty and neglect, his refusal to work otherwise than he thought right, were a tonic of which we stood in great need. We owe him more for this than for his pictures. He formed several artists—Henry R. Newman, Charles H. Moore, Margaret I. McDonald—and was not without influence on the Hills, father and son, though to them also, as independent teachers, the development of art in this country owes a great deal. In 1869, Farrer went to England, where he has since remained, and where he will probably continue to live, as he has been very successful there, taken cordially in hand by Mr. Ford Madox Brown, Mr. Ruskin, Mr. Morris, and other leaders in that circle of painters, poets, and teachers. While living in America, Mr. Farrer was devoted to those progressive ideas which we love to call American, and when the war for the Union broke out he entered the ranks as a common soldier, showing then, as always, that his devotion to principle was not mouth-service merely. In 1864, Mr. Farrer married Anne Richards, daughter of the late Rev. James W. McLane. By this lady he has several children.

CLARENCE COOK.

**Farriery** [remotely from the Lat. *ferrum*, "iron"]. From its derivation and the early use of the word, farriery means the trade of applying iron to the horse's foot. However, as all horse-surgery was of the coarsest and often of the most brutal kind, performed by the common smith with the tools and implements at hand, it is natural that veterinary surgery as it grew into a profession should have been called *farriery*. Now, however, the treatment of the diseases of our domestic animals is no longer of necessity left to the guesswork of the blacksmith, nor surgical operations to the tongs and searing-iron. Therefore we return to the original definition.

The foot of the horse is wonderfully guarded against injury from without, and equally protected against painful jars and disease which one might suppose would arise from the tremendous blows which the feet sustain when travelling upon hard roads. The hoof is a tough, elastic, horn-like substance, completely boxing in the delicate tissues, cushions, and bones of the foot. In the living animal and in the recent state it is in one piece, but after maceration it may be separated into the crust or wall, the sole, and the frog. The front part of the crust of each hoof is called the toe, the hindmost parts the heels, and the intermediate parts the quarters. The corresponding parts of the shoe have the same names. The *crust* grows from the coronet, at the top of the hoof next the hair, and from the sensitive laminae which surround the pedal or coffin bone upon its upper sides. It is about half an inch in thickness at the edge, and in many horses so hard and tough that they hardly need shoeing at all except in icy weather or when used upon paved roads. The *sole* is a slightly-arched dome with a large segment removed, in the place of which the frog is found. The horn of the sole differs essentially from that of either the crust or the frog, it being more granular and shelly, wearing off naturally with comparatively little abrasion. At the rearward portions of the sole, divided as they are by the frog, two elevated ridges, of a character of horn more resembling the crust, occur. These are called the *bars*, and are really the ends of the crust reflected inward at the heels. The *frog* is a wedge-shaped body in form like a sharp-pointed V, the point being turned forward. It is of an exceedingly spongy and elastic kind of horn, and is placed as a cushion between the navicular bone and joint and the ground, to relieve concussion and to distribute jars so as to break their force. With every step of the natural foot, unshod as well as when at rest, the frog communicates a pressure directly upon the navicular joint and the tendons which underlie it. In ordinary shoeing the frog never touches the ground, being cut away and left reduced in size, while at the same time the foot is lifted up from the earth by thick-heeled or calked shoes. That a foot so treated becomes diseased is not to be wondered at. The wonder is that acute diseases of the foot are not much more prevalent. The flexibility and elasticity of the hoof, concerning which so much is written, rests chiefly, indeed almost altogether, in the frog, slightly in the sole, and practically very little or not at all in the crust or walls of the foot. Much has been written about the expansion and elasticity of the quarters and heels. It may be disregarded. There is indeed elasticity in the crust, but it is only brought into play perceptibly under extraordinary circumstances.

When an unshod natural hoof is placed upon hard ground, the parts which bear upon it are the edge of the crust all around and the frog. Upon uneven ground the

sole is frequently called upon to sustain its share of the weight, and when the horse steps upon frozen clods or stones the sole often bears the whole. In travelling upon ordinary country roads the hoof wears very evenly; upon gravelly roads the toe usually wears fastest, and will first become tender. If the toe and quarters be protected from wear by a narrow shoe, for ordinary service no other shoeing will be necessary. If such a shoe, which is the "half-moon shoe" of Coleman, drawn out thin at the quarters, be seated nearly level with the sole by cutting out the crust of the hoof upon the toe and quarters, it is evident that the horse will have his natural foot, with simply an iron front edge to take the wear. This is the lightest and best shoe a horse can wear when his work is not too severe nor upon too rough ground. Were the same principle to be carried out in a shoe similarly seated (level with the sole), much wider in the web, and extended to the heels, so as to protect the foot thoroughly, the foot would still have its natural bearings, and be guarded against even extraordinary wear and tear. The frog would bear upon the ground, and so would the sole, nearly as much as if the hoof were not shod.

The presence of a shoe prevents the natural wear of the hoof; hence, sooner or later, according to the rapidity of growth of the horn, it must be reset and the horn pared back as nearly as possible to the condition it would have been in if it had not been shod and had worn off evenly and naturally. The earliest shoes worn by horses were probably plates of iron, having a similar shape to our present horseshoes, but covering a much larger portion of the hoof. This necessitated a paring away of both crust and sole when the shoes were reset. The sole is very easily cut by the smith, and so is the frog, while the crust is hard and tough. It is easily rasped off, however, after the sole is cut away, and the smith has plain sailing.

When a horse is brought to a common blacksmith to be shod, the "clinchers" at the ends of the nails are first cut off; then the shoe is wrenched off with the tongs, a portion of the crust coming off frequently with it. This is done by an apprentice, who then proceeds to pare out the sole all around, cutting close to the frog. The cutting down of the crust is done by the smith himself, if he is a very careful man, or by an experienced journeyman, but quite as often trusted to an apprentice, who forms roughly, at his discretion, the seat for the shoe. Then the shoe is shaped, heated red hot or nearly so, and a seating burned level by the application of the hot shoe—an operation liable to do serious harm. When the shoe is formed to fit the foot it usually happens that if flat at first the heels are made nearly twice as thick as the toe, if indeed they be not turned down into calks, making the shoe at the heels half an inch to an inch or more in thickness; and thus it is applied. The result is that no part of the hoof touches the ground. The frog, upon which so much depends, is gradually reduced in size, both by the paring of the smith and (especially) by lack of use: it shrivels often to one-third its proper size. The paring out of the sole is usually accompanied by the cutting away of the bars entirely, which the smith says he does "to open the heels." The foot, thus weakened and placed in a most unnatural position, becomes the seat of disease. When the bars are cut away, or the soles pared too thin near the heels, and the frog has no bearing upon the ground, ulcers occur near the heels, which are called *corns*.

The frog should, by its constant pressure at every step, give healthy action to the navicular bone and joint; this wanting, inflammation or fever of these parts, *navicular disease*, results. To this, horses with strong, solid-looking hoofs are especially liable. Flat-footed horses are liable to another trouble from the same cause—namely, *founder*. As already said, the weight of the horse is sustained naturally upon the crust of the hoof and upon the frog. Where the frog can bear none the crust must sustain all. The crust grows in part from the sensitive laminae enveloping the pedal bone, and is attached to them by laminae of horn interlocking—or, rather, interleaved—with them; and it is upon these sensitive laminae that all the weight is thus placed. They can bear a great deal naturally, but inflammation (*laminitis*) is almost sure to come when there is a provoking cause, and the horse is foundered. *Seedy toe* is a form of laminitis, where the crust separates from the laminae at the toe. *Pumice foot* is a name given to another form of laminitis, wherein the sole becomes convex instead of concave, and the horn is spongy within and externally brittle, the whole foot being in a highly feverish condition. *Contraction of the heel* comes from the same general cause—namely, want of frog-pressure. *Thrush* is a disease of the frog, made apparent by a very offensive discharge from the cleft, and results primarily from lack of use of the frog, and, except the frog be wounded, probably altogether from this cause. *Quittor* is an ulcer or abscess of the foot, result-

ing from bruise, nail-prick, thrush, or any other cause which may finally, if neglected, affect the coffin or pedal bone. It cannot be treated by the farrier, but presents a problem which only a surgeon can properly solve. Taken in time, a cure is possible. *Sund-crack, quarter-crack, etc.*—The fibres of the horn in the wall of the hoof run from the coronet to the ground direct. In hoofs subject to inflammation the secretion of horn is often of a weak character, and the fibres separate, forming a crack, or, in case of an injury to the coronet, a soft, spongy streak in the horn, causing lameness. The cause of the former is bad shoes and bad shoeing—of the latter, usually, "calking," the horse treading on his own coronet. The cure for both is causing healthy horn to be secreted by rest and counter-irritants, and shoeing so as to give bearing to the frog and sole. *Nail-prick* in shoeing shows itself either at once, in which case little harm usually results, or after the horse has been used a day or so, in which case suppuration may take place. The horse will tell which nail is at fault when the hoof is tapped by the hammer around the clinches. The offending nail must be taken out, the shoe being removed, the hole probed, and if any fetid odor be perceptible and the hoof be hot, the hole must be enlarged, and, in case of any discharge, cut out until blood flows, and the opening syringed out with chlorinated soda, chloride of zinc, or some other active prophylactic. The shoe may be replaced if necessary, provided the animal is not seriously lame, the nails being lightly driven. The foot must be kept cool and rest given. Nails picked up on the road will seldom enter the sole to do injury if it be not pared down, and thus softened and weakened; but they may be found between the frog and the bars, in which situation they seldom do much injury unless neglected. The wound should be cleaned out and syringed with some corrosive as above mentioned. *Overreaching* is when a horse throws his hind foot into the heels or against the sole of the fore foot as it is partially raised to take the step in trotting. It occasions bruises on the heels or in the sole near the toe. The former are treated by external applications—tincture of arnica, etc.; the latter like a prick or any bruise of the sole. A horse well shod will seldom overreach, but long hoofs or big toe-calks on the fore feet will cause the foot to be placed upon the ground an inch or two short of where it should rest, and this is sufficient cause for the trouble. *Interfering, or "cutting."*—A horse allowed to tread fairly on the ground seldom or never cuts himself, if the shoe does not extend outside the crust.

So far as we are aware, the most rational system of horseshoeing ever proposed is that invented by Mr. Goodenough, and called the Goodenough system. It has been for several years, and is now, extensively used by street-railroad companies in New York and Brooklyn and elsewhere, and by omnibus, express, and transfer companies also. The superintendent of one of these stables informed the writer that the simple use of the Goodenough shoe and system, without any other application, had cured corns, quarter-cracks, thrush, etc. throughout his stables, and had developed previously shrunken frogs, spread out contracted heels, and given his horses almost uniformly sound feet. The shoe is applied by cutting out a seating for it, leaving the sole and frog as much exposed as possible, and never applying the knife to either. It is light, has five calks or bearings, a lower surface, similar to the edge of the natural foot, is beveled on both surfaces, the nail-holes are countersunk, and the shoes are applied cold.

M. C. WELD.

**Far'ington** (WILLIAM GEORGE), D. D., an American clergyman, b. Dec. 15, 1832, in the city of New York; graduated from Columbia College in 1853, and from the General Theological Seminary, New York, in 1856. Was ordained deacon on St. Peter's Day and priest on St. Thomas' Day of the same year, and entered upon the rectorship of St. John's church, Huntington, L. I., which he held until July 4, 1858. Assisted in Trinity parish, New York, from Dec. 15, 1858, to Easter, 1862. In the spring of 1863 he organized the parish of Christ Church, Hackensack, N. J., and continued rector of the same for seven years. In 1870 accepted a call to St. Barnabas' church, Newark, and in 1872 took charge of the church of the Holy Innocents, Orange, N. J., where he resides (1874). Published a tractate on *The Historical Church* in 1861, and has edited *The Church Almanac* since 1868. Was elected secretary of the diocese of New Jersey in 1867, and secretary of the General Theological Seminary, New York, in 1869, both of which offices he still holds. The degree of master of arts was conferred upon him by his alma mater in 1856, and the degree of doctor of divinity by the College of William and Mary, Va., July 4, 1873.

**Fars**, or **Farsistan'** [a name etymologically identical with *Persia*, and the region was, indeed, in ancient times

called "Persia"], a province of Persia, stretching along the eastern shore of the Gulf of Persia, lying between lat. 28° and 32° N. and lon. 50° and 55° E., presenting an area of 55,000 square miles, with a population of 1,700,000, according to a rather uncertain estimation, and bounded by the Persian Gulf and the provinces of Khoozistan, Irak-Ajeme, Yezd, Kerman, and Laristan. Along the gulf the land is low, sandy, or argillaceous, scorched by the sun—a desert; but the coast-line presents several convenient and secure harbors. Farther back it rises through broad terraces, separated from each other by high and wild mountain-ranges, into a flat, sandy table-land, where the large salt lake Bakhtegan occurs. The terraces belong to the most fertile and beautiful regions on earth. They are well watered by the Bundmeor (Araxes), which flows into Bakhtegan, and by the Nabour and the Tab (Arosis), which fall into the Persian Gulf. They produce tobacco, wine, rice, dates, opium, linen, cotton, silk, and kermes. They are the home of the rose, from which is manufactured the celebrated perfume, attar. They have iron and lead mines and marble and alabaster quarries. The principal towns are Shiraz, Jehroom, Darab, and Bushire. In this province occur the ruins of Persepolis, Pasargadæ, and Shapoor, and the celebrated sculptured rocks called by the Persians *Naksh-i-Rustam*.

**Farther India, or Chin-India.** See INDO-CHINA.

**Far'thing** [from the Ang.-Sax., and signifying a "fourth part"], a British coin, the fourth part of a penny. It was coined by the Saxons, and again by King John (1210), but the quarter of a penny, cut twice across, also passed for a farthing. In Edward VI.'s time the coinage of silver farthings ceased. An act 9 Henry VI. mentions a *gold farthing*. Copper farthings were first struck in 1665; tin farthings appeared in 1684 and 1692; half farthings were coined in 1843 and 1852. A farthing is worth about half a cent.

**Farthingale.** See CRINOLINE.

**Far'well**, on R. R., Clare co., Mich. (see map of Michigan, ref. 5-1, for location of county), 55 miles N. W. of Saginaw. Principal business, farming and lumbering. Pop. in 1880, 521; in 1884, 449.

**Fasa'no**, town in Southern Italy, in the province of Terra di Bari, on the road from Bari to Brindisi. It is celebrated for its olive plantations, and carries on a considerable trade in produce. But in the summer the flies become such a plague as to drive away most of the inhabitants to the neighboring La Selva, on the hills. Pop. 11,022.

**Fas'ces** [Lat., plu. of *fascis*, a "bundle"], a bundle of rods of birch or elm, sometimes having an axe (*securis*) tied up within it. Such fasces were borne by the lictors before the superior magistrates of ancient Rome. The ancient kings, the consuls, the prætors, the dictator, etc. had the fasces carried before them; while the quæstors had this distinction in the provinces only. Generals who had been saluted as imperatores had fasces crowned with laurel, a custom anciently observed with some of the other magistrates. The number of the fasces and lictors varied with the rank of the dignitary, and was different in different ages.

**Fas'cia** [Lat., a "bandage," plu. *fasciæ*], in the anatomy of man and most of the vertebrate animals, a laminated tissue of fibrous or aponeurotic character found in nearly all parts of the body. There are two kinds, the superficial and the deep fasciæ. The superficial fascia lies under the skin, is of varying thickness, and is disposed into several layers of fibro-areolar substance, containing particles and layers of fat. Between its layers blood-vessels and nerves run. Its fat serves to keep the body warm. The deep fasciæ are composed of unyielding fibrous substance. They sheathe the several muscles and the entire limbs (aponeuroses of investment), or serve instead of bones for the insertion of certain muscles (aponeuroses of insertion).

**Fascination by Serpents.** Popular opinion has for a long time attributed to certain serpents a power of so charming weak animals by their eyes and movements of body that they are easily secured as prey. This is not a blind, overpowering force, but one which the doomed animal seems to partly appreciate, but which is unwilling to entirely resist. Squirrels, mice, and the weaker birds are the animals which are most often captivated by this power. They are described as running in front of the fascinator by short vibrations of distance or passing round in a circle, gradually shortening the intervals until they are seized by the serpent. Often the animal during the process utters piercing cries, as if aware of its danger, and yet unable to resist. Sometimes a diversion of the animal's attention by a sudden noise, or the interposition of some material obstruction to the vision, breaks the charm and sets the captive free.

Though the whole process is often ridiculed as impossible, yet it seems to bear a striking analogy to the so-called mesmerism influence which one human being sometimes has over

another, or to the more undefined od or odylic force. Or perhaps it is the diseased mental or bodily element manifested in a desire often expressed by persons to throw themselves from a tower or precipice; and even still further, where the mind or body or both are so diseased that there is a morbid impulse to commit an insane act, or destroy its own self or some other person. EDWARD HITCHCOCK.

**Fashion** [remotely from the Lat. *facere, factum*, to "make"], in dress, in customs, on every field where it reigns, arises from our desire of beauty, and changes with our ideas of what is beautiful. Dress is by itself a product of physical necessity, determined by a regard, first, to what is useful under a certain climate (*national costume*); then, to what is convenient for a certain occupation (*uniform*); and lastly, to what is beautiful (*style*). Customs are by themselves a product of moral necessity, determined by a regard, first, to what is due to certain authorities (*religious rites*), next, to what is proper at certain occasions (*social etiquette*), and lastly, to what is beautiful (*good manners*). The true cause of any change of fashion in dress or customs is a regard to beauty, purposing to produce a new and more refined harmony, or at least to avoid something harsh and discrepant; and although in details it would be very difficult to demonstrate the relation between a certain piece of dress and the ruling ideal of beauty, still in all the great movements of fashion the connection is apparent. The enormous change which took place between 1789 and 1799 in dress corresponded exactly to a similar change of taste in general from the *rococo* to the classic ideal. Fashion thus being the expression of the ideal of beauty in a certain stage of its development, stubborn disregard makes people as unfit for refined society as stupid acceptance; and the uncouth independence of the "original" is generally neither more valuable nor more agreeable than the conceited silliness of the "swell."

**Fasquelle** (JEAN LOUIS), LL.D., b. in France in 1808, became a resident of the U. S. in 1834; was professor of languages in the University of Michigan 1846-62; author of a series of French text-books. D. in Michigan 1862.

**Fast** [Ang.-Sax. *fastan*], to abstain from food from any cause, particularly through religious discipline. When the mind is much excited the claims of the body are less felt; if disturbed by grief, there cannot be much regard for the gratifying of appetite. The Psalmist expresses what is common to man when he says, "My heart is smitten down, so that I forget to eat my bread." Fasting thus becomes an expression of mental engagement. It is natural that a man should observe what is seen to attend the state of mind which he would cultivate. It is also wise that any outward rule intended to enforce special spiritual duty should impose, as an aid, the outward attendant on the spiritual state. Hence it is that men are severe with themselves in proportion as they consider it proper to discipline their souls, and that in all ages and in all countries religion has imposed fasting. The proper state of mind can be indicated only, but the outward signs of such a state can be exacted; and so fasts belong to all religions. All ancient nations with whom history makes us acquainted had their fasts—the Egyptians, the Phœnicians, the Assyrians, the Indians, and after these the Greeks and Romans. Extraordinary religious acts were preceded by fasts. The mysteries demanded this discipline, especially from those about to be admitted to them. In consequence of certain prodigies the Sibylline books directed "a fast in honor of Ceres to be instituted and to be kept every fifth year." (*Livy*, lib. 36, c. 37.) A stated fast imposed by Jupiter is spoken of by Horace (*Satire*, ii. 3). Fastings were sometimes practised before undertaking military enterprises, or whenever there was special cause to seek the favor of the gods or to avert their anger. A notable instance is given in the book of Jonah. When Nineveh was threatened with destruction, to avert the calamity a fast was proclaimed, and the order given, "Let neither man nor beast, herd nor flock, taste anything; let them not feed nor drink water." Among heathen philosophers and religious people fasting was reckoned a duty—markedly so by the Pythagoreans, who lived a life of constant asceticism, abstaining always from flesh and fish, and at times from food altogether. At the present day, fasting as a religious act is confined to no land or faith. The nations of the East and our Western red men are alike exceedingly severe in this respect. The Mohammedans keep as an annual fast their ninth month, Ramadan; during every day of this month, from sunrise to sunset, they eat nothing, drink nothing, and give up the solace of their pipe and every other usual indulgence. Their months being lunar, each in the course of thirty-three years occurs in every season. When the Ramadan happens in summer, the long hot days are exceedingly trying to those who must labor. The Jews from their earliest existence to the present day have observed

stated and special fasts, national and private. Under the Law, as first given, there was but one day imposed on the nation—the great day of the Atonement. In the course of time four other days were added in commemoration of sorrowful events in Jewish history. These days, especially the first, have been always, and are now, observed with great rigor: no food, no water, is allowed to pass the lips, not even for the rinsing which, on first rising, must always make clean the mouth before the pronouncing of God's name; even the swallowing of the saliva is carefully avoided. The fast lasts from sunset, when the Jewish day begins, until the shining of the stars the night after. Besides the public fasts, there were and are many observed by individuals in consequence of vows, or because of personal cause for affliction, or by way of discipline. The Pharisees fasted steadily twice in the week—Monday and Thursday. These fasts are not all of equal severity.

Under the New Testament there is no fast-day appointed by the Lord or by his apostles, nor does the practice rest upon direct command from them. It is even clear that Jesus imposed no special abstinence on his disciples, but it is also clear that he assumed that this exercise would not be neglected by any who desire the rewards given by God. He gave directions for fasting, for the shunning of hypocritical show, saying, "When ye fast be not of a sad countenance," etc., and by his example he taught the duty. It may be said that he thus taught and acted as a Jew. But we know that when it was objected that his disciples did not fast as did those of other Jewish teachers, he gave as a reason why they did not that he being with them the signs of sorrow were not expedient; and he added that the time would come when they should fast, referring to a time after the fulfilling of the Law. If the apostles gave no rule on the subject, there is no room to doubt as to their practice. One reference is sufficient. In Acts xiii. it is said that as certain prophets and teachers at Antioch "ministered to the Lord, and fasted, the Holy Ghost said, Separate Barnabas and Saul for the work whereunto I have called them. And when they had fasted and prayed, and laid their hands on them, they sent them away."

It is not so stated in the New Testament, but we cannot but believe that from its first recurrence the day of the crucifixion was observed as a day of humiliation, as it has been through the many centuries since. We know that very soon rules were laid down touching this and other seasons of bodily mortification. Wednesday and Friday in every week were kept as such, and early writers who speak of these days of abstinence refer the observance to apostolic usage. The duty of bodily mortification at times of repentance or humiliation or of special spiritual exercises (for fasting does not of necessity imply sorrow) is recognized, it is believed, in this day by all classes of Christians without exception. There are some bodies of believers who have rejected the seasons so long observed, but yet these, on what they deem proper occasions, appoint days to be kept by all their members. Even the early Puritans of New England had their yearly Fast-day.

In the West, the churches of the Roman obedience, together with the Church of England, impose as stated fasts, first, Lent, the *spring* fast, beginning with Ash Wednesday in the seventh week before Easter, and counting forty days, Sundays being excluded. This long fast is of very early observance, but the time of its commencement and the period of its duration were not always the same, it being an expansion of the observance of the time of the passion of our Lord. As now kept, Lent was fixed by Saint Gregory the Great in the sixth century. Second, the Ember Days, which are Wednesday, Friday, and Saturday preceding the four quarterly seasons of ordination. It has been already shown that in apostolic days fasting preceded ordination. The name is variously accounted for: probably it is a corruption of the Latin name for the seasons—*quatuor tempora*, or *tempora*. Third, the Rogation Days, the three preceding Ascension Day. This fast is not older than the close of the fifth century; it was first instituted in Vienna in France, to accompany a season of special rogations (petitions) that God would withdraw certain temporal chastisements. It was probably fixed because of its being a meet introduction to a great festival. Fourth, every Friday, this day being the weekly commemoration of the crucifixion, even as the first day, the Lord's Day, is a joyful remembrance of his resurrection. Fifth, the vigils on the eves of certain great festivals. At one time these vigils were literally kept as watches, the whole night, or a part, being spent in devotions in the churches. They are not so kept now. Advent, the four weeks before Christmas, bears some analogy to Lent, but its Wednesdays and Fridays are alone kept as fasts. The Protestant Episcopal Church in the U. S. follows the Anglican rule, excepting that vigils are not imposed.

The rule of the Orthodox, the Armenian, and other



churches of the East is nearly like that of the Western, having the same origin, that of the usage before the schism, but in some details they differ—e. g. in the Holy Orthodox Church on the 1st of August begins the fast of the Mother of God, which lasts until the feast of her repose—fourteen days. It is to be observed, however, that in the East the strict idea of a fast is preserved to a greater extent than in the West. From earliest times a distinction in food was recognized, and allowance made for those who through bodily weakness could not wholly abstain. To whatever due, it is a fact that in the West the rules of fasting have always been more lenient than in the East. Very few of the days spoken of as fast-days are strictly such; they are days of abstinence, when less food and of a coarser character is taken. In the Holy Orthodox Church 266 days in the year are kept as fasts with scrupulous fidelity.

A practice so universal as that of fasting must be based on some necessity of man. Nevertheless, the objection is sometimes heard that it tends to spiritual pride and formalism. This must be granted, but abuse is no argument against due use. A Christian, who knows that his Lord joined together prayer and fasting, can hardly advance the objection. It is also objected that health is frequently injured by religious fasting. It may be so. But on the other hand, it can admit of no doubt that in an age and country particularly luxurious a stated abstinence from food, a weekly putting aside of self-indulgence, and supporting the body on plainer, less attractive food, would go far towards freeing men from many of the evils that wait on appetite.

WILLIAM F. BRAND.

**Fast-and-Loose**, a game formerly much played at fairs and popular assemblies in England. The exhibitor places a girdle, belt, or garter upon a table in such a way that it seems certain that a skower thrust through it in a certain direction must hold it fast to the table. Upon this point the rustic visitor is induced to wager his money, when the exhibitor takes the belt by both ends and pulls it away without any difficulty.

**Fas'ti**, the court-days or festival-days of the ancient Romans. The word is used absolutely to denote these. But as *fastus*, -a, -um is, properly speaking, an adjective, derived, probably, from *furi*, it is necessary to supply *dies*. In accordance with this derivation, *dies fasti* were days on which it was allowed to speak, hence days on which judgment could be pronounced, on which courts could be held—court-days. A *dies nefastus* therefore denoted the opposite, and *dies nefasti* were esteemed unlucky days. To the *dies fasti* belonged the *dies comitiales*; to the *dies nefasti*, the *dies religiosi*, which were considered days of evil omen. The institution of these days is ascribed to Numa Pompilius, and belongs, therefore, to the earliest days of Rome. Their order or succession was long known only to the priests, who thus acquired great political power, until Cn. Flavius made it public about 304 B. C. From this time onward the lists of the *dies fasti et nefasti* received more particular attention, and contained, gradually enlarged and perfected, an accurate description of the whole year according to its months, with exact specification of the *dies fasti*, *dies comitiales*—festivals and holidays, days appointed for the celebration of public games, etc. Thus, they assumed the form of our calendars or almanacs. As they were still, notwithstanding the care taken in their preparation, unavoidably inaccurate and imperfect, we are told of Cæsar "fastos correxit," etc. As the *fasti* or *calendaria* of ancient Rome were engraved on stone and set up in public places, remnants or fragments of such records, more or less complete, have been preserved and united together, in order to produce as perfect a representation as possible of one of these ancient Roman calendars or almanacs. If the ordinary *fasti* or *calendaria* are valuable as affording a correct knowledge of the Roman year, much more important are those which Livy calls "*fasti consulares*," and which, because they were set up on the Capitoline, are also called *Capitolini*. The *Fasti Capitolini* contain lists of the annual consuls, of the censors, dictators, *magistri equitum*, and also of generals who celebrated triumphs (*fasti triumphales*) and a record of the services for which a triumph had been granted. Of such *Fasti Capitolini* important fragments, discovered in 1547 at Rome, are extant. (For further particulars, see PAULY'S *Real Encyclopædie*, etc.)

*Fas'ti* is also the title of a well-known but unfinished poem by Ovid, the subject of which is the Roman festivals—the festival-calendar. It may be regarded as "a poetical year-book or companion to the almanac, having been composed to illustrate the *Fasti* published by Julius Cæsar," who corrected and entirely reformed the calendar.

HENRY I. SCHMIDT.

**Fa'ta Morgan'a** [the *Fairy Morgana*—i. e. castles or

palaces of], a remarkable and singularly beautiful effect of mirage, occasionally observable in the Sea of Reggio, Straits of Messina, between Sicily and Calabria. It presents a series of magnificent architectural structures and landscape views, embracing columns, arches, towers, castles, palaces, trees, avenues, and wooded plains, with crowds of moving men and animals, all constantly varying and assuming new aspects, and in certain conditions of the atmosphere becoming resplendent with prismatic colors. There can be no doubt that these images are derived from objects on the shore, their singular forms and transformations being the result of extraordinary refractions in the atmosphere (for the explanation of which see MIRAGE).

F. A. P. BARNARD.

**Fate** [Lat. *fatum*; literally, "something spoken," as a decree, and involving the thought that events come out of an inevitable destiny]. Fatalism is the belief in such a destiny. It has various forms. The old Chaldaic or astrological fatalism looked upon the visible heavens as the book of this destiny, and found all things necessarily prefigured in the positions of the stars. The old Stoical fatalism considered the rise and the decay of the world as controlled by an absolute necessity, but while this necessity, with them, was a fate (*εἰμαρμένη*) which determines, it was also a providence (*πρόνοια*) which governs all things. The fatalism of the Greek dramatists made all events fixed through the control of Dike and Nemesis, Justice and Retribution. Mohammedan fatalism regards all things, great and small, as so inexorably predetermined from the foundation of the world that no accident is possible, and any attempted defence against danger is futile. Pantheistic fatalism considers the infinite substance which it calls God to be developed in space and time by a procedure so changeless that things extended or things thought are equally necessary; and which not only destroys all freedom of the will, but obliterates all distinction between good and evil. The modern philosophical conception of fate is that of a blind causality undirected and undetermined by any conditions.

J. H. SEELYE.

**Fates**, The [Gr. *Μοῖραι*. plu. of *μοῖρα*, "one's part, lot, or destiny;" Lat. *Parææ*], in the Greek mythology, three goddesses who ruled the fates of men and all things. They are generally named Clotho, who spins the thread of life; Lachesis, who marks off the allotted span; and Atropos—the inflexible—who cuts the thread. Their genealogy, and the whole mythus, are quite variously given in different authors. The Homeric poems speak usually only of one *Moiræ*, and the personification is not complete; no particular appearance of the goddess, no attributes, and no parentage are mentioned. Nor is the Homeric *Moiræ* an inflexible fate to which the gods themselves must bow; on the contrary, Zeus, as the father of gods and men, weighs out their fate to them. With Hesiod the personification of the Fates is completed, but they are still represented as depending on their father Zeus, and subject to his commands. And it was not until the time of Æschylus that they appeared as the divinities of fate in the strict sense of the word, independent of the Olympic gods, the messengers of the eternal necessity to which even the gods must bow. They are generally associated with the Erinyes, who inflict the punishment for evil deeds, and they are sometimes called their sisters. By authors still later their genealogy is changed, and they are called children of Erebus and Night (Cicero), of Cronos and Night (Tzetzes), of Ge and Oceanus (Athenagoras), or of Ananke and Necessity (Plato).

**Fa'ther Lash'er**, or **Luck'y Proach**, the *Aspicotta bubalis*, a marine fish of the European and United States coasts, from six inches long up to a much larger size. It belongs to the Cottidae or sculpin family, its head is covered with spines, and it has a repulsive aspect. It can live a long time out of water, and though regarded with aversion and seldom used, it affords a palatable article of food.

**Fa'ther Point**, a small post-v. of Rimouski co., Quebec, Canada, on the S. shore of the St. Lawrence, 207 miles below Quebec. It is important only as a landing-place for passengers and mails from ocean steamers. Father Point lighthouse is in lat. 48° 31' N., lon. 68° 27' W. Pop. about 100.

**Fa'thers (of the Church)**, the distinguished earlier laborers in the Christian Church. (See APOSTOLIC FATHERS.) The Roman Catholic Church distinguishes between Church Fathers, Church teachers, and Church writers. The Church teachers are men of acknowledged orthodoxy, authorities for the doctrines of the Church, while the Church writers are of less, or even doubtful, authority. The greatest of the Church teachers are also Church Fathers. Such were Athanasius, Basil the Great, Gregory of Nazianzen, and Chrysostom in the Oriental Church—Jerome, Ambrose, Augustine, and Gregory the Great in the Church of the West. Thomas Aquinas and Bonaventure may be named

as Church teachers who were not fathers, and Tertullian in his second era and Origen as Church writers. The line of Church Fathers is generally regarded by Protestant theologians as terminating with the sixth century; the Roman Catholic writers extend it to the thirteenth. The scientific treatment of the matter contained in the writings of the Fathers is embraced in PATRISTICS (which see), while their lives and topics related to the externals of their works come under the head of PATROLOGY, but this distinction is not always observed. The Fathers are of great value in the history of biblical interpretation, the history of dogmas, creeds, rituals, the constitution of the Church, and indeed in every part of historical theology; nor is there any part of theology in which they may not be made highly useful. In the greatest internal struggles of the Church the importance of the Fathers as witnesses or as authorities has been recognized on both sides, as in the Reformation, and in our own day in the controversies of the Anglican Church. (The principles to be observed in interpreting the Fathers are stated in KRAUTH'S *Conservative Reformation*, 726 seq.) Next to the Apostolic Fathers in value are the Apologists, or APOLOGETIC FATHERS (which see); the Alexandrians, Clement and Origen, Athanasius, Gregory of Nyssen, Chrysostom, Augustine, and Jerome. (All the earlier writers on patrology, beginning with Jerome, were edited together by Fabricius, 1718.) The greatest laborers in the issue of editions of the Fathers have been the BENEDICTINES. (See that word and BENEDICTINE EDITIONS OF THE FATHERS.) Next to them have been the Anglican divines. The most recent interest in patristics in Great Britain has been shown in the issue of translations of the Fathers. In the Roman Catholic Church, among the names illustrious in patristics are Bellarmine, Oudin, Du Pin, Le Nourry, Tillemont, and Hefele; in the Protestant churches of the Continent, Scultetus, Walch, Danz, Bunsen, Otto; in Great Britain, Cave, Cureton, Routh, and Pusey. Among the editions of the collected writings of the Fathers, the most complete are De la Bigne's, 17 vols. fol., 1654; the Lyons *Maxima Bibliotheca*, 27 vols. fol., 1677; Cailleau and Guillon, 1829 seq., 148 vols., and still in issue; Migne, 1844 seq. The last is, in bulk, the greatest of the collections. The very numerous editions of particular Fathers are mentioned under their names. Books of selections, Rösler, Augusti, Orelli, Philo, Ehler; epitomes, introductions, Moehler (1839); monographs on the lives and literature of the Fathers, Ullmann—Gregory of Nazianzen; Neander—Chrysostom (3d ed. 1858); Wiggers—Augustinism (1821–1831) have been characteristic of our century. C. P. KRAUTH.

**Fath'om** [from a Teutonic root denoting a "seizure;" Gothic, *fahan*, to "take"], originally the length which a man can measure by extending both his arms. It now denotes a measure equal to two yards, or six lineal feet, and is chiefly employed in nautical affairs. It is the unit of measure in soundings, and is employed in the measurement of cables, etc. The early colonists of the present U. S. reckoned the Indian wampum-chains, then current as money, in fathoms.

**Fat'imites**, a family of Arabian caliphs who claimed descent from Fatima, the daughter of the prophet Mohammed, the fourth of his four daughters by Khadijah. They ruled from 909 till 1171, chiefly at Cairo, and at the period of their widest sway ruled all North Africa, with Syria and Palestine. They professed the Shiite doctrines, while the subjects of the Bagdad caliphs were orthodox. After the death of the last Fatimite of this line (Adhid), the great sultan Saladin assumed authority.

**Fat Lute**, a mixture of pipe-clay and linseed oil, mixed and worked together like putty. It will stand considerable heat. It is used by chemists and pharmacists to cover joints in apparatus, and especially to prevent the escape of corrosive vapors.

**Fats.** (See OILS.) In the common sense, fats are those unctuous parts of animal and vegetable bodies secreted in the cellular tissues, and separable therefrom by fusion at a moderate temperature. The animal fats do not differ chemically from those of vegetable origin. Both are definite compounds of certain fatty acids, chiefly oleic, stearic, and palmitic acids, with a peculiar base called GLYCERINE (which see), or the sweet principle of fats. The fats are, as a rule, nearly insoluble in water, but dissolve readily in ether, which is their proper solvent. They are also soluble in naphtha, benzene, and the oils from coal; in oil of turpentine and other essential oils; bisulphide of carbon, chloroform, fusel oil, etc. They are scarcely at all soluble in cold ordinary alcohol. In absolute alcohol they dissolve much more readily than in weaker alcohol, and especially with the aid of heat.

The fats stain paper permanently, and are not volatile by heat, a high degree of heat being required to make

them boil. They distil over at a high heat, but not without complete, or nearly complete, decomposition, and the evolution of a peculiar pungent, disagreeable odor, irritating the eyes and known as *acroleine*. Those fats which are fluid at ordinary temperatures are called oils. All the fats burn with a bright flame and with little smoke.

Chemically, the fats form part of a very large group of organic bodies (the fatty group), distinguished as containing no nitrogen or its analogues, being hydrocarbons with little or no oxygen.

M. Chevreul, in a series of six memoirs concluded in 1816 (*Ann. de Ch. et Phys.*), first revealed to us the true constitution of the fats—that they are mixtures of several fats of different degrees of fusibility—*c. g.* oleine, stearine, palmitine—the hard fats being chiefly stearine and palmitine, and the soft fats oleine. The hard fats are beef fat, mutton fat, human fat, cholesteroline, Chinese tallow, cacao butter, wax, spermaceti, etc.; the soft fats, hog's lard, butter, etc., which are greasy at ordinary temperatures; while the liquid fats, or oils, are fluid at ordinary temperatures.

The researches of Chevreul showed that fats were either saponifiable or non-saponifiable; *c. g.*, if boiled with an alkaline solution, certain fats, so called, were unaffected (as spermaceti, wax, paraffin, etc.), while others were broken up and soaps formed, the fatty acids combining with the alkali, while the glycerine was set free; and that this change was accompanied by a gain of weight in the products as compared with the weight of the factors employed; which could be accounted for only by the assumption that hydrogen and oxygen from the water must contribute to form the product. This led him to the conclusion that the saponifiable fats were analogous in constitution to compound ethers—*i. e.* the fats are compounds of fatty acids with glycerine, *minus* a certain quantity of water, just as ethers are compounds of alcohol with acids, *minus* a certain quantity of water. In later years the researches of Berthelot have demonstrated the accuracy of Chevreul's views by the synthesis of fats from the union of fatty acids with glycerine, and the separation of one, two, and three molecules of water. (See GLYCERINE, OILS, and SOAP.)

The memoirs of Chevreul on the fatty bodies are among the most remarkable examples of a chemical research which has remained for more than half a century almost without important addition or change from the labors of subsequent investigators. B. SILLIMAN.

**Fatty Degeneration**, in pathology, a condition in which the minute structural elements of the tissues of living organisms are gradually replaced by fat-globules. In man this diseased condition has been observed in nearly all the tissues, though some authorities state that the nerves and the red corpuscles of blood are not liable to this change. Fats, though always of organic origin, and often closely associated with living tissues, are never, it is believed, truly organized bodies; and consequently they are not regarded as ever truly vitalized, any more than are the water and the limo which are found in living organisms. In this view, fatty degeneration is a molecular death, a necrobiosis, of the tissues. It has been likened to the change of dead bodies into adipocere.

In the great closed glands of the foetus, and in the corpus luteum of the ovary, fatty degeneration is a normal process. In the liver, it is merely an excess of the normal fatty element contained in the acini, which, however, encroaches upon the organized elements of those structures, and becomes a true fatty degeneration. It also attacks the muscles, and especially the heart; the bones (in some forms of *mollities*), the brain (yellow softening), the cornea (*arcus senilis*), and the kidney in many cases of so-called Bright's disease. The fatty degeneration of the heart is a rather frequent disease, but very difficult to detect, even by the trained diagnostician. When suspected, a quiet life, a nourishing but not too stimulating diet, with the judicious use of tonics and iron, are to be recommended. For the disease there is no cure known.

REVISED BY WILLARD PARKER.

**Fatu'ity** [from the Lat. *fatuus*, "insipid, tasteless, foolish"] is a state of mind characterized by absence or great deficiency of the will and the intellect, and by apathy with regard to those things which usually arouse the feelings and impulses. If congenital, it constitutes complete or partial idiocy. When it is associated with, or consequent upon, acute disease, it has no significance except as a symptom of that disease; while if it be long continued, obscure in its origin, and progressive in character, it is almost certain to result in dementia, one of the most hopeless forms of mental disorder.

**Fau'ces Ter'ra** [Lat., "jaws of the land"], projecting headlands or promontories, including arms of the sea, as, *e. g.*, bays, creeks, lakes, basins, harbors, rivers, etc., where the tide ebbs and flows. In England the general rule is

that such bodies of water, as far as the point to which the flow of the tide extends, and unless they are within the body of a county, are under the jurisdiction of the courts of admiralty. In these exceptional instances the common-law courts exercise exclusive jurisdiction, except in a few classes of questions to which admiralty powers have been extended by statute. A stream is said to be "within the body of a county" (*infra corpus comitatus*) when a person standing on one shore can see what is done upon the other. In the U. S. the admiralty jurisdiction is not confined to tide waters, and is not excluded from waters "within the body of a county," but extends over the great lakes and over all rivers, etc. capable of navigation for practical commercial purposes. The whole subject is fully developed in the decisions of the Supreme Court of the U. S., as found in the volumes of reports.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Fauche** (HIPPOLYTE), b. at Auxerre in 1797, inherited a fortune and became a Sanscrit scholar. His translations of the *Râmâyana* (9 vols., 1854-58) and the *Mahâbhârata* (7 vols., unfinished, 1863-67) are among his most important works. He published an original tale and some poems. D. at Juilly, Seine-et-Marne, 1869.

**Faucher** (LÉON), French state minister, political economist, and financial writer, b. in Limoges Sept. 8, 1803, was in youth a designer of embroidery-patterns, and then a teacher; wrote for the *Courrier Français* and the *Revue des Deux Mondes*. In 1846, in the French Chamber of Deputies, acted with the *Gauche*; minister of the interior from Dec., 1848, to May, 1849, and from Apr. to Oct., 1851; was liberal but not republican in politics. *Studies on England* (1845) and *Miscellanies of Political Economy and Finance* (2 vols., 1856) were his productions. D. at Marseilles Dec. 15, 1854, having always declined office under the emperor Louis Napoleon.

**Faucit** (HELEN), an English actress of renown, b. in 1816, made her *début* at Covent Garden, London, Jan. 5, 1836, in the character of Julia in the *Hunchback*, in which she achieved great success and at once took high rank as an actress, becoming a leading member of Mr. Macready's companies during the production of his Shaksperian revivals. She was the original representative of the heroines in Bulwer's *Lady of Lyons*, *Richelieu*, etc., and in many other plays of different authors; married in 1851 to Theodore Martin, but continued to appear on the stage at intervals.

GEORGE C. SIMMONS.

**Faugeres** (MARGARETTA V.) was b. at Tomhanick, near Albany, N. Y., in 1771. Her mother, Mrs. Ann E. Bleeker, had considerable fame as a poet. In 1792 she married Dr. Peter Faugeres of New York, whose irregular habits brought his wife to poverty. She afterwards became a successful teacher, and was well known for her poems and prose-writings, which at that time were highly prized. *Belisarius* (1795), a tragedy, was her most ambitious work. D. at New York Jan. 9, 1801.

**Faulhorn**, a mountain of the Alps, in the canton of Berne, between the valley of the Grindelwald and the Lake of Brienz. It is 8802 feet high.

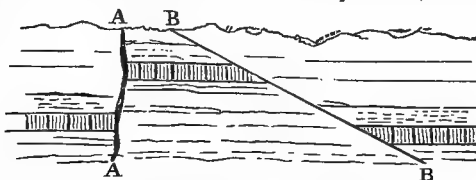
**Fauche-Borel** (LOUIS), b. at Neuchâtel in 1762, d. there Sept. 7, 1829. When the French Revolution broke out, he was at the head of a large printing-establishment in his native city; but in 1795 he gave up business, in order to devote himself entirely to the cause of the Bourbons. He proved one of their most active and audacious agents, carried on all negotiations with Pichegru, Barros, etc., but was after the restoration treated with gross ingratitude. He continued, however, to act as an agent of the king of Prussia. He has published some curious memoirs relating to the various negotiations in which he was employed.

**Faulkner** (CHARLES J.), American Congressman, b. in Berkeley co., Va., in 1805, received a collegiate education, and was admitted to the bar in 1829. In 1832-33 was elected to the house of delegates, in 1841 to the senate of Virginia, in 1848 again to the house of delegates, and in 1850 was a member of a convention to revise the constitution of the State; representative in Congress from Virginia 1851-1860, when appointed minister to France by President Buchanan. Returning to the U. S. in 1861, was imprisoned, on suspicion of disloyalty, in Fort Warren, Boston harbor, and exchanged in December of that year for Hon. Alfred Ely. In 1874 was elected to Congress from West Virginia. D. Nov. 1, 1884.

**Faulkner's Island**, a small elevated island lying off the harbor of Guilford, Conn., in Long Island Sound. It is within the limits of New York, and has a lighthouse with a flashing light, and a fog-bell, lat. 41° 12' 41" N., lon. 72° 38' 54" W.

**Fault**, in geology, a vertical displacement of rocks ac-

companying a line of fracture. "The amount of dislocation measured in a vertical direction produced by a fault is termed its 'throw,' a fault being said to be an 'upthrow' or a 'downthrow,' or an 'upcast' or a 'downcast,' according to the side from which we view it." (*Jukes*.) The "dislocation" may have been caused by the mass on one side of the fracture having subsided by reason of its weight, or the displacement may be the result of an upward thrust. Faults may be vertical or inclined at various angles. In the accompanying cut two faults are represented, the one



Vertical and Inclined Faults (*Jukes*).

vertical at A and the other inclined at B, and have clearly been the result of a subsidence of the two lateral masses. Faults may extend indefinitely downward, and the throw may amount to many thousand feet. Horizontally also, faults extend for long distances; one in Virginia, according to H. D. Rogers, has been traced for upwards of 80 miles. The fissure accompanying a fault may be wide and the interval filled up with subsequent deposits, thus in many instances giving rise to mineral veins, or the faces of the fracture may remain in apposition. In the latter case the sliding of the one surface over the other will have smoothed and polished both, thus causing the appearance known as "slickensides." Miners in different districts use the terms "slip," "slide," "heave," "dyke," "thing," "throw," "trouble," "check," etc. to express a fault; and one of the chief difficulties and causes of expense in coal, and indeed in other mining, is caused by the displacements of the veins or beds by faults. Geology, by establishing the facts which determine the sequence of sedimentary strata, has done much to simplify the difficulties caused by faults in coal-mines. E. C. H. DAY.

**Fau'na** [from *fau*, a rural divinity in the Latin mythology] is a term given to the assemblage of animals inhabiting any given locality, either in the present or past ages of the globe. In palæontology, however, it is sometimes used with more latitude, and is given to an assemblage of animals characteristic of a given period. Inasmuch as there are no very abrupt demarcations for any given region, the idea of a *fauna* is based, to a greater or less extent, on the forms combined in a central, or, as it is called, metropolitan district. Various combinations of animals are more or less characteristic of certain countries or portions of the earth's surface, many forms being limited by climatal or physiographical or unknown conditions.

Various names have been applied to these combinations, or to the regions of which these combinations are characteristic, but the most restricted ones are generally designated *regions* or *districts*; and to the more comprehensive into which they are combined, among others, the names *realm*, *range*, or *fauna* have been given, the last having at one time been applied by Agassiz in this sense. (The consideration of the faunas of the respective regions of the earth is the subject of a particular branch of science, ZOOLOGICAL GEOGRAPHY; and under that head the principles and facts involved will be treated, while the principal features of the geographical distribution of the various groups of animals—the subject of GEOGRAPHICAL ZOOLOGY—will be presented in the articles on such groups.) THEODORE GILL.

**Fau'nus**, a Roman woodland deity, corresponding to the Grecian Pan, many of whose attributes were assigned to him. He possessed the power of prophecy, and his oracles were in the groves. A festival, named Faunalia, was celebrated in his honor by the country-people. As a frolicsome wood-deity, represented with the horns of a goat and the feet of a satyr, he became multiplied by the poets, and the Fauni or Fauns corresponded to the Greek satyrs. Poetic tradition represented him as an early king of Latium, son of Picus, grandson of Saturn, and father of Latinus.

H. DRISLER.

**Fauque de Jonquières** (JEAN PHILIPPE ERNEST DE), b. at Carpentras, in the department of Vaucluse, France, July 3, 1820, entered the navy in 1835, and became a captain in 1858 and an admiral in 1874. He held important commands in Cochin China (1864) and as maritime prefect of Rochefort, and published several valuable mathematical treatises (*Mélanges de géométrie pure*, 1856; *Théorèmes fondamentaux*, 1865; *Système de courbes et surfaces algébriques d'ordre quelconque*, 1866, etc.).

**Fauquier** (FRANCIS), lieutenant-governor of Virginia 1758-68, was a popular and able governor, a man of culture, a free-thinker in religion, and a friend of Jefferson. He published some financial writings in England, and d. Mar. 3, 1768.

**Fauquier White Sulphur Springs**, in Fauquier co., Va., 56 miles W. S. W. of Washington and 10 miles N. W. of Bealton Station on the Great Southern R. R., have strong saline sulphur waters. The buildings were to great extent destroyed during the war. The situation is delightful, and the waters have a wide range of usefulness in chronic diseases.

**Faure** (JEAN BAPTISTE), a French baritone singer of great reputation, b. at Moulins Jan. 15, 1830, went upon the stage in 1852, and became in 1857 a professor at the Conservatoire.—His wife, CONSTANCE CAROLINA LEFEBVRE, b. at Paris Dec. 21, 1828, has also attained distinction as an operatic singer.

**Fauriel** (CLAUDE CHARLES), French philologist and historian, b. at St. Étienne Oct. 21, 1772, was nephew of the abbé Sieyès, and d. in Paris July 15, 1844. In 1830 a chair of foreign literature was founded for him in Paris. Among his principal works are a *History of Southern Gaul under the Rule of the German Conquerors* (1836), *History of Provençal Literature* (1846), and *Popular Songs of Modern Greece*, with a French version (1825).

**Faust** (JOHANN), DR., a German magician who flourished during the first thirty years of the sixteenth century, is generally supposed to have been a native of Knittlingen in Württemberg, b. about 1480, d. about 1538. His history is obscured by extravagant fiction, and it is impossible to state with certainty the place of his birth or decease. Regarding his existence there is undoubted testimony, and we learn that he spent some time at Wittenberg, at one time enjoying the association of Melanchthon. (See SCHEIBEL, *Kloster*, ii. p. 14.) Conrad Gesner, and even Luther (*Tischreden*, p. 216) also, make mention of him. Dr. Faust seems to have been a learned man who had studied magic and astrology, and, travelling about the country performing various feats, came to be regarded as a dealer in the black art, and one maintaining an intimate relation with evil spirits. The belief in witchcraft was universal in Europe in the Middle Ages, and nowhere did it prevail so universally as in Germany. A bull of Pope Innocent IV. (1243-54) declares that it having come to his ears that in parts of Germany persons forgetting or denying the Christian faith have dealings with the devil, he commands all such individuals to be seized and punished forthwith with loss of property and life; and soon after appeared a work on sorcery and witchcraft—the *Malicium Maleficarum*, or "Witch's Hammer"—which enjoyed the approbation of the theological faculty of Cologne. "Germany indeed seemed to live and breathe in an atmosphere of sorcery. The ground which Faith had lost Superstition made her own." Even the Reformers believed in witchcraft and in the bodily presence of the Spirit of Evil upon the earth. According to tradition, Faust enjoyed in his youth a large fortune, gave himself to a life of extravagance and licentiousness, and soon squandered his vast possessions. He then devoted himself to the study of magic at Cracow, determined to regain his wealth and enjoyments, and after a mastery of the secret sciences made a compact with Satan, according to which the latter was to serve Faust for twenty-four years, when the Evil One should possess the soul of Faust. The contract signed by Faust with his own blood contained the following conditions: "1. He shall renounce God and all celestial hosts; 2, he shall be an enemy of all mankind; 3, he shall not obey priests; 4, he shall not go to church nor partake of the holy sacraments; 5, he shall hate and shun wedlock." Mephistopheles, a devil "who liked to live among men," was given Faust as an attendant, and the two together roamed over the land, Faust enjoying every form of sensual pleasure, and performing magical feats never before performed, until at last the time arrived when the fatal debt was due, and Satan appeared in the most hideous form imaginable between twelve and one o'clock at night, and finished Faust's earthly career, bearing away with him the soul of the unhappy being. Such is the monstrously mythical form in which Faust's life appears in the popular tradition. Its aim evidently is to describe that tendency to sacrifice the future, however precious—nay, salvation itself—to immediate gratification. Embodying all the dire superstitions, the idle terrifications, the thirst for the strange and wondrous, the story of Faust entertained the popular mind, while the clergy availed themselves of the moral it taught to recall men from sensuality and vice, and from the foolish attempts to fathom the mysteries of the supernatural.

The story of Faust was first published by the printer Spies

of Frankfort-on-the-Main in 1587, under the title *Historia von D. Johann Fausten, den weitbeschreyten Zauberer und Schwarzkünstler*, and already in 1588 another edition was called for; in this year appeared also a rhymed edition and a version in Low German and Danish. In 1590 two English translations came out—one entitled *A Ballad of the Life and Death of Doctor Faustus, the great Conjuror*, and the other, *The History of the Damnable Life and Deserved Death of Dr. John Faustus* (which was probably used by MARLOWE (which see) in 1591 in the preparation of his drama). In 1592 appeared a Dutch, and in 1598 a French version. In 1599, G. R. Widmann published an "improved" edition, entitled *Wahrhaftige Historien von den greuelichen und abscheulichen Sünden und Lastern, auch von vielen wunderbarlichen und seltsamem abentheuren so D. Johannes Faustus hat getrieben* (Hamburg, 3 vols.); still further improved by Pfitzer in 1674 (Nuremberg). Widmann's edition, but without his or Pfitzer's notes, was published at Reutlingen in 1834. A large number of books on necromancy have inserted Faust's cabalistic formulas, charms, talismans, etc. All of these publications, and also all important monographs bearing upon this subject, are found in SCHEIBEL, *Das Kloster, weltlich u. geistlich* (Stuttgart, 1847). German literature abounds in elegies, pantomimes, tragedies, and comedies on Faust. As far back as 1594 appeared a work by Tholeth Schotus, purporting to be from the Spanish and treating of Faust and his disciple Wagner. Its form intended it for the marionettes, and it was promptly taken up. (See *Puppenpiel*, edited by Charles Simrock (Leipzig, 1850); MAGNIN, *Histoire des Marionnettes* (Paris, 1854, 8vo); HAGEN, *Ueber die ältesten Darstellungen der Faustsage* (1844); and SCHEIBEL's work.) In a dramatic form, Faust was first treated in the German by Lessing in his masterly fragment entitled *Faust und die Sieben Geister*, but the grandest of all on this subject is Goethe's *Faust*, of which Bayard Taylor has recently furnished a masterly English version (Boston, 1870, 2 vols., 4to). Goethe, however, introduced an element foreign to his model—that of the ardent, inextinguishable thirst for knowledge for its own sake alone. (Compare KREYSSIG, *Vorlesungen über Goethe's Faust*, Berlin, 1866, 12mo, p. 3-36.) Goethe's *Faust* has furnished Gounod with the subject of his opera. (See DÜNTZER, *Die Sage von D. Joh. Faust* (Stuttgart, 1846); PETER, *Literatur der Faustsage* (2d ed., Leipzig, 1851); and especially KÜHN, *Das älteste Faustbuch* (Leipzig, 1868).)

JAS. H. WORMAN.

**Faust**, originally written **Fust** (JOHANN), a native of Mentz, Germany, who shares with Gutenberg and Schöffer the honor of establishing the art of printing. He was (1450-55) Gutenberg's partner in the new business of printing books, but Faust probably did nothing but furnish capital. In 1455, Faust prosecuted Gutenberg for money advanced, took the business into his own hands, and associated with himself his son-in-law, Peter Schöffer, who originally was a calligrapher of great repute. They carried on the business successfully until 1462, when, at the sack of Mentz, the workmen were scattered and the art of printing was no longer a secret. Faust still went on with his business, and is thought to have died of the plague at Paris in 1466. There are in existence copies of quite a number of books printed by Faust and his partners, some of them beautifully executed.

**Fausti'na** (THE ELDER) **Annia Galeria**, wife of the emperor Antoninus Pius. Her character was in marked contrast to that of her husband, who nevertheless retained his regard for her, and at her death caused a temple to be erected to her honor, remains of which are still standing.

**Faustina** (THE YOUNGER) **Annia**, daughter of the preceding, was married by her father to Marcus Aurelius, her cousin, who had been adopted by Antoninus at the suggestion of Hadrian. She d. A. D. 175, near Mt. Taurus in Asia Minor, and though, like her mother, she had proved unworthy of the affection of her virtuous husband, yet at the request of Aurelius divine honors were decreed to her by the senate. As a further testimonial of his regard for her memory, Aurelius established, as Antoninus had done in the case of the elder Faustina, an asylum for female orphans, to whom the name "Faustinian" (*Faustiniæ*) was given.

H. DRISLER.

**Faus'tulus**, in the early legends of Rome, the herdsman of Amulius, who found the twin-brothers Romulus and Remus, when they had been exposed by the order of Amulius, and took them to his home and reared them as his own children. (See ROMULUS.)

H. DRISLER.

**Fauveau, de** (FÉLICE), b. in 1803 at Florence of a family of Breton legitimist exiles, attained distinction as a sculptor under the patronage of the restored Bourbons; took part in the legitimist movements of 1832; was condemned to deportation, but escaped, and has since chiefly lived at Florence, and practised her art with success.—Her

brother, HIPPOLYTE DE FAUVEAU, has considerable fame as a sculptor.

**Fauvelet** (JEAN BAPTISTE), a French genre and flower painter, b. in Bordeaux in 1822, first began to exhibit in 1845; attained reputation for the gracefulness and fidelity of his paintings, which are numerous, and in style somewhat resemble the works of Meissonier.

**Fauvette** [Fr.], a name applied to several song-birds in France, and used to some extent in England. The term is nearly equivalent to warbler.

**Fava'ra**, town of Sicily, celebrated for its rich mines of sulphur. Pop. 12,829.

**Favart** (CHARLES SIMON), b. at Paris Nov. 13, 1710, published many plays, and was the inventor of the modern vaudeville. D. May 12, 1792.—His wife, MARIE JUSTINE BENOÎTE, née DU RONCERAY (1727-72), was a famous singer, comic actress, and dancer, and wrote some plays.—His son, CHARLES NICHOLAS JOSEPH JUSTIN (1749-1806), and grandson, ANTOINE PIERRE CHARLES (b. in 1784), had great repute—the first as a comedian, the second as a politician, *littérateur*, and painter.—MARIE FAVART, the adopted daughter of the last-named, née PIERRETTE IGNACE PINGAUD, b. Feb. 16, 1833, went upon the stage in 1848, and attained a most brilliant fame as an actress, both in tragedy (*Hernani*) and in comedy.

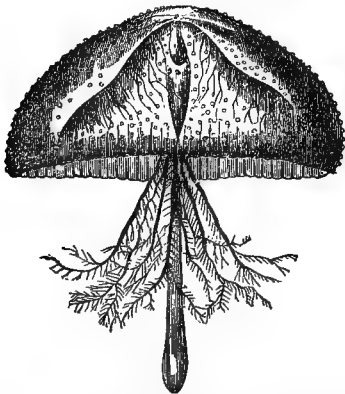
**Fav'ersham**, municipal borough and seaport of England, in the N. of Kent. It has valuable oyster-fisheries. Pop. in 1881, 8616.

**Favigna'na**, the chief of the Ægades, a group of islands in the Mediterranean, 6 miles off the W. coast of Sicily. It is fruitful, has good pasturage, excellent wine, and a town of the same name with a population of 3245. Lat. 37° 57' N., lon. 12° 18' W.

**Fa'ville** (ORAN), b. at Manheim, Herkimer co., N. Y., Oct. 13, 1817, graduated at the Wesleyan University in 1844, became in 1852 professor of ancient languages at McKendree College, Ill., in 1853 president of Ohio Wesleyan Female College, removed in 1855 to Mitchell co., Ia., where he was a county judge, lieutenant-governor, and president and afterwards secretary of the State board of education. In 1863 he was one of the visitors to the U. S. Military Academy; was (1863-67) editor of the *Iowa School Journal*; State superintendent of public instruction 1864-66, and president of the Iowa Teachers' Association. D. at Waverley, Ia., Oct. 3, 1872.

**Favistel'la**, a genus of fossil corals found in the Silurian rocks, having the general structure of *Favosites*, but the columns are furnished with numerous vertical radiating septa.

**Favo'nia**, a genus of acalephs (jelly-fishes) of the order



Favonia Octonema.

Discophora, including some of the most characteristic organisms of that order. The *Favonia octonema* of the South Seas has a somewhat hemispherical body, with a long proboscis and eight branchiferous appendages.

**Favo'nus** (MARCUS), a Roman politician, whose career was marked by strong personal opposition to Pompey and admiration for Cato. In 55 B. C. he was ædile, and probably was prætor in 49; went over to Pompey's party in 48, and after the battle of Pharsalia was reconciled to Cæsar, but after Cæsar's murder was a partisan of Brutus, and was outlawed and put to death 42 B. C.

**Favorini**, a philosopher and rhetorician in Rome under Trajan and Hadrian, b. at Arimate (now Arles) in the south of Gaul. He received his education in Rome, and became distinguished for his knowledge of Greek, in which language he had Dion Chrysostom as instructor.

He stood high in the favor of Hadrian, and numbered among his friends Demetrius of Alexandria, Fronto, Plutarch (who dedicated to him his treatise *περί τοῦ πύλου ψυχῆς*), and Herodes Atticus, to whom he bequeathed his library and his house in Rome. Wrote numerous works on a great variety of subjects, all in Greek, and was famed also as an orator, on which account the Athenians raised a brazen statue to his honor, but when he lost the favor of Hadrian they tore it down. Among his numerous writings two are of an historical character, his *Ἱστορίαι* and his *Ἀπομνημονεύματα*, from both of which a few fragments are preserved. His orations have all perished. (See J. L. MARRES, *Dissertatio de Favorini Arlatensis vita, studiis, scriptis, accedunt Fragmenta*, Utrecht, 1853. The fragments are collected also in MÜLLER's *Hist. Græc. Fragm.*, vol. iii. pp. 577-585.) H. DRISLER.

**Favosites**, an extinct genus of corals exceedingly common in the Devonian and carboniferous rocks, of which a large number of species are described. The corallum of *Favosites* is compound, and usually forms hemispherical or conical masses, composed of a large number of prismatic columns divided horizontally by transverse septa or "tabulæ," and usually having the vertical walls pierced by one or several rows of pores. The name is derived from *favus*, a "honeycomb," which some of the species very much resemble. J. S. NEWBERRY.

**Favre** (JULES CLAUDE GABRIEL), b. in Lyons, France, Mar. 21, 1809, became a prominent lawyer and liberalist of Paris, and in 1848 held positions in the revolutionary ministry, opposed Louis Napoleon during the presidency of the latter, and more especially after the *coup d'état* of 1851. In 1853 he ably defended Orsini, the would-be assassin, and in the Corps Législatif eloquently and irreconcilably opposed the policy of the emperor on all leading public questions; opposed the measures which ended in the Franco-German war, and after the fall of Sedan advocated the deposition of the imperial dynasty, and became minister of foreign affairs and vice-president in the provisional government. As minister of foreign affairs he took an important part in the negotiations for peace with Bismarck. He was for a time, during the siege of Paris, acting minister of the interior; but withdrew in 1871 from the government during the presidency of Thiers, and devoted himself to law and literature. He was author of *Rome et la République Française* (1871) and *Le Gouvernement du 4 Septembre* (1871-72). D. at Versailles, France, Jan. 19, 1880.

**Favula'ria**, a sub-genus of *Sigillaria*, which includes some of the most remarkable trees of the coal-flora. The name was given by Sternberg to those species in which the trunks are fluted and the leaf-scars are closely approximated. (See SIGILLARIA.) J. S. NEWBERRY.

**Fa'vus** [Lat., "honeycomb"], or **Scald Head** (i. e. "scabby head," from *scall*, a "scab"), a disease formerly known as *tinea* and *porrigo*, generally seated on the hairy part of the scalp, but sometimes attacking the roots of the nails and other parts. This disease is now known to be caused by a parasitic vegetation of low forms of fungus. These fungi are known as *Achorion Schœnleini*, and *Puccinia favi*, but are now believed to be aberrant forms of the species known as the yeast-plant, *Cryptococcus cerevisiæ*. Favus is a contagious disease, best prevented by cleanliness, and best cured by carefully removing the hair and applying parasiticide medicines, such as have the power of destroying low organisms. Sulphurous and carbolic acids and weak solutions of corrosive sublimate are the best applications. It is called *favus* because the diseased surface often assumes a honeycombed appearance. It leads to permanent baldness.

**Faw'cett** (HENRY), M. A., b. at Salisbury, England, in 1833; graduated with honors at Trinity Hall, Cambridge, 1856; lost his sight by an accident in 1858; attained a fellowship at Cambridge, and in 1863 became professor of political economy there. Several times sat in Parliament, where he advocated republican principles. Author of *Manual of Political Economy* (1863, 1869), *The Economic Position of the British Laborer* (1868), *Pauperism* (1871), etc. D. Nov. 6, 1884.—His widow, MILLICENT GARRETT, is a writer on topics kindred to those which were treated of by her husband, and is the author of some books.

**Fawkes** (GUY or GUIDO), English conspirator in the reign of James I., was a Roman Catholic, born in Yorkshire. In 1605, with Robert Catesby, Thomas Percy, and others, he endeavored to blow up the English House of Parliament, with king, Lords and Commons, having hired a vault under the House of Lords and lodged in it thirty-six barrels of gunpowder, but was arrested on the night of Nov. 5th in the vault, and executed at Westminster Jan. 31, 1606. (See JARDINE, *Narrative of the Gunpowder Plot*, and the *Fawkeses of York*.)



**Fay** (HEMAN A.), b. at Bennington, Vt., 1778, graduated at West Point Military Academy in 1808, and d. at Bennington Aug. 20, 1865. He wrote *Official Account of the Battles of 1812-15*.

**Fay** (JONAS), M. D., b. at Hardwick, Mass., Jan. 17, 1737, was surgeon under Col. Ethan Allen at the surrender of Ticonderoga, a member of the convention of 1777 which declared Vermont an independent State, and author of the declaration of the fact and their reasons for it to Congress; secretary of the convention to form the State constitution in July, 1777, and one of the council of safety to administer the government; member of the State council (1778-85); judge of the supreme court (1782); of probate (1782-87); agent of the State in Congress Jan., 1777, Oct., 1779, June, 1781, and Feb., 1782. D. Mar. 6, 1818.

**Fay** (THEODORE SEDGWICK), b. in New York City Feb. 10, 1807, began contributing to the *New York Mirror* in 1828, which he finally edited. *Dreams and Reveries of a Quiet Man* was published in 1832. This was succeeded by *Minute Book*, a journal of travel in Europe. *Norman Leslie*, his first novel, published in 1835, went to a second edition in the same year. Other works are *Sydney Clifton* (1839), *The Countess Ida* (1840), *Hoboken* (1843), *Robert Rueful* (1844), *Utric*, or *The Voices*, poems (1851). His best known fugitive contributions are his papers on Shakspeare. He has also published a *History of Switzerland*, in which country he was U. S. minister-resident from 1853 to 1861. Prior to this appointment he was U. S. secretary of legation at Berlin from 1837 to 1853.

**Fayal'**, one of the most important of the Azores, a group of islands in the Northern Atlantic belonging to the Portuguese. It has the best harbor in the islands and lies directly in the track of any vessel crossing the Atlantic. Its name is derived from the extreme abundance of the *faya*, an indigenous shrub. It presents the same general features as the other members of the group, but it has suffered once only from earthquake—namely, in 1672. It contains 37 square miles, with 25,000 inhabitants. It is very fertile, and besides its considerable transit-trade with America it exports a great quantity of oranges and wine. Its principal town, Horta, lies in lat. 38° 30' N. and lon. 28° 41' W. The bay forms a good roadstead, though not safe under southern winds. Pop. 7636. The manufacture of laces and open-work stockings is one of the principal industries of the island.

**Faye** (HERVÉ AUGUSTE ÉTIENNE ALBANS), b. at Saint Benoît (Indre) Oct. 5, 1814, studied astronomy with Arago, in 1843 discovered the comet bearing his name, became professor of astronomy in 1873, and published a number of astronomical treatises. Was appointed director of the Paris observatory in Jan., 1878.

**Faye's Comet** was discovered by M. Faye Nov. 22, 1843. It has been shown by Leverrier that it came into the solar system in 1747, and that the attraction of Jupiter then gave it its present orbit. Its mean distance is 3.8118 times that of the earth; eccentricity, .5576; inclination, 11° 22' 7"; period, 7.414 years; and its motion is direct.

**Fayette**, on R. R., Fayette co., Ia. (see map of Iowa, ref. 3-J, for location of county), contains Upper Iowa University. Pop. in 1880, 995; in 1885, 892.

**Fayette**, on R. R., capital of Jefferson co., Miss. (see map of Mississippi, ref. 8-E, for location of county), 27 miles E. N. E. of Natchez. Pop. in 1870, 120; in 1880, 369.

**Fayette**, on R. R., capital of Howard co., Mo. (see map of Missouri, ref. 3-G, for location of county), 12 miles from the Missouri River. It has Central College and a female seminary. Pop. in 1870, 815; in 1880, 1247.

**Fayetteville** (P. O. name, FAYETTE COURT-HOUSE), on R. R., capital of Fayette co., Ala. (see map of Alabama, ref. 3-B, for location of county). It has an academy. Pop. in 1880, 180.

**Fayetteville**, on R. R., capital of Washington co., Ark. (see map of Arkansas, ref. 2-A, for location of county), in the Ozark Mountains, and 55 miles from the Arkansas River. The Arkansas Industrial University is situated here. Pop. in 1870, 955; in 1880, 1788.

**Fayetteville**, capital of Fayette co., Ga. (see map of Georgia, ref. 3-G, for location of county), 25 miles S. of Atlanta. Pop. in 1880, 138.

**Fayetteville**, on R. R., Onondaga co., N. Y. (see map of New York, ref. 4-F, for location of county), 10 miles E. of Syracuse. The manufacture of hydraulic cement, quicklime, and land-plaster is extensively carried on here. There are an excellent union school, a public library, large flouring-mills, manufactories of pearl barley, paper-mills, and a machine-shop. Pop. in 1870, 1402; in 1880, 1556.

**Fayetteville**, capital of Cumberland co., N. C. (see map of North Carolina, ref. 4-G, for location of county), on R. R. and Cape Fear River, 60 miles from Raleigh and

90 from Wilmington. It has a gas company, water-works, a public cemetery, 1 female college, a male institute, a dozen or more private and primary schools, and a large and excellent school for colored children; large carriage-factory, a wagon-manufactory, 4 mills, 2 extensive coppersmith establishments, and a large grape-vineyard. There are also 4 cotton-factories near the village. It contains 3 public-halls, the county court-house, prison, etc., a large opera-house, and a market-house. It has a large trade in rosin, turpentine, and cotton, is a great horse and mule market, and has several steamboats running to Wilmington. It enjoys a large trade from the surrounding country. Fayetteville suffered largely from invasion and destruction to property at the close of the war. Pop. in 1870, 4660; in 1880, 3485.

**Fayetteville**, on R. R., capital of Lincoln co., Tenn. (see map of Tennessee, ref. 7-F, for location of county), 82 miles S. of Nashville, 12 miles N. of the Alabama State line. It has a manufactory of woollen goods, broadcloths, cassimeres, etc., a carriage manufactory, 2 academies, and 3 other schools. Large quantities of cotton, corn, wheat, hogs, etc. are shipped from here. Pop. in 1870, 1206; in 1880, 2104.

**Fayetteville**, Vt. See NEWFANE.

**Fayetteville**, capital of Fayette co., West Va. (see map of West Virginia, ref. 5-C, for location of county). Pop. of dist. in 1870, 1877; in 1880, 2784.

**Fayoom'** [also written **Faioum**, **Fayoum**, and **Fayum**, from the Coptic *Pi-ou*, which means, Wilkinson says, "the cultivated land," or, according to Mariette, "the sea"], a province of Egypt, on the W. side of the Nile, between lat. 29° and 30° N. and lon. 30° and 31° E. Its capital, Medeneh (pop. about 13,000), is about 65 miles S. W. of Cairo and 30 miles N. W. of Benisouef. The Fayoom is a basin formed by a depression in the Libyan range, its main plateau being on about the level of the Nile, but in its lowest point 100 feet below that level. Its area, anciently somewhat greater, is now about 750 square miles, more than 100 of which are occupied by the natural lake Birket el Keroon. It is still the most fertile province of Egypt, abounding in figs, grapes, apricots, olives, and other fruits. But its ancient renown was much greater. It contained the LABYRINTH (which see), and the artificial lake MOERIS (which see), both built by Amenemka III., the great king of the twelfth dynasty, according to Wilkinson, nearly 2000 B. C., according to Mariette, nearly 3000 B. C. (See HERODOTUS, ii. 148-150: *Aperçu de l'Histoire d'Égypte*, by AUGUSTE MARIETTE-BEY, 2d ed. 1870; and ZINCKE's *Egypt of the Pharaohs and of the Khedive*, 1871.) R. D. HITCHCOCK.

**Fayrer** (Sir JOSEPH), b. at Plymouth Dec. 6, 1824, studied medicine in London, Edinburgh, and on the Continent; entered the Bengal medical service in 1850; served in the Burmese war of 1852 and during the mutiny of 1857, and was appointed professor of surgery in the medical college of Bengal in 1859, and in 1874 surgeon-general and president of the medical board of the India office. He has written *Clinical Surgery in India*, *Clinical and Pathological Observations in India*, *European Child-Life in Bengal*, *Malarial Splenic Cachexia of Tropical Climates*, *Bronchocoele in India*, *Physiological Action of the Poison of Naja Tripudians*, *Some of the Physical Conditions of the Country that affect Life in India*, *The Claws of the Felidae*, *Anatomy of the Rattlesnake*, etc.

**Fazy** (JEAN JAMES), Swiss statesman and journalist, b. at Geneva May 12, 1796, descended from a family of French Protestants exiled by the Revocation of the Edict of Nantes. He was educated in France, studied law and political economy, and settled in Paris, where he took active part in the opposition of the liberal party to the restoration. Besides his contributions to the press, among which especially his *Lettres d'un Américain in the Mercure de France* attracted much attention, he published *De la Banque de France considérée comme nuisible aux transactions commerciales* (1819), *L'Homme aux portions* (1820), *De l'État périlleux des finances* (1830), etc. In 1830 he was strongly opposed to the duke of Orleans; and when he saw that it was impossible to have a republic established in France, he left the country and returned to his native city. In Geneva he joined the radical party, and in 1846 the party succeeded in changing the constitution, and Fazy found himself at the head of the government. After the fall, however, of the French republic, in 1852, the position of the radical party in Geneva became less and less secure. It lost its hold on the sympathy of the masses; it suffered one defeat after the other; a heavy reaction at last set in and became almost threatening; and in 1865 Fazy retired into private life. D. at Geneva Nov. 6, 1878.

# APPENDIX.

[EMBRACING SUPPLEMENTARY ARTICLES AND ARTICLES RECEIVED TOO LATE FOR INSERTION IN THEIR ORDER.]

**Cervidæ** [from *Cervus*, the Latin name for deer, the typical genus], a family of mammals of the order Ungulata and sub-order Artiodactyla, containing the deer and related types. The form is for the most part typified by the familiar species of deer, but deviations are exhibited by the moose and reindeer; the head is attenuated forward, and the nose generally tapering, with a moist, naked muffle, but sometimes more or less broad and hairy; the teeth are of the usual ruminant type (M. 3, P. M. 3, C. 1 or 2, I. 3); the molars with four crescentiform lobes, two anterior and two posterior; the canines in the upper jaw generally rudimentary or absent, especially in the females, but sometimes hypertrophied and developed as tusks; the canines in the lower jaw and in the incisors alike and proclivous; frontal appendages are generally present, at least in the males, and consist of horns, called "antlers," which are periodically developed preliminary to and during the rutting season, and subsequently cast off, but in some forms they are always absent; they are rarely possessed by the females, the reindeer being, however, an exception; the feet have two main hoofs, and almost always lateral or false ones high up on each side; the skull has its palatine axis nearly parallel with the occipito-sphenoid axis; the auditory bullæ are little produced outward, and are applied only to the inner surfaces of the paroccipital processes; the styloid processes are directed downward, and interposed between the bullæ and paroccipital processes, and not enclosed in oblique folds of the auditory bullæ; the stomach is quadripartite, and exhibits the typical ruminant characters; Cowper's glands and the gall-bladder are generally, but not always, absent. The family thus defined is exemplified in quite a number of genera, which are combinable in seven groups. Commencing with the most generalized forms, there are (1) *Moschus*; (2) *Hydropotes*; (3) *Cervulus*; (4) *Pudu*, *Furcifer*, *Coassus*, *Blastocerus*, *Cariacus*, and *Capreolus*; (5) *Hyelaphus*, *Rucervus*, *Rusa*, *Cervus*, *Elaphurus*, and *Dama*; (6) *Rangifer*; and (7) *Alces*. By recent writers these have been further combined in three sub-families, the first two genera being approximated under the name *Moschinae*; the third (3) genus isolated as the type of a peculiar sub-family, *Cervulinae*, and the remaining (4-7) segregated as the sub-family, *Cervinae*. There are reasons for doubting, however, whether this is a natural classification. A remarkable distinction exists between two of the major groups of deer in the structure of the anterior feet. (1) In the genera of the first, second, fourth, sixth, and seventh groups the lateral metacarpals are well developed at their distal extremities, and atrophied at their proximal, and thus distinguished from other *Pecora*; in the genera of the third and fifth sections the corresponding bones are developed at their proximal extremities, and atrophied at the distal, as in most *Pecora*. The indications are that in the primitive deer the said bones were complete, although slender. (See DEER, FALLOW DEER, ELK, MUNTJAK, REINDEER, ROEBUCK, etc., in CYCLOPÆDIA.)

THEODORE GILL.

**Cesnola, di** (LUIGI PALMA), b. near Turin, Italy, July 29, 1832, received his education at the Royal Military Academy; was in the war for Italian independence, and in the Crimean war; came to the U. S. in 1860; volunteered in the military service of the U. S., and was made colonel of the Fourth regiment of New York cavalry; was in many collisions with the enemy, and at the battle of Aldie, in June, 1862, was presented by Gen. Kilpatrick with his own sword on the field for distinguished gallantry. On the same day he was wounded and captured, and was confined for some months in the Libby prison. After the war he received the brevet of brigadier-general, and was appointed U. S. consul to Cyprus. It was during his residence in this island that Di Cesnola engaged in those investigations and made those remarkable discoveries which have secured to him his honorably-earned and world-wide celebrity. He commenced with Larnica, his official residence, and its vicinity, but subsequently extended his explorations over a great part of the island, with the result of bringing together an immense number of objects of ancient art, many of them showing traces of

Phœnician, Assyrian, and Egyptian design. These objects consist principally of statues, statuettes, terra-cottas, glass vessels, gold ornaments, gold coins, and inscriptions. The site of the largest discovery was at Golgos, where among the ruins of the buried temple of Aphrodite an incredible number of statues were unearthed, with many Cypriote inscriptions. At Curium were found very many valuable gold ornaments, many of them of exquisite beauty. A collection consisting of the most valuable of these various objects was offered to the British Museum, but the authorities would not comply with the conditions proposed by Gen. Di Cesnola—that it should be kept separate and called by his name. Through the agency of Mr. Hiram Hitchcock and Mr. Wm. T. Blodgett of New York a strong public interest was excited in the collection on this side of the Atlantic, and Mr. John Taylor Johnson, the president of the Metropolitan Museum of Art, became its purchaser on his own private account. It was subsequently transferred to the museum. These occurrences took place before 1873. Toward the close of that year Gen. Di Cesnola returned to Cyprus and continued his explorations, making considerable additions to his collections previously gathered. (See CYPRUS.)

Some time in 1879 there appeared in the *Art Amateur*, a New York journal devoted to art, some criticisms on certain of the objects of the collection, which the author, Mr. Gaston L. Feuardent, a dealer in antiquities in New York, asserted to be factitious—or, in his own words, "patchwork of unrelated parts." These were followed by articles of similar character in the daily press, producing at length an excitement in the public mind which led to the appointment by the trustees of a committee consisting of five well-known gentlemen charged with the duty of investigating the truth of the charges. This committee began its sessions in Dec., 1880, and reported in Jan., 1881, declaring all the charges of Mr. Feuardent and his supporters to be totally groundless. A paper read by Gen. Di Cesnola before this committee, and afterward published, was regarded by Mr. Feuardent as a personal libel, and he consequently commenced an action against Di Cesnola for damages, which, after considerable delay, was finally brought to trial in the autumn of 1883. In the course of this trial, which lasted a long time, every one of the imputations made by Feuardent upon the genuineness of the objects of the collection and the honesty of the collector was made a subject of searching inquiry, and every one of the objects which was portable was brought into the court-room and submitted to the examination of the jury, which with very little delay brought in a verdict against the plaintiff, completely vindicating Gen. Di Cesnola. Notwithstanding this, malicious aspersions similar to those thus disproved continue occasionally to appear in the public prints, but they are written by persons of no consideration with the public, and do no harm except to the authors themselves.

F. A. P. BARNARD.

**Chalmers** (LIONEL), b. at Cambleton, Scotland, about 1715; studied medicine at the University of Edinburgh; emigrated to South Carolina; practised in Christ Church parish and in Charleston. D. in 1777. He published *Useful Remarks on Opisthotonos and Tetanus* (1754), *Essay on Fevers* (1767), etc.

**Chamberlain**, cap. of Brulé co., Dak. (see map of Dakota, ref. 7-E, for location of county), on Iowa and Dakota division of Chicago Milwaukee and St. Paul R. R., and on the Missouri River, is a thriving place. Pop. not in census of 1880.

**Chamberlain** (D. H.), b. at Worcester, Mass., 1837; graduated from Yale College with high honors, and from the Harvard Law School; entered the army in 1864 as lieutenant in the 5th Massachusetts Colored Cavalry; promoted to be captain, and served in Maryland, Louisiana, and Texas; went to South Carolina in 1866, and for two years was engaged as a cotton-planter. Upon the call for a constitutional convention he was chosen as a delegate, and subsequently elected attorney-general of the State,

which position he filled for four years with marked ability; governor of South Carolina 1875-76; renominated in 1876 and reinaugurated Jan., 1877; but, his election being contested, he withdrew April 10, 1877. Became engaged in the practice of law in New York City June, 1877.

**Chambers** (TALBOT WILSON), D. D., LL.D., b. Feb. 25, 1819, at Carlisle, Pa., graduated at Rutgers Coll. 1834; studied theology at New Brunswick and at Princeton, N. J.; was licensed to preach at Clinton, Miss., in 1838, and in Oct., 1839, became pastor of the Second Reformed Dutch Church, Somerville, N. J.; in Dec., 1849, was installed as one of the pastors of the Collegiate Dutch Church, New York. His published works are *The Noon Prayer Meeting in Fulton Street* (1857), *The Life of the Hon. Theo. Frelinghuysen* (1863), *Exposition of Zechariah in Lange's Commentary* (1874), *The Psalter a Witness for the Divine Origin of the Bible* (1876). He was a member of the American Committee engaged in revising the English Bible.

**Chambersburg**, Mercer co., N. J. (see map of New Jersey, ref. 4-C, for location of county), on R. R. and Delaware River, is a southern suburb of Trenton, and was formed in 1872 from part of Hamilton township. Pop. in 1885, 8542.

**Chancellor** (CHARLES W.), b. in Virginia Feb., 1833; educated at Georgetown College, D. C., and at the University of Virginia. In 1853 graduated doctor of medicine at Jefferson Medical College, Philadelphia. He practised medicine in Alexandria, Va., till 1861. During the civil war he was medical director on Maj.-Gen. Pickett's staff. He then practised medicine in Memphis, Tenn., till 1868; was then elected professor of anatomy in the Washington University of Maryland; in 1869 was made dean of the faculty; in 1870 was transferred to the chair of surgery; and in 1873 he severed his active connection with the school, retiring from general practice. He was commissioner of public schools in Baltimore two years; a member of the city council five years, two of which he was president of the board of aldermen; in 1876 was elected secretary of the State board of health; in 1877 was president of Maryland Insane Asylum, still retaining both positions Mar., 1879. In 1876 he made an able report on the prisons, reformatories, and charitable institutions of Maryland, which attracted much attention here and in Europe; has published an able work on contagious and epidemic diseases, with special reference to quarantine and sanitary laws, and has contributed largely to medical literature and sanitary science, etc. F. A. SOULÉ.

**Cha'pin** (WILLIAM), b. in Philadelphia in 1802; engaged in literary pursuits; was commissioner of schools in Yates co., N. Y., for six years; became supt. of the Ohio State institution for the blind in 1840; visited Europe in 1845; was appointed principal of the Pa. institution for the instruction of the blind in 1849; published a report *On the Benevolent Institutions of Great Britain and Paris* (1846), and prepared the article on the blind in the U. S. census of 1860.

**Chapman** (Sir FREDERICK E.), b. in British Guiana in 1816; graduated at the Royal Military Academy at Woolwich, and entered the royal engineers in 1835; became a captain in 1846, and colonel commandant of engineers in 1872; was present at the battles of Alma and Inkerman; during the siege of Sebastopol directed the left attack in the early part of the siege, and later was executive engineer to the army; was frequently mentioned in official despatches, and brevetted major, lieutenant-colonel, and colonel; was created a C. B., officer of the Legion of Honor, and received a medal with three clasps from his own government, besides the Turkish and Sardinian medals, and the 3d class of the Medjidie. He became a major-general in the army in 1867, and lieutenant-general in 1872; was made K. C. B. in 1867; served as governor and commander-in-chief in Bermuda 1867-70; inspector-general of fortifications and director of works 1870-75. Became a general in 1877.

**Chapman** (JOHN A. M.), D. D., b. at Greenland, N. H., Aug. 21, 1830; graduated at Waterville College, Me., in 1854; studied at the Biblical Institute, Concord, N. H.; entered the Methodist Episcopal ministry in 1855; has held pastorates in various towns and cities of New England; was stationed in Boston, Mass., 1863-71, and in Brooklyn, N. Y., 1871-74, taking a leading position in his denomination. In 1871 he received the degree of D. D. from the Wesleyan University, Middletown, Conn.

**Chartres** (ROBERT D'ORLÉANS), DUC DE, b. Nov. 9, 1840, second son of the late duke of Orléans, and grandson of the late King Louis Philippe of France. After the death of the duchess (1858) he entered the military school of Turin. In the war with Austria (1859) the duke served with distinction in the Nice cavalry regiment. (For his services in the civil war in the U. S. in 1861-62 see PARIS, COMTE DE.) Many acts of individual

gallantry are recorded, among which may be noticed the capture on the eve of the battle of Williamsburg of seventeen prisoners. Though an exile when the Franco-German war of 1870 broke out, he succeeded (see biography of the PRINCE DE JOINVILLE), though not until after the catastrophe of Sedan, in serving his country as a captain under the assumed name (that of a dual ancestor) "Robert le Fort." His services, mostly about Rouen and Cherbourg, exhibited his wonted dash and gallantry. Under his borrowed name the duke was proposed by Gen. Chanzy for the grade of chevalier de Légion d'Honneur, which he received. As an officer of the 3d Chasseurs d'Afrique he has more recently served in Algiers. "The duke de Chartres is a soldier whom no one, even at first glance, could mistake." (Yriarte, *Les Princes d'Orléans*.) "He is a cavalry soldier" (officier) "to whom the life of the camp, its alarms, its dangers, and its glory, are necessary, as are its incessant movement, its physical exposures, and even the stern discipline, in which he is in his element." The duke wedded in 1863 the princess Frances Marie Amélie d'Orléans, daughter of the prince de Joinville. J. G. BARNARD.

**Chase** (WILLIAM H.), b. in Massachusetts; graduated at the U. S. Military Academy in 1815; appointed brevet second lieutenant of engineers; first lieutenant 1819, captain 1825, major 1838. The events of the war of 1812 having shown the vulnerability of the ports of the Gulf coast, and especially of the key to its western territory, New Orleans, Chase was assigned to duty for their defence in 1819. FORTS PIKE and MACOMB (which see) were his earliest works. His most important were FORTS PICKENS, McREE, and BARANCAS (which see), for the defence of Pensacola, regarded then as the great naval station of the Gulf. But subsequently, as senior engineer officer, all the works of fortification and of river and harbor improvement (e.g. the Mississippi mouths) came under his supervision. Energetic, observing, but impulsive, there was, moreover, scarce a project connected with the development of the region of his adoption in which he did not take an influential part. The Alabama, Georgia and Florida R. R. (projected 1835, a quarter of a century too early) and the associated commercial development of Pensacola, his home, may be cited. Original and bold in conception, want of early discipline alone impaired the value of his projects. Few men have acquired more or warmer friends. In 1856 he was appointed by Pres. Pierce superintendent of the Military Academy, but resigned Oct. 31 from the army without entering on its duties. He espoused the Confederate cause, and was prominent in the seizure of the Pensacola navy-yard, but subsequently took no part in the war. D. at Pensacola Feb. 8, 1870. J. G. BARNARD.

**Chatfield**, on R. R., Fillmore co., Minn. (see map of Minnesota, ref. 11-G, for location of county), is near Root River, lies partly in Olmsted co., and has an academy. Pop. in 1880, 1166.

**Chau'cey** (JOHN S.), b. in New York; entered the U. S. navy as midshipman in Jan., 1812; was promoted to be lieutenant in 1825, commander 1841, captain 1855, and commodore 1862; in 1822, Chauncey commanded the sloop Peacock, and was engaged in the capture of a fleet of armed pirate vessels off Bahia Honda, Cuba; from 1838 to 1843 and from 1843 to 1847 he was assistant inspector of ordnance; in 1861 he commanded the *Susquehanna*, and was second in command in the engagements of Forts Hatteras and Clark; subsequently in command of blockade on coasts of Virginia and North Carolina. D. at Brooklyn, N. Y., Apr. 11, 1871. GEO. C. SIMMONS.

**Cheape** (Sir JOHN), b. in 1792; entered the royal engineers in 1809; served in the Pindaree war 1815-16, and was present at the siege of Dhamounnee and Mundela, siege of Asseerghar 1818; throughout the Burmese war 1824-26, the Punjab campaign 1848-49, and chief engineer at siege and capture of Mooltan and battle of Goojerat; was second in command in the Burmese war of 1852-53, and in command of the expedition which captured Donaben; succeeded to command of the entire force on the departure of Gen. Godwin, and nominated a K. G. C. B. in acknowledgment of his services; appointed major-general in 1854, lieutenant-general 1859, and general 1866; became colonel-commandant of engineers (late Bengal) in 1844. D. at the Isle of Wight Mar. 30, 1875.

**Cheese** [Lat. *ca'seus*; Ger. *Kü'se*; Fr. *fromage*], a variety of food prepared by coagulating milk, separating the curd, pressing it into forms, and subjecting it to a process of ripening or curing.

The material may be either cow's milk, whole or skimmed, cream, or mixtures of these, or the milk of goats or ewes. Cow's milk, which is generally used, varies considerably in composition (see article MILK); the following is an average of several hundred analyses, made by different chem-

ists: Fat, 3.80; caseine and albumen, 4.37; sugar, 4.54; salts, 0.63; water, 86.66. The following analyses by Alex. Müller show the composition of cream and skimmed milk, and the whole milk from which they were obtained:

	Whole milk.	Cream.	Skimmed milk.
Whole product.....	100.	10.	90.
Fat.....	4.00	35.00	0.55
Caseine and albumen.....	3.25	2.20	3.77
Sugar.....	4.50	3.05	4.06
Salts.....	0.75	0.50	0.78
Water.....	87.50	59.25	90.64
	100.	100.	100.

The proper management of the milk exerts an important influence on the character and flavor of the cheese. The utmost cleanliness is necessary to secure good results. Dirty fingers, pails, vessels, etc. are liable to taint the milk, so that no amount of subsequent care will correct the evil. Unless all the vessels and utensils are washed as soon as they are used, fermentation is liable to occur, which is transferred to the next portion of milk which comes in contact with them. Scalding with boiling water is the most effective method for preventing fermentation. Dirty floors or proximity to pigsties or drains will taint the milk. The milk should always be strained to separate leaves, straws, hairs, etc. which may happen to fall into it during milking, and it should be preserved in a cool room till it is used. Salt or nitre is sometimes added to prevent souring. Some think it well to let the milk sour before it is used for making cheese, but the best cheesemakers prefer to prevent this. The evening milk may be cooled in the cheese-tub by placing in it a tin pail of cold water. A better plan is to use a cheese-vat of tin, surrounded by a wooden vat, the intervening space being supplied with a circulation of cold water. In large establishments special coolers are employed. It is difficult to thoroughly incorporate with the milk the cream which rises during the night; and many prefer to take it off, keep it till the morning milk has been added, and then use it for mixing with the rennet. In many cases, however, it is used for butter.

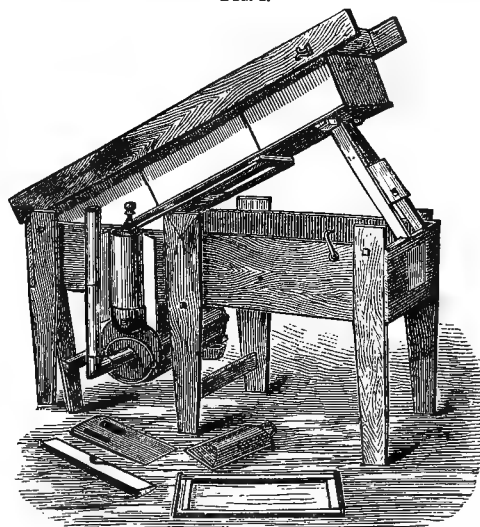
**I. MANUFACTURE OF CHEESE.**—The manufacture of cheese may be subdivided into the following operations: (1) curdling or coagulating the milk; (2) cutting the curd; (3) cooking or scalding the curd; (4) separating the whey; (5) grinding the curd; (6) salting; (7) pressing; (8) curing or ripening.

1. *Curdling or coagulating* may be spontaneous, as in the manufacture of cottage cheese, or it may be produced by the addition of rennet or of acids. In most cases rennet is employed. *Rennet* is the fourth stomach of the sucking calf, the *girling*. It is carefully cleansed without washing, rubbed with salt, stretched, and dried by artificial heat. The stomachs of other animals, as the sheep, pig, etc., are sometimes used. For use, the dried rennet is usually soaked in brine, with or without the addition of spices, in the proportion of one rennet to the gallon. Half a pint of the liquid is sufficient to curdle 70 gallons of milk, one rennet serving to curdle more than 1000 gallons. (For details of the preparation see Arnold's *American Dairying*, p. 347, or Flint's *Milch Cows and Dairy-Farming*, p. 248.) Wilkins (*Landwirthschaftl. Centralb. f. Deutschland*, 1874) prepares rennet essence by rubbing fresh calves' stomachs with salt, treating with water for two days at 100° F. (or a mixture of equal parts of water and Rhine wine), adding to this solution alcohol (90 per cent.) containing a little hydrochloric acid, and allowing the whole to stand eight days. The liquid is then filtered, and will keep for years. His proportions are 6 oz. fresh rennet, 1 oz. salt, 17 oz. water (or wine and water), 2 oz. alcohol, 12 grains acid. One pint of the essence will curdle 250 gallons of milk in thirty to forty minutes. Schatzmann (*Wiener Landwirthsch. Zeit.*, 1873) investigated the action of artificial preparations of rennet, and found them to be very permanent, their action to be reliable and accurate to the minute, and the cheese to separate better, with a higher yield. Hansen (*Landwirthschaftl. Centralb. f. Deutschland*) is said to have prepared rennet from hog stomachs after they had been used for making pepsin, using acid, and obtaining rennet in solution and in the solid form. The action of rennet was formerly explained by assuming that the caseine or curd of milk is held in solution by an alkali, and that rennet acts as a ferment, changing the milk-sugar to lactic acid, which neutralizes the alkali and thus precipitates the curd. This was disproved by Voelcker, who made milk alkaline, and found that rennet still curdled it, although the whey was still alkaline. Heintz (*J. p. Chem.* [2], vi. 374, 384), Hammarsten (*Jahresb. Thier*

*Chem.*, ii. and iv.), and others have shown that the coagulation of caseine does not depend upon the formation of lactic acid; and Hammarsten, that pure rennet does not produce the acid. The latter (*Bul. Soc. Chim.*, 1874, xxii. 352) recognizes three distinct ferments in the mucous coating of the stomach: (1) pepsin, (2) rennet ferment, (3) a ferment which changes milk-sugar into lactic acid. The latter is not precipitated by magnesian carbonate nor by potassic hydrate. Hammarsten also finds that the rennet ferment does not precipitate caseine unless soluble lime-salts are present. L. B. Arnold (*American Dairying*, p. 296) attributes the action of rennet to minute plants (bacteria), and compares the action of rennet to that of yeast. (See article FERMENTATION.) F. Cohn, one of the best authorities on fermentation and bacteria, thinks that rennet ferment is not organized (*Dingl. J.*, 220, 191), as it may be preserved uninjured in alcohol, as it does not increase on keeping, and as a fixed relation exists between the milk and the quantity of rennet necessary for its coagulation.

The use of acids in place of rennet has often been recommended, and hydrochloric acid is said to be used extensively in Holland. It is claimed that cheese made with acids is firmer, sharper to the taste, and keeps longer, and that the acids act with certainty, and give a somewhat larger yield than rennet. On the other hand, they are more expensive than rennet, and the flavor of the cheese is not as good.

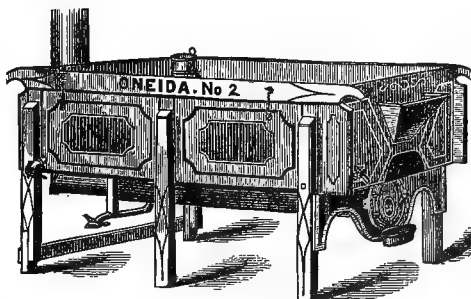
FIG. 1.



Roe's Cheese-Vat.

Warming the milk previous to adding the rennet is absolutely necessary. There is considerable difference of opinion, however, as to the proper temperature, some putting it as low as 72° F., others as high as 98° F. Dr. Voelcker says: "If the temperature of the milk when the rennet is added is too low, the curd remains too soft, and much difficulty is experienced in separating the whey. If, on the other hand, the temperature is too high, the separation is easily effected, but the curd becomes hard and dry." He considers 72° to 75° proper for thin cheeses, but 80° to 84° for thick cheeses like Cheddar. Cheese-vats of various forms (Figs. 1, 2, 3) have been invented to take the place of

FIG. 2.

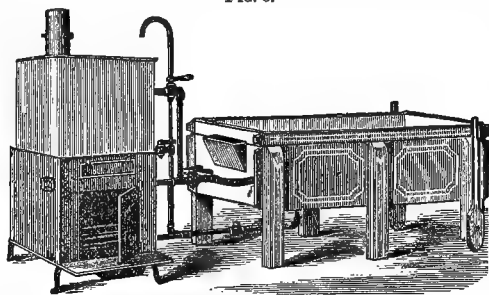


Ralph's Oneida Vat and Heater.

the kettles and caldrons formerly used to hold the milk for warming and the tubs for curdling. They are generally

provided with a water-jacket for applying heat, and are also arranged so that one end can be elevated to drain off the whey. When the milk has reached the proper temperature, enough rennet is added to curdle it in thirty to forty

FIG. 3.

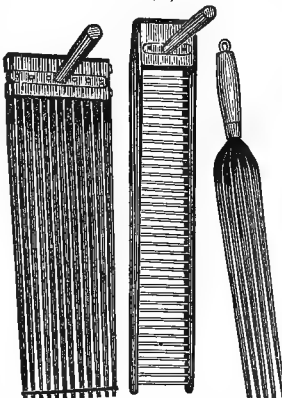


Millar's Portable Vat and Heater.

minutes; after it is stirred in, the milk is allowed to remain quiet until it solidifies. Care is taken to avoid jarring it, as it would prevent perfect cohesion. The rennet converts the entire mass into a tremulous jelly.

2. *Cutting the curd*, in order to enable the whey to separate, is the next step. This was formerly accomplished by hand or with the aid of a flat wooden ladle. The mass was cut into thin slices, and then further reduced with a wooden stirrer. Great improvements have been made in the cutting of the curd by a series of American inventions. First came the introduction of a frame of crossed brass wires; then the tin breaker, formed in checks, which was pushed down into the curd, cutting it into long, square vertical strips; the final improvement consisted in the use of the steel gang-knife. Two of these are used; one cuts the curd into perpendicular columns, the other, the horizontal gang-knife, cuts these into cubes. It is found that when the curd is cut with sharp steel knives, the tendency of the fat to go into the whey is prevented. Greater uniformity in the curd can also be secured by the use of the gang-knives, and a larger yield of cheese. (Figs. 4, 5, 6.)

Figs. 4, 5, 6.



Gang-knives for cutting the curd.

3. *Cooking or scalding* the curd simply means slightly raising the temperature to from 98° to 100° F. Sometimes, after the curd has settled, a portion of the whey is taken out, heated to the proper temperature, and poured back upon the curd. In other cases heat is applied to the outside of the vat by steam or direct heat. During this operation the curd is well stirred. The curd gradually becomes sour; and when it is sufficiently acid, and it has acquired the proper consistence, the whey must be drawn off.

4. *Separating the whey*, or "wheying off," is effected in various ways. It may be dipped out of the tub, piling the curd up against the side for greater convenience; the curd may be ladled out into a cloth which is suspended over the tub and serves as a strainer; a perforated strainer may be run down into the corner of the vat, and a cork drawn out of the bottom to let the whey out; the vat may be tilted up to cause the whey to drain down and out at one end.

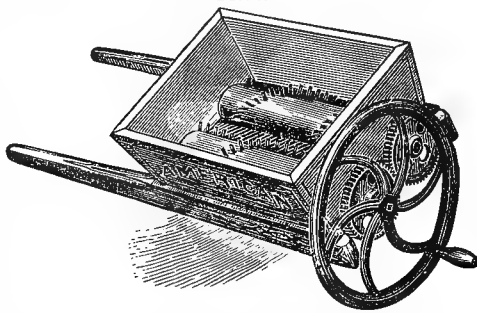
The whey from curd which has been properly cut and handled is nearly as bright and clear as Rhine wine, and of a yellowish-green color; but when the curd has been carelessly broken up, the whey will be more or less milky, and a large quantity of curd will separate from it on standing. This curd is of the choicest character, as it is specially rich in butter. "When the white whey runs, the richness of the cheese passes off." In any case the whey will send up a certain amount of cream on standing, which is collected and made into whey-butter. The whey is drunk as a beverage, fed to hogs, or evaporated for the extraction of milk-sugar. The following analyses of whey are selected from a large number which have been made by Voelcker (see Willard's *Practical Dairy Husbandry*, p. 319):

ANALYSES OF WHEY.

	1.	2.	3.	4.
Fat.....	0.68	0.49	0.29	0.14
Caseine, albumen, etc.....	0.81	1.43	0.93	0.76
Sugar and lactic acid.....	5.28	4.49	5.03	5.31
Salts.....	0.58	0.64	0.90	0.69
Water.....	92.65	92.95	92.85	93.10
	100.	100.	100.	100.

5. *Grinding the curd* in a curd-mill or curd-breaker is resorted to in order to make it fine and uniform, for the sake of even salting and to hasten the cooling. (Fig. 7.)

FIG. 7.



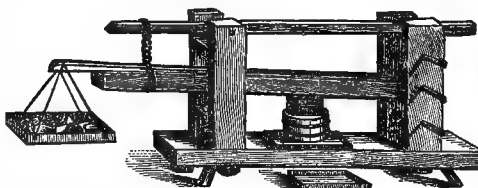
Ralph's American Curd-mill.

6. *Salting* the curd is practised to check and regulate the fermentation of the cheese during the ripening. It is specially necessary in lean cheeses, made from skimmed or half-skimmed milk. Rich cheeses, such as Stilton and cream Cheddar, may be made without salt, as the large amount of butter in them sufficiently preserves the caseine. The proper quantity of salt to be used is from 1 to 2 per cent.; more than the latter quantity is objectionable, as it prevents ripening, though some use as much as 3 or 3½ per cent. The saline taste of old cheese is not due to the salt added, but to the ammonia-compounds formed during the ripening; consequently, over-salted cheese does not taste as salt after six or eight months as under-salted cheese kept the same length of time. The salt must be fine, and must be evenly mixed with the curd. Its purity is a matter of great importance. The objectionable impurities are the magnesian and calcic chlorides, especially the former, on account of its bitter taste. Formerly, Ashton and other imported brands were preferred by the best cheesemakers, but since the beautiful process for purifying salt, invented by Dr. C. A. Goessmann, was put in practice under his direction by the Onondaga Salt Company at Syracuse, a salt of unsurpassed purity has been furnished by that company under the name of *factory-filled dairy salt*. Sometimes the salt is applied to the curd in the whey or to the outside of the pressed cheese, either in the form of brine or by rubbing in the fine salt; but the best results are obtained by mixing the dry salt with the curd.

*Saltpetre*, added in small quantities, three or four pounds to the barrel of salt, has long been used in some English dairies, and is said to aid in preserving the flavor of the cheese and to improve its keeping qualities.

*Coloring cheese* is often practised to meet the demands of certain markets. The material employed is annatto, the product of the orellan tree (*Bixa orellana*). It is most conveniently employed in the form of a solution in potash.

FIG. 8.



Old-fashioned Log-Press.

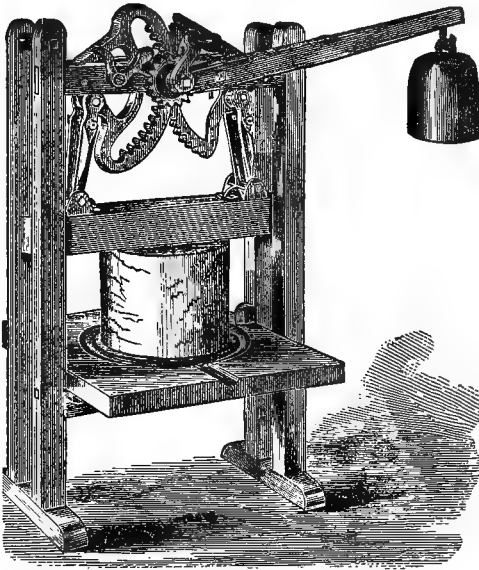
It is added to the milk just before the rennet is introduced. In summer the desired color can be given to cheese by simply allowing the curd to remain in the vat or tub exposed to the air for a short time.

7. *Pressing* expels most of the remaining whey, and consolidates the curd into the desired form. Hoops and cloths are employed, and the cheese is turned during the operation and the bandage properly adjusted. Many different presses are in use: lever presses, screw presses, etc. (Figs.



8, 9, 10, 11.) Horizontal gang-presses are now coming into general use. Eighteen to twenty-four hours is the

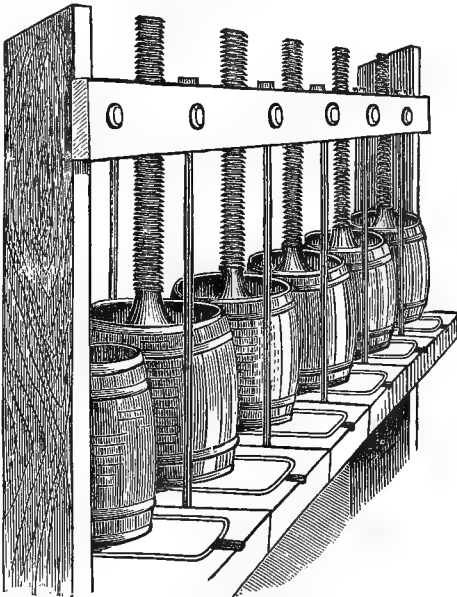
FIG. 9.



Oyston's Herkimer County Press.

usual time of pressing. The form of the cheese is determined by the diameter and height of the hoop. The

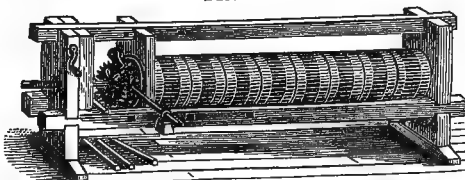
FIG. 10.



Factory Presses.

cheese is taken from the press to the curing-room. There it is turned occasionally and rubbed with hot whey-butter, to prevent the rind from cracking.

FIG. 11.



Frazer's Horizontal Gang-Press.

8. *Curing or ripening.* As the product comes from the press it cannot properly be called cheese. It is a tasteless, insipid, chalky mass, consisting of caseine, fat, and a small portion of the whey. In order that it may acquire the characteristics of cheese, the sharp taste, and peculiar odor, it must be kept a long time, and allowed to undergo

a process of fermentation or putrefaction involving a decomposition of the caseine, fat, etc. The extent and character of the changes during this ripening process depend upon the intentional or accidental conditions to which the cheese is exposed from the milking of the cow to the day the cheese is consumed. The peculiarities of the cheese of different localities depend upon the predominance of one or another of these conditions. The fresh acid curd, which is chalky and pulverulent in the fresh cheese, becomes yellow and translucent on standing, acquires the peculiar odor of cheese, and becomes alkaline.

Generally, the more compact the curd is made by the use of a high temperature during coagulation, the more completely the whey is removed, and the more carefully the access of air is prevented during ripening, the more slowly will the process proceed, and the resulting product will have little tendency to change; it will dry up to a horn-like mass and exhibit a mild and pleasant aroma. The so-called "hard cheeses" are of this character.

On the other hand, the lower the temperature during coagulation, or the use of spontaneous coagulation, and the more whey there is left in the cheese, the sooner will the ripening be completed; the resulting cheese will be soft, and may even deliquesce to a smeary mass having a very strong smell. By variations between these extremes all the different varieties of cheese are produced. Excess of salt retards ripening by its antiseptic properties. The softening of cheese during the ripening is due to a decomposition of the caseine, resulting in the formation of ammonia, which unites with unchanged caseine, forming an ammoniac caseate soluble in water. Well-ripened cheese is largely soluble in water chiefly for this reason, while new cheese is insoluble. The peculiar substances tyrosine and leucine ( $C_6H_{13}NO_2$ ) are also produced during the ripening by the decomposition of the caseine; to the amount of several per cent. of the cheese, sometimes. The fats of the butter are also involved in the decomposition, and by combining the elements of water develop fatty acids, as butyric, valeric, caproic, caprylic, capric, palmitic, stearic, oleic, etc. These combine partly with ammonia, forming salts, partly with caseine to form acid albuminates, and are partly reduced to alcohol radicals, which, replacing hydrogen in ammonia, appear as amines; butylamine, amylamine, etc. These amines, like ammonia, combine with caseine, forming butylamine-caseate, amylamine-caseate, etc. The number of these decomposition products already recognized, or whose formation is highly probable, is extremely large. They exert an important influence on the character of the cheese, and in some cases give rise to odors and flavors which are by no means acceptable to all. Old Limburg cheese is especially rich in valeric acid and amylamine. It has even been proposed to prepare the above-mentioned acids, amines, etc. artificially, and use them to imitate the different varieties of cheese, as fruit-syrups are now made artificially. The whey left in the cheese contributes its decomposition products. The lactic acid converts the milk-sugar into galactose, and this undergoes vinous fermentation, forming carbonic acid gas, which expands the cheese, producing cavities. This cellular character can be exaggerated by adding sugar to the curd. The conversion of milk-sugar into butyric acid may also produce cells by the formation of carbonic acid gas. Salt retards butyrous fermentation; hence very salt cheese is not cellular. This is the case with most Dutch cheese. Blondeau (*Dingl. J.*, 172, 309) and others have asserted that caseine is changed into fat during the process of ripening, but this has been disproved by Brassier (*Ann. Chim. et Phys.* (4), v. 270) and A. Müller (*Landw. Jahrbücher*, 1, 68). Brassier experimented on skim-milk curd prepared with rennet, and gives the following among his results, which serve to show the changes during ripening. The numbers refer to 100 parts of fresh cheese in each case. The third column represents the case in which 5 parts of salt were added:

	Fresh cheese.	Cheese unsalted, after 4 months.	Cheese salted, after 7 months.
Fat.....	22.26	15.64	13.25
Caseine.....	32.07	28.34	22.35
Milk-sugar.....	3.82	None.	None.
Leucine.....	None.	3.43	} 11.14
Other bodies sol. in alcohol.....	None.	2.79	
Ammonia.....	Trace.	0.65	1.07
Salts.....	0.75	0.75	0.75
Water.....	41.10	19.73	18.68
Salt added.....	None.	None.	5.00
Weight of cheese.....	100.	71.33	72.24
Loss in weight.....	.....	28.64	32.76
Original weight.....	100.	100.	105.

F. Cohn has investigated the ripening of cheese (*Dingl. J.*, cxxx. 191), and believes it to be a true fermentation caused by bacteria. (See article FERMENTATION.)

For the proper ripening of cheese, curing-rooms must be used which are well ventilated, free from dampness, and of a uniform temperature—not above 75° nor below 60° F. Moreover, the cheese must be turned often, especially in the beginning.

The American system of associated dairies—"the factory system"—originated with Jesse Williams and his two sons in 1852 at Rome, Oneida co., N. Y. It extended slowly at first, but became very popular when its advantages were fully understood. At present more than seven-eighths of all the cheese made in the U. S. is made in the factories. Much skim-cheese is now made in the butter-factories. The census of 1880 gives the total number of cheese-factories and of butter-factories in the U. S. as 3932, of which 1652 are in N. Y. The number of cheese-factories is not given. The factory is organized by a neighborhood of farmers, who furnish the milk and are credited for the number of pounds of milk supplied. A manufacturer takes charge of the factory as the agent of the farmers, and makes the cheese, which is sold, the proceeds being divided *pro rata* after deducting expenses. In some cases the factory is organized as a stock company, the stock being held by the farmers, but the company paying a certain price for milk. C. L. Flint says: "The factory system has relieved the farmer's family from much drudgery; it has brought the principles of commerce to the farmer's door; has educated him more or less to a knowledge of the favorable influences on price of a uniformity of product, and the great gain to be derived from associated effort. It has rendered possible, and originated, associations for the advancement of dairy interests, where not only the aids of practice and science, but the methods of each, have been brought to the attention of all."

The most profitable cheese for the farmer to make is shown by the experiments of Voelcker and Goessmann to be obtained by skimming off a portion of cream for the manufacture of butter. The sale of this cheese, together with that of the butter, yields a larger return than could be obtained by making whole-milk cheese and no butter. Voelcker obtained the largest return by skimming the morning milk after twenty-four hours, the evening milk after thirty-six hours. The cheese contained—fat, 27.08; caseine, 30.37; extractive matters and lactic acid, 0.22; salts, 2.90; water, 39.43. Goessmann obtained the largest return by skimming after twelve and twenty-four hours.

II. COMPOSITION OF CHEESE.—The composition of cheese has been already discussed in several of the preceding paragraphs, especially in that on *curing*. No detailed quantitative analyses have been made, and it is doubtful if they can be made with any accuracy. The number of different constituents in cheese, especially when well ripened, is so large that their accurate separation and estimation is practically impossible. For purposes of comparison a rough approximate analysis is made by extracting with ether, and calling all the matter extracted fat, determining the nitrogen in the remainder, multiplying it by 6.25, and calling the result caseine. The water is determined by drying at a constant temperature, the salts by burning and weighing the ash. The following analyses by Voelcker exhibit results thus obtained; the portion soluble in water is recorded as extractive matter, after deducting the salts it contained:

CHEESE ANALYSES (Voelcker).

	Cream and milk.	Whole milk.	Partly skimmed.	Skimmed.
Fat.....	41.58	28.91	29.25	27.08
Caseine.....	23.38	25.00	29.87	30.37
Extractive matter.	2.45	4.91	4.92	0.22
Salts.....	2.06	3.33	3.08	2.90
Water.....	30.53	37.85	32.88	39.43
	100.	100.	100.	100.

The mould on and in old cheese consists of a few common species of green, blue, and red fungi, such as *Penicillium glaucum*, *P. globulosum*, *Torula viridis*, *T. aurianticaea*, etc. (See articles FUNGI, MILDEW, and MOULD.)

Cheese-mites, which appear on some kinds of old cheese as a light buff dust, are known as *Acarus domesticus* or *A. siro*. They are of the same genus of the Arachnidae as the sugar-mites. (See article SUGAR.) They are harmless.

SKIPPERS, called also *hoppers* and *jumpers*, are the larvae or maggots of the cheese-fly, *Piophilæ casei*, which lays its eggs in the cracks or on the surface of the cheese. This fly is about half as large as the ordinary house-fly. Care and cleanliness are the only means for preventing its inroads; frequent turning, rubbing, brushing, etc.

Poisonous cheese is occasionally noticed. The chemical nature of the poison, which is very violent in its action, has never been determined; it is probably analogous to the "sausage" and "corned-beef" poisons. All of these poisons are now supposed to be due to bacteria, and result from an unusual kind of putrefaction. (See article GERM-THEORY OF DISEASE.)

III. VARIETIES OF CHEESE.—The varieties of cheese are innumerable. They differ (1) according as they are made from cream, whole milk, skimmed milk, or mixtures; (2) as spontaneous, rennet, or acid coagulation is practised; (3) as high or low temperatures are employed in curdling and scalding; (4) as the whey is more or less completely removed; (5) with the manner of ripening. Some are soft, as cottage and cream cheese, Neufchâtel, Limburg, etc., and will not keep long; some hard, as Cheshire, Gloucester, Cheddar, Parmesan, Dutch, and most American; some intermediate, as Gruyère and Stilton.

Sour-milk cheese, called *cottage*, *pot cheese*, *Dutch cheese*, or *curds*, is the curd of sour milk drained from the whey and pressed into moulds. It is sometimes flavored with sage. It is eaten fresh.

Full-cream cheese is prepared from cream curd drained in a cloth. It must be eaten fresh, as it will not keep long. Neufchâtel, Brie, Vaschein, Cotherstone, cream Cheddar, and Yorkshire Stilton belong to this class. Neufchâtel and Brie are now manufactured in large quantities in New Jersey.

Half-cream cheese is made from a mixture of the cream from the evening milk and the whole of the morning milk, or about one quart of cream to ten quarts of milk. Stilton and rich double Gloucester cheese are made in this way. Great care is required in making them.

Whole sweet-milk cheese is very extensively manufactured, and includes many of the best-known varieties, as the best Cheddar, Cheshire, Wiltshire, Gloucester, and other English cheeses, the Edam and Gouda cheese of Holland, the Gruyère and Jura cheese of Switzerland. Much of the cheese made in the American factories is made of whole milk, and approximates most nearly to Cheddar in its method of manufacture and its character. Gruyère and Jura are known in the U. S. as Schweitzerkäse. This is now made in Oneida co., N. Y., in Ohio, and elsewhere. It is a tough cellular cheese, with a sharp taste and strong odor. Limburg cheese is a soft cheese, formed at a low temperature and slightly pressed. It is eaten in a state of putrefaction, and is very offensive to persons who have not acquired a taste for it. New York, Ohio, Illinois, and Wisconsin manufacture considerable quantities of it for the German population. Swiss Schabzieger cheese is made by working the fermented curd into a paste with powdered zieger-kraut, *Mellilotus corulea*.

Cheese from partly-skimmed milk is largely manufactured under all the names mentioned under whole milk. There is always a tendency in the dairy to rob the milk of some of its cream for butter.

Skim-milk cheese is also extensively manufactured in all countries, and sold often under the name of whole-milk cheese. It is generally harder and more translucent and horn-like than other cheese. Sometimes the milk is skimmed three times, and yields a cheese which becomes so hard in a short time that a pickaxe must be used to break it. By allowing the curd of skim milk to ferment somewhat, and by leaving considerable whey in it, softer cheese is obtained. Such is the offensive German hand-cheese. Parmesan cheese is made from skim milk.

Oleomargarine cheese, devised by H. O. Freeman of Sherburne, N. Y., has recently been extensively manufactured. It is made by replacing the fat removed in the cream with oleomargarine made from beef suet. The oleomargarine is melted and added to the skim milk, which has been previously heated to 94° F., and colored with annatto. Rennet enough is then added to curdle in eight or ten minutes. Only about 1½ pounds of oleomargarine are retained by 100 pounds of milk. When skillfully made, this cheese appears rich and well-flavored, and passes for fair whole-milk cheese.

Lard cheese has recently been manufactured in New York and other States. It is similar to oleomargarine cheese, being made from skimmed milk and lard.

Goat's and sheep's milk cheese is made in some localities. The most familiar cheese of this kind is the Roquefort. This is a French cheese made from either goat or sheep milk, the specific qualities of which are largely due to the peculiar caves in the Jura limestone in which it ripens at a very low temperature.

As will be seen by the following statistics, the total amount of cheese manufactured on farms in the U. S. bears but a very small proportion to the immense quantity made in factories. This proportion is constantly diminishing, owing to the great superiority of the factory-system:

IV. STATISTICS.—*Cheese produced on Farms in the U. S. (Census of 1880), in Pounds.*

Alabama.....	14,091	Louisiana.....	7,618	Ohio.....	2,170,245
Arizona.....	18,360	Maine.....	1,167,730	Oregon.....	153,198
Arkansas.....	26,301	Maryland.....	17,416	Pa.....	1,008,686
California... 2,566,618	Mass.....	829,528	R. I.....	67,171	
Colorado.....	10,867	Michigan.....	440,540	S. C.....	16,018
Conn.....	826,195	Minnesota.....	523,138	Tennessee.....	98,740
Dakota.....	39,437	Mississippi.....	4,239	Texas.....	58,466
Delaware.....	1,712	Missouri.....	283,484	Utah.....	126,727
Florida.....	2,406	Montana.....	55,570	Vermont.....	1,545,789
Georgia.....	19,151	Nebraska.....	230,819	Virginia.....	85,535
Idaho.....	20,295	Nevada.....	17,420	Wash.....	109,200
Illinois.....	1,035,063	N. H.....	807,076	W. Va.....	100,300
Indiana.....	367,561	N. J.....	66,518	Wisconsin.....	2,281,411
Iowa.....	1,075,988	N. Mex.....	10,501	Wyoming.....	2,930
Kansas.....	483,987	New York.....	8,362,590	Total.....	27,272,489
Kentucky.....	58,468	N. C.....	57,380		

215,885,361 pounds of full cream and skim-milk cheese were made in the U. S. in factories in the census year 1880, making the total cheese-product 243,157,850 pounds.

V. LITERATURE.—F. D. Curtis, *Hints on Cheesemaking* (Utica, 1871); X. A. Willard, *Practical Dairy-Husbandry* (New York, 1872); C. L. Flint, *Milk Cows and Dairy-Farming* (Boston, 1874); X. A. Willard, *The Practical Butter-Book* (New York, 1875); L. B. Arnold, *American Dairying* (Rochester, 1876); Benno Martiny, *Die Milch* (Danzig, 1871); C. Husson, *Le Lait* (Paris, 1878); I. J. Ellerbrock, *Die Holländische Rindviehhucht und Milch-wirtschaft* (Braunschweig); W. Fleischmann, *Das Molke-reiswesen* (Braunschweig, 1877); Johnston's *Chemistry of Common Life* (New York, 1870); Knapp, Ronalds, and Richardson, *Chemical Technology* (vol. iii., London, 1851); Payen, *Précis des substances alimentaires* (4th ed., Paris, 1865); Ure's *Dictionary* (London, 1867); Bolley, *Handbuch der Chem. Tech.* (Bd. iv., 1867); Muspratt's *Chemistry* (London, 1850); Muspratt's *Chemie* (3te Auf. Bd. iii. (Braunschweig, 1876); Hassall, *Food and its Adulteration* (London, 1876); *The American Dairymen* (New York, weekly); *The Milk Journal* (London, monthly); *Milch Zeitung* (Bremen, weekly); *Annual Reports of the Department of Agriculture*; *Transactions N. Y. State Ag. Soc.*; *An. Reports Am. Dairymen's Association*; *An. Reports Butter and Cheese Exchange of N. Y.*; *An. Reports N. Y. Produce Exchange*; *J. Roy. Ag. Soc. England*; *Wagner's Jahrb. Tech. Chem.*; *Hoffmann's Jahrb. Ag. Chem.* (For lists of 155 references to special articles see *Die Milch* by Martiny, vol. i. p. 417; vol. ii. p. 324.) C. F. CHANDLER,

**Chehalis**, cap. of Lewis co., W. T. (see map of Washington Territory, ref. 4-B, for location of county), on R. R. and Chehalis River. Pop. not in census of 1880.

**Cheiron** (Χείρων), one of the Centaurs, is the noblest specimen of a combination of the human and animal forms created by the Greek imagination. Generally, the centaur expresses the sensual and savage features of a man combined with the strength and swiftness of a horse; but to these qualities Cheiron added justness, wisdom, and kindness. Having been instructed by Artemis and Apollo in hunting, gymnastics, music, and medicine, he in his turn became the instructor of many heroes—Achilles, Heracles, and others—in these arts. Together with the other Centaurs, he was expelled by the Lapithæ from Mount Pelion, but sacrifices continued to be offered to him even after his expulsion by the Magnesians; and the family of the Cheironidæ, living in that neighborhood and distinguished for knowledge in medicine, was said to descend from him.

**Chelsea**, Washtenaw co., Mich. (see map of Michigan, ref. 8-J, for location of county), is on Michigan Central R. R., 22 miles E. by N. of Jackson. Pop. in 1870, 1013; in 1880, 1160.

**Cherea** (CASSIUS), the murderer of Caligula, is first mentioned during the revolt of the German legions after the death of Augustus, when he escaped the general massacre of the centurions by his brilliant valor and intrepidity. As tribune of the prætorian guard he afterward became one of the principal members of the conspiracy against Caligula, and when the emperor, on Jan. 24, 41 A. D., returned from the theatre, where he had been present at the games celebrated in honor of Augustus, it was Cherea who in the long gallery of the palace gave Caligula the first blow. He supported the senate in its attempt to establish the republic, but in the mean time the prætorian guard had declared Claudius emperor, and the next day Cherea was executed.

**Cherokee**, city and R. R. junction, Crawford co., Kan. (see map of Kansas, ref. 8-K, for location of county). Pop. in 1880, 556.

**Cherry Vale**, city and R. R. junction, Montgomery co., Kan. (see map of Kansas, ref. 8-I, for location of county). Pop. in 1880, 690.

**Ches'ney** (CHARLES CORNWALLIS), b. in England in

1829; entered the British army as second lieutenant in the corps of royal engineers; became lieutenant-colonel in 1868 and brevet colonel 1873. Although he bore an excellent reputation as an officer of engineers, it is by his contributions to military literature his name is best known. He was for many years professor of military art and history at the Staff College, Sandhurst. In 1863 he published his *Campaigns in Virginia*; in 1865 his *Waterloo Lectures*; in 1870, jointly with Mr. Reeve, *Military Resources of Prussia and France*; in 1870 his *Military Biographies*, contributed mainly to the *Edinburgh Review*, including essays on Gens. Grant, Lee, and others, were published in 1 vol. D. Mar. 19, 1876.

**Chevaux-legers** ("light-horse") was the name of a company of light cavalry created by Henry IV., and used by him as a kind of household troops. The company consisted originally only of 240 men, all noblemen, and ranked next the *garde du corps*. Afterward several other companies were added, and the name became very celebrated until, in 1779, it disappeared from the French army-rolls, the companies having been incorporated with the regular regiments of dragoons. Meanwhile, the name had crossed the Rhine, and not only the minor princes of Germany, but even Austria, created companies of chevaux-legers. The name is frequently met with in the Napoleonic wars, and was much endeared in Germany, but has now disappeared there too.

**Chézy, de** (ANTOINE LÉONARD), b. at Neuilly Jan. 15, 1773; was educated in the Polytechnic School of Paris; studied Arabian, Persian, and other Oriental languages under Sacy and Langlès; was appointed to accompany Napoleon to Egypt in 1799, but fell sick in Toulon, and was compelled to return home; became conservator of the Oriental manuscripts in the National Library in 1799, and professor of Sanskrit in the Collège de France in 1814, and made a translation of *Medechun and Leila* in 1807, and of *Sacuntala* in 1830. D. in Paris Aug. 31, 1832.

**Chris'tiancy** (ISAAC P.), b. at Jamestown, Montgomery co., N. Y., Mar. 12, 1812; went to Monroe, Mich., in 1836, and was admitted to the bar in that place in 1838; was a delegate to the Free-Soil convention which nominated Martin Van Buren to the Presidency, and was one of the founders of the Republican party in Michigan; served two terms in the Michigan senate; was editor for a year of the *Monroe Commercial*, and in 1857 was elected a judge of the supreme court of the State; was re-elected in 1865, and again in 1873, both times without opposition. In Jan., 1875, he was elected U. S. Senator from Michigan. Resigned Feb. 10, 1879. J. B. BISHOP.

**Christian Union Churches** is the name adopted by a denomination which first came together in convention at Columbus, O., in 1863, though the organization was not completed until 1865. Their principles, as stated by themselves, are—(1) the oneness of the Church; (2) Christ the only Head; (3) the Bible the only rule of faith and practice; (4) good fruits the only condition of fellowship; (5) the repudiation of controversy; (6) each local church governs itself; (7) no preaching of partisan politics. Their motto is, "In things essential, unity; in non-essentials, liberty; and in all things, charity." They practise baptism as a condition of membership, but are practically unrestricted in their communion. They have about 30,000 members and an adherent population of about 150,000, principally in Ohio, Indiana, Michigan, Iowa, Illinois, Missouri, Arkansas, Texas, Nebraska, and Kansas. There is some probability of their absorbing the general convention of Christians of the South, a branch of the Christian Connection, which holds to similar views. They have one newspaper, *The Christian Witness*, published at McArthur, O., and have issued several books and tracts. They are active in revival and missionary work. L. P. BROCKETT.

**Chris'tie** (WILLIAM D.), b. in 1815, and after thorough collegiate training became a member of the bar in 1840. He quickly distinguished himself, and enjoyed many distinctions. In 1842 he gained a seat in Parliament, which he held until 1847, for Weymouth, Dorsetshire. He entered the diplomatic service, and continued in it until 1870, holding last the important post of minister plenipotentiary at the court of Brazil. D. in 1874. His last years were spent in England in literary labors, one of which is *Life of the First Earl of Shaftesbury*. J. H. WORMAN.

**Church** (JOHN ADAMS), E. M., b. Apr. 5, 1843, at Rochester, N. Y.; graduated in 1867 at the School of Mines in New York City. After three years of professional travel in Europe, he published in 1871 a pamphlet on *Mining Schools in the United States*, in 1873 *Notes on a Metallurgical Journey in Europe*, and in 1880 *The Comstock Lode*, the material for which was obtained during an examination made for one of the government surveys. Mr. Church has

contributed largely to recent technical literature, and was for two years associate editor of the *Engineering and Mining Journal of New York*. From 1872 to 1874 he filled the chair of mineralogy and metallurgy in the School of Mines, and is now engaged in the active practice of his profession.

**Cigna'ni** (CARLO), b. at Bologna in 1628; studied painting under Francesco Albani; spent several years in Florence and Rome; was made director of the Clementine Academy in 1708 by Pope Clement XI. D. at Forlì Sept. 6, 1719. His principal pictures are frescoes in the cathedral of Forlì, the church of St. Michael in Bologna, and the Farnese Palace in Florence. Among his oil-paintings is a *Joseph and the Wife of Potiphar*, which was often copied by himself and pupils.

**Cinq-Mars, de** (HENRI COIFFIER DE RUZÉ), MARQUIS, b. in 1620; came to the court in 1639 as a protégé of Richelieu, who intended to make him the favorite of the king, in order to use him as a spy. The cardinal, however, mistook the young man. Cinq-Mars, proud, noble, and brilliantly gifted, had an ambition of his own, and a deadly hatred soon sprang up between the favorite and the minister. Cinq-Mars joined the Orleans party, a conspiracy was formed for the overthrow of Richelieu, and an alliance was concluded with Spain. Meanwhile, the cardinal had watched the movement from the very beginning, and just as the conspiracy was ripe to enter into action he laid all its traitorous documents before the king, and had Cinq-Mars and his friend De Thou arrested at Narbonne June 13, 1642. In order to save himself, the duke of Orleans confessed all, and Cinq-Mars was executed at Lyons Sept. 12, 1642. Alfred de Vigny has given a very interesting description of his life and character in his romance, *Cinq-Mars, ou une Conjuration sous Louis XIII.*

**Cisco**, Eastland co., Tex. (see map of Texas, ref. 3-G, for location of county), at junction of Houston and Texas Central and Texas and Pacific R. R., 315 miles W. by S. of Fort Worth. Pop. not in census of 1880.

**City Island**, Westchester co., N. Y. (see map of New York, ref. 7-B, for location of county), is situated in Long Island Sound a few miles E. of New York, and is occupied by that city for public institutions. Pop. in 1880, 989.

**Clai'borne** (JOHN HERBERT), A. M., M. D., b. in Brunswick co., Va., Mar. 10, 1828; studied medicine at the University of Virginia and in Jefferson Medical College, Pa.; was a delegate, then a senator, to the Virginia general assembly; entered into the Confederate service as a surgeon in 1861; organized in 1862 the general hospitals of Petersburg, of which he became chief executive officer, and settled in that city.

PAUL F. EVE.

**Clai'borne, Clayborne, or Cleborne** (WILLIAM), b. in England about 1585, was the second son of Sir Edmund Cleburne of Cleburne Hall, Westmoreland; was appointed by Charles I. his secretary of state for the dominion of Virginia Mar. 4, 1626, and treasurer of Virginia for life Apr. 6, 1642. He discovered, purchased, and planted Kent Island in 1631, and owned a large portion of the land upon which Annapolis now stands. He battled for his rights against Lord Baltimore with varying success until 1651, when he withdrew into Virginia, and was appointed by Cromwell a commissioner for the reduction of the colonies. Recent investigations into colonial history prove him to have been the victim of court-favoritism, injustice, and misrepresentation. He has been styled "the champion of Virginia" and the "evil genius of Maryland." D. about 1676.

C. J. HUBBARD.

**Clark**, on R. R., cap. of Clark co., Dak. (see map of Dakota, ref. 6-F, for location of county). Pop. in 1880, 25.

**Clarke** (ANDREW), SIR, entered the corps of royal engineers June 19, 1844, in which he became a captain in 1854, lieutenant-colonel in 1867, and a full colonel in 1877; was acting secretary of the British government in Van Diemen's Land 1851-52, and surveyor-general and chief commissioner of crown lands in Victoria 1853-58. In 1856 he became an executive councillor and member of the first cabinet in the latter colony, and in 1858 was strongly urged to accept the premiership, but declined. For his distinguished services in successfully inaugurating the new government in the young colonies, and for his vigorous and sagacious administration during the period of excitement which followed the discovery of gold, he was subsequently created a knight commander of St. Michael and St. George. In 1863 he made an inspection of the west coast colonies. In 1864 he was appointed director of engineering and architectural works of the navy under the admiralty, and as such designed and executed the great docks at Malta and Bermuda, also the extensive new works at Portsmouth, and

other enormous works connected with the extension of the principal dockyards, until 1873, in which year he was appointed governor of the Straits Settlements, including Penang, Singapore, and Malacca. In 1875 he relinquished this office, and became minister of public works, and member of the council of the governor-general in India. For his services at the admiralty he was created a C. B. in 1869.

**Clarke** (WILLIAM TRAVIS), b. at Walpole, Mass., Oct. 1, 1829; educated for the pulpit at Meadville and Cambridge; ordained at Hingham, Mass., in 1855, and afterward preached at Haverhill and Chelsea; removed to New York in 1866, and edited the *Liberal Christian* till 1870; associate and afterward sole editor of the *Golden Age* till its discontinuance, Oct., 1875; gathered a Liberal society known as the Unity Chapel Congregation in 1869, of which he was the pastor till the close of 1876; editorially connected with the *Daily Graphic* from its start, Mar., 1873, to 1876, when he became associated with the New York *Evening Express*. From early in 1882 until his death, Dec. 11, 1883, he was editorially connected with the New York *Star*. Several of his discourses have been published, and he contributed largely to magazines and newspapers.

**Clarkson** (ROBERT A.), BISHOP, born in Gettysburg, Pa., in 1826, was educated for the ministry; graduated from a Pennsylvania college and went to the theological school of St. James College, Md., from which he received a diploma in 1848; was soon after appointed rector of St. James Episcopal church, Chicago, and held that position until 1865, when he removed to Omaha and became bishop of Nebraska and Dakota. He was instrumental in establishing about fifty Episcopal churches in his diocese, and was for about twenty-five years trustee of the Racine and Neosho colleges, in Wisconsin. D. Mar. 10, 1884.

**Clayton**, cap. of Rabun co., Ga. (see map of Georgia, ref. 1-H, for location of county). Pop. in 1880, 180.

**Clayton-Bulwer Treaty, The**, was concluded between England and the U. S., and signed in Washington Apr. 19, 1850. It related to the establishment of a communication between the Atlantic and Pacific oceans by means of a ship-canal across the Isthmus of Panama, and consisted of nine articles, the contracting parties declaring that they would not erect fortifications on the banks or in the vicinity of the proposed canal, that they would not assume dominion over Nicaragua, Costa Rica, the Mosquito coast, or any part of Central America. Opposite and contradictory constructions having been placed upon this treaty by England and the U. S., another, called the Dallas-Clarendon treaty, was signed in London Oct. 17, 1856. But, as objections to it were raised on both sides of the Atlantic, it was ultimately rejected, and the President in his message of 1857 recommended the abrogation of the Clayton-Bulwer treaty as the best method of solving the difficulty.

**Cleve'land** (ORESTES), b. at Duaneburg, Schenectady co., N. Y., Mar. 2, 1829; came to New York in 1844, and entered the service of an importing fancy-goods house; became a partner in the business in 1854; withdrew in 1858; bought out the partner of his father-in-law, Joseph Dixon of Jersey City, manufacturer of crucibles and graphite articles, and developed the Dixon Crucible Co. to one of the largest and most successful establishments of the kind; was elected mayor of Jersey City in 1864, and re-elected in 1865 and 1866, and was elected to the 41st Congress in 1868, and chosen first vice-president of the U. S. Centennial Commission.

H. L. STUART.

**Clifton**, Graham co., Ari. (see map of Arizona, ref. 7-H, for location of county), on the Arizona and New Mexico R. R., 71 miles N. W. of Lordsburg, N. M. Pop. not in census of 1880.

**Clifton**, cap. of Sully co., Dak. (see map of Dakota, ref. 6-D, for location of county). Pop. not in census of 1880.

**Clinton** (GEORGE W.), LL.D., son of Gov. De Witt Clinton, was born in New York City in 1807; graduated at Hamilton College, N. Y., in 1825; studied medicine for two years, and afterward law, and was admitted as an attorney in 1831; practised in Albany, N. Y.: in 1835 he was appointed examiner in chancery and district attorney of Ontario co., N. Y.; removed to Buffalo, N. Y., in 1836; in 1838 he became collector of customs at that port; in 1844 he was elected mayor of Buffalo; was district attorney 1847-49 for the northern district of N. Y.; in 1854 he was elected judge of the superior court of Buffalo, and held position until 1877, when he was retired on account of his age; from 1870 he was chief judge of that court; in 1856 he was elected a regent of the University of the State of New York, and became vice-chancellor in 1881; he was an active member of the constitutional convention of 1867;

organized Buffalo Society of Natural History in 1861, and was its president from that time. Died Sept. 7, 1885.

**Clintwood**, cap. of Dickenson co., Va. (see map of Virginia, ref. 7-B, for location of county). Pop. not in census of 1880.

**Clyde**, city, Cloud co., Kan. (see map of Kansas, ref. 4-G, for location of county), on R. R. and Republican River. Pop. in 1880, 956.

**Clyt'ia**, or **Clyt'ie** [Gr. *Κλυτία* or *Κλυτίη*], the name of three mythical personages mentioned by Hesiod, Ovid, Pausanias, and Tzetzes. With Ovid (*Metamorphoses*, iv.) she is a nymph loved by Apollo, the god of the sun, but who, having offended and being forsaken by him, pined away with her eyes fixed on the sun, and was turned into a flower, which (from its ever turning toward the sun) was called *heliotropium* (*ἡλιότροπον*).

**Coleman** (LEIGHTON), b. in Philadelphia May 3, 1837; graduated at the General Theological Seminary in New York City in June, 1861, and settled at once as rector of the memorial church of St. Luke in Philadelphia. In the autumn of 1863 he became rector of St. John's church in Wilmington, Del. Three years later he became rector of St. Mark's church at Mauch Chunk, Pa., remaining there nearly eight years, when he removed to Toledo, O., assuming the rectorship of Trinity church. In 1875 he was elected bishop of the diocese of Wisconsin. J. B. BISHOP.

**Col'lins** (THOMAS WHARTON), b. in New Orleans 1812; was educated a printer; rose from the case to be editor, and then studied law; distinguished himself as a jurist; was several times a judge of the district court; was a prominent member of the constitutional convention of Louisiana in 1852, and is the author of several literary and philosophical works—*The Martyr Patriots*, in blank verse, a tragedy, *Humanities* and the *Eden of Labor*, a new theory of political economy, eposited in the form of a Utopia; also of many essays published in the magazines of the day. C. G. FORSHEY.

**Collinsville**, city, on R. R., Madison co., Ill. (see map of Illinois, ref. 8-D, for location of county), 11 miles E. by N. of St. Louis. Pop. in 1880, 2887.

**Colorado**, cap. of Mitchell co., Tex. (see map of Texas, ref. 3-F, for location of county), on Texas and Pacific R. R., 230 miles W. by S. of Fort Worth. Pop. not in census of 1880.

**Columbia**, cap. of Brown co., Dak. (see map of Dakota, ref. 5-F, for location of county), on the Chicago and North-western R. R. and the James or Dakota River. Pop. in 1880, 133.

**Columbus Grove**, R. R. junction, Putnam co., O. (see map of Ohio, ref. 3-D, for location of county), 84 miles N. of Dayton. Pop. in 1870, 578; in 1880, 1392.

**Colville**, cap. of Stevens co., W. T. (see map of Washington Territory, ref. 3-E, for location of county). Pop. in 1880, 67.

**Col'yar** (ARTHUR ST. CLAIR), b. in Washington co., Tenn., June 23, 1815; was self-educated; became a successful lawyer; opposed secession in 1861, but was a member of the Confederate Congress 1861-65; after the war gave his attention to the development of the Sewanee coal-mines, Tracy City, Tenn.; reorganized the Tennessee Coal and R. R. Co., of which he became president, and also gave attention to manufacturing. His enterprise has made the Tracy City mines a great success, and has done much to develop the material interests of his State.

**Comstock** (JOHN HENRY), b. Feb. 24, 1849, at Janesville, Wis., graduated B. S. at Cornell University 1874; U. S. entomologist 1879-81; now professor of entomology and general invertebrate zoology in Cornell University. Author of *Report on Cotton Insects* (500 pp.), *Monograph of the Diaspiine* (a family of scale-insects), several reports as U. S. entomologist, and various papers on entomology. RALPH S. TARR.

**Comstock Lode**. This gigantic and famous silver-and-gold-bearing lode is situated in the western part of the State of Nevada, in Storey co., at a point about 12 miles N. E. of Carson City, and about 19 miles E. of the California State line, in lat. (about) 39° 22' N. and lon. 119° 39' W. from Greenwich. It lies on the eastern slope of the Virginia Mountains, a nearly due N. and S. offshoot of the Sierra Nevada, near the base of Mount Davidson, the loftiest peak of this secondary range, which is 7827 feet above the sea-level. The most important portion of the lode is included within the limits of Virginia City, which at C street is 1635 feet below the summit of this peak, or about 6192 feet above the level of the ocean.

**Discovery**.—According to J. Ross Browne, as well as Henry Degroot (*Overland Monthly*, June, 1873), the discovery of the Comstock Lode was a fortuitous occurrence.

The sides of the Virginia range of mountains are furrowed by many deep ravines. Two of these, named respectively Gold and Six-Mile cañons, afforded as early as 1849 a considerable amount of placer-mining. In the spring of 1858 the miners working in Six-Mile Cañon found their rockers clogged with particles of a dark-colored mineral, which on account of its weight it was difficult to separate from the gold. This "black stuff" consisted of small pieces of rich sulphuretted silver ore that had been released from the Comstock Lode, which crossed the ravine a short distance above. Being ignorant of its value, these men threw away this material with the tailings. Among these pioneer miners was an elderly man who had taken unto himself the cognomen of James Fennimore. His associates first contracted it into "Old Finny," and afterward it was corrupted into "Old Virginny," probably from the fact that he hailed from the State of Virginia. This old man set about examining the croppings from which the cañon below had been enriched. These, being much decomposed, were found to contain a good deal of free gold, and he forthwith (Feb. 22, 1858) proceeded to take up a "claim" along them. This claim covered a portion of what is now the Mexican and Ophir grounds, at one time the most productive section of the Comstock Lode. It was not, however, until the following spring (1859) that the character of the deposits at this point became fully known. A couple of miners, at that time sinking a shaft at this place for the purpose of obtaining water for their rockers, discovered that this stratum of decomposed ore was not only very rich, but that it extended to a considerable depth beneath the surface. As soon as this became known the belt of croppings on both sides of this spot was "taken up" for a long distance along the ledge. These claims were originally taken up for placer-mining, but it was not long before its value as a silver-bearing lode became known. Indeed, as early as 1857 miners were actually engaged in placer-mining on the southern portion of what is now known to be the Comstock Lode, near Gold Hill, but they failed to recognize its argentiferous character. In the same year (1857) H. B. and E. A. Grosch, two educated metallurgists, first discovered silver ore while engaged in placer-mining in the portion of Gold Cañon near the site of Silver City. But the operations of these gentlemen were conducted at a point more than 2 miles S. E. of the Comstock Lode; so that they failed to recognize the existence of this celebrated ledge.

**Origin of Name**.—Among the comrades of "Old Finny" was Henry P. Comstock, who offered to purchase the old man's claim, tendering him in part payment an "old bottailed Indian pony," the balance consisting of a whiskey consideration. The simple-minded Finny accepted the offer, and made over to his friend, "in consideration of the premises," a property which in less than a year after sold for more than a million of dollars. How little Comstock himself appreciated its real value is apparent from the fact that he shortly after disposed of his interest therein for some \$5000 or \$6000. In the second sale the claim was described as the "Comstock" ground, and being at the time supposed to cover the most important part, the name came soon after to be applied to the entire lode. And thus was poor Finny doubly defrauded—first, out of his interest in the lode itself, and second, out of the honor to which he was entitled as its original discoverer. To atone for this wrong, the miners, when they came to select a name for the new town to be laid out here, called it "Virginia."

**Character of the Lode**.—The Comstock is probably a true fissure-vein. The jaws of the fissure at the surface are from 250 to 1100 feet apart, gradually approaching each other in descending, forming a V-like section, until the fissure is reduced to an average width of 150 feet or less; in many places, however, swelling out to 500 feet in thickness, and in others contracting to not more than 20 feet in width. Its outcrop is not by any means continuous. In fact, the Comstock, though properly characterized as a single lode, is rather a broad metalliferous belt or ore-channel, carrying a congeries of subordinate lodes, bunches, and chimneys of ore, all reposing in as many distinct clefts, separated by "horses" and dikes of porphyry, belts of quartz, seams of clay, making up a body of vein-matter unparalleled for magnitude and complexity in the history of mining. "In point of geological time," Clarence King says, "the system of fissures which constitutes the Comstock Lode are subsequent to the propylite outflow, and belong in all probability to the dynamical disturbance connected with the eruptions of andesite. It is considered certain that the whole series of volcanic outbursts are since the Miocene epoch, and we may safely call the Comstock a Tertiary lode." In general terms, the course or "strike" of the lode may be said to be N. 25° E. (true meridian), to pitch or "dip" toward the E. at an angle of from 35° to 50°, and to have been definitively



traced along a linear extent of more than 4 miles in the general direction (a little E. of the magnetic meridian) of the Virginia range of mountains. The productive portions of the vein, however, cover a linear space of scarcely over 2 miles.

**Character of Ores.**—The ores of the Comstock Lode consist chiefly of native gold, native silver, vitreous silver ore (argentite), stephanite, and argentiferous galena imbedded in a quartz gangue. Besides these, ruby silver, horn silver, polybasite, pyrrargyrite, and sternbergite occur in small quantities; also, iron and copper pyrites, zinc blende, and several carbonates and sulphates.

**Bonanzas or Ore-Bodies** (see BONANZA).—These productive masses—variously designated as bonanzas, ore-bodies, ore-chambers, chimneys, zones, etc.—are irregular in shape, with a general tendency to a lenticular form, something like a concavo-convex lens. They usually occur in the swells of the vein, and their position is more vertical than the dip of the lode. Under existing circumstances it is impossible to obtain trustworthy data in relation to the dimensions and present prospects of such of these bonanzas as are at this time yielding more or less productive ores. Indeed, so long as these mining stocks are manipulated in San Francisco and elsewhere for speculative purposes it will be found to be impossible to elicit such information from mining engineers, superintendents, and others who are cognizant of the true condition of the mines. In fact, since the publication of the admirable volume on *Mining Industry* (vol. iii. of the *U. S. Geological Exploration of the 40th Parallel*) by James D. Hague and Clarence King, which indicated the true condition of these mines up to the end of 1869, nothing reliable has been published in regard to the precise dimensions and character of the bonanzas that have been exposed since that time. In the excellent atlas accompanying this volume the topography of the mining explorations on the Comstock Lode are given with all the precision and truthfulness which science demands. During the years that have elapsed since that time immense and important developments have been made on this remarkable lode, particularly on the *deep levels*; but our knowledge of them is exceedingly vague and imperfect. Most of these mines have had their prosperous eras, holding for a certain period, to be followed by seasons of restricted production; and it is obviously to the interest of speculators to conceal these fluctuations of productiveness from the public.

From the topographical surveys of 1869, Clarence King estimated that in the longitudinal elevations or sections of the lode not more than one-fourth, or 25 per cent., of the actual face of the lode has been occupied by argentiferous bodies; and that it is safe to say that not more than  $\frac{1}{100}$ , or 0.2 per cent., of the lode materials have been charged with silver to a workable percentage. (*Mining Industry*, p. 76.) The true limits of these bonanzas or ore-bodies cannot be definitely assigned, since the only clues to the bonanza outlines are the measurements of actually "stoped" ground. These deposits of silver ore occur in the quartz, distributing themselves capriciously in segregated bonanzas, separated from each other by intervals of entirely barren gangue, or of ore so poor as not to be workable. Hence their boundaries only represent the limits of the *pay ore* on a grade rarely less than \$20 per ton. Moreover, as some of the earlier exploration-workings were scarcely ever surveyed at all, and of which, when measured, the records have not been preserved, it is impossible to obtain a few important features. In relation to the dimensions of the bonanzas that have been exposed since 1869, as has already been intimated, the data are very unreliable, and sadly in need of verification. The numbers contained in the following table relating to the dimensions of the bonanzas are obtained partly from measurements taken from the longitudinal and cross-sections of the lode, as given in atlas-plates 6, 7, 8, 9, and 10 of the volume on *Mining Industry*, and partly from other and less trustworthy sources:

BONANZA.	Depth of upper limit, feet.	Length along vein, feet.	Extent in depth, feet.	Width or thickness, feet.
1 Mexican and Ophir.....	Surface.	600	650	2- 70
2 Gould and Curry.....	Surface.	600	540	3-100
3 Savage (continuation of No. 2).	440	500	300	5- 60
4 Hale and Norcross.....	260	520	600	3- 40
5 Chollar-Potosi.....	Surface.	580	500	5- 85
6 Gold Hill.....	Surface.	1040	550	10-100
7 Yellow Jacket.....	80	340	500	5- 60
8 Kentuck.....	.....	300	400	2- 40
9 Crown Point and Belcher.....	850	600	600	5- 60 (?)
10 Con. Virginia and California.....	1050	700	600	20-250 (?)

**Product for the Big Bonanza for the year 1876.**—The last in the foregoing table (No. 10) constitutes the world-renowned "Big Bonanza." During the ten years elapsed since its discovery there are no trustworthy data from which an estimate can be made of the probable aggregate value of the gold and silver contained in this gigantic ore-body. In fact, until its complete outlines are exposed, and the exact quality of the ore of its various portions is determined, we have no basis for an estimate. It has been supposed to contain, in the aggregate, ore to the value of about \$150,000,000.

The official returns for the year 1876 furnish the following numbers in relation to the Consolidated Virginia and the California mines, both of which operate upon the Big Bonanza:

MINE.	Ore in tons of 2000 lbs. each.	Value of gold, dollars.	Value of silver, dollars.	Total value, dollars.	Average yield per ton of ore.
Con. Virginia.....	142,678	7,378,145	9,279,504	16,657,649	\$116 75
California.....	127,541	6,488,641	6,912,201	13,400,842	106 07
Both.....	270,219	13,866,786	16,191,705	30,058,491	\$111 24
Comstock Lode.....	.....	17,125,000	19,875,000	37,000,000	

It is obvious that nearly five-sixths of the precious metals came from the Big Bonanza mines.

**Bullion-Product.**—It is difficult to obtain trustworthy data in relation to the bullion-product of the Comstock Lode. The amount of precious metals yielded by this group of mines has indeed been enormous, but there is scarcely a doubt but that there has been a tendency to publish *exaggerated* estimates. The following figures, taken from a careful estimate furnished by Mr. James D. Hague and Mr. J. J. Valentine, exhibit, probably, a more accurate statement of the annual bullion production of this lode since the date of its discovery than any that has heretofore been published:

YEAR.	Value of bullion.	YEAR.	Value of bullion.
1860	\$100,000	1873	\$23,216,062
1861	2,000,000	1874	23,051,496
1862	6,000,000	1875	24,885,617
1863	12,400,000	1876	37,000,000
1864	16,000,000	1877	37,911,710
1865	16,000,000	1878	21,295,043
1866	11,739,100	1879	8,530,562
1867	13,738,618	1880	5,312,592
1868	8,479,769	1881	1,726,162
1869	7,405,578	1882	1,333,018
1870	8,254,272	1883	1,725,486
1871	10,644,704		
1872	13,159,093	Total.....	\$312,208,882

Hence we may assume the total value of bullion-product of this celebrated lode from the date of its discovery to the end of 1883 to be, in round numbers, about \$312,200,000. Comparing this amount with the estimated aggregate value (previously given) of the bullion-product of the Bonanza mines, it is evident that the great bulk of the precious metals comes from a few prominent mines.

The proportional value of *gold* contained in the bullion-product varies from 33 to 70 per cent. In the Big Bonanza it is stated at 42 per cent.; in the product of the Comstock Lode for 1876 it is estimated at 46 per cent. In the total product of the lode from its discovery to the end of 1883 the value of the gold cannot, therefore, be less than 40 per cent; hence we have to the end of 1883—

Total bullion-product = \$312,200,000  
 " gold " = 124,880,000  
 " silver " = 187,320,000

By reference to the table it will be seen that the bullion-product of the lode attained a maximum in 1864-65, diminished until 1869-70, and then increased again until 1876-77, at which time it reached its second maximum, since which it has rapidly diminished.

**Comparative Product in 1876.**—Taking the number furnished by the report of J. J. Valentine, general superintendent of Wells, Fargo & Co. (Dec. 30, 1876), as the basis, we have calculated the following table relating to the comparative product of gold and silver for the year 1876:

**Product of Gold and Silver for the Year 1876.**

	Value in dollars.			Per cent. of world's product.		
	Gold.	Silver.	Total.	Gold.	Silver.	Both.
World.....	101,328,501	77,006,672	178,335,173			
United States...	44,328,501	41,506,672	85,835,173	43.75	53.90	48.12
Comstock.....	17,125,000	19,875,000	37,000,000	16.90	25.81	20.75
Per cent. of United States product.						
Comstock.....				38.63	47.88	43.11

It thus appears that the gold and silver product of the Comstock Lode for the year 1876 was more than one-fifth of the total world's product for the same year; and that its yield

of silver was more than one-fourth of the aggregate silver-product of the world for that year. The proportional yield of gold, although very large, is not so extraordinary. The percentages in relation to the product of the Comstock Lode,

in comparison with the aggregate product of the whole U. S., are equally striking in illustrating the enormous productiveness of this lode. The following table presents the summary:

*Statement of Ore and Bullion Products, Assessments, and Dividends of the Principal Mines of the Comstock Lode during a series of years; prepared from Official Sources by James D. Hague.*

Name of mining company.	Period of time considered.	Product of ore in tons during said period.	Approximate yield in gold and silver of said ore-product.	Average yield per ton of said ore.	Amount received from assessments during said period.	Amount paid in dividends in same time.	Percentage of product paid in dividends.	Percentage of product paid in net dividends (after deducting assessments).
Ophir.....	1860 to Dec., 1876.....16 years	128,800	\$10,598,055	.....	\$2,038,344	\$1,394,400	13.15	0.
California.....	Year ending Dec. 31, 1876.... 1 year	129,800	13,589,841	\$105.07	None.	8,640,000	63.58	63.58
Consolidated Virginia	Apr. 14, 1867, to Dec. 31, 1876. 9 years	405,153	39,007,570	96.75	458,500	27,000,000	69.22	68.10
Gould and Curry.....	1860 to Nov. 30, 1876.....16 "	314,101	15,672,376	49.90	2,245,052	3,826,800	24.40	10.9
Savage.....	Apr., 1863, to July 1, 1876....13 "	474,055	15,755,705	33.25	2,730,200	4,208,000	23.71	9.86
Hale and Norcross.....	Mar. 20, 1866, to Mar. 20, 1876, 10 "	324,459	7,930,668	24.44	1,421,450	1,598,000	20.15	2.23
Chollar-Potosi.....	1865 to May 31, 1876.....11 "	472,019	13,168,900	27.90	1,022,000	3,081,080	23.40	15.74
Imperial.....	1865 to Apr. 15, 1876.....13 "	218,484	5,580,054	25.54	1,751,000	1,067,500	18.14	0.
Empire.....	1865 to Apr. 15, 1876.....13 "	81,020	2,678,518	33.06	477,100	439,600	18.27	0.46
Yellow Jacket.....	1865 to July 1, 1876.....13 "	14,320,905	4,326,536	.....	2,878,000	2,184,000	15.25	0.
Kentuck.....	Nov. 1, 1865, to Nov. 1, 1874. 9 "	798,110	29,576,467	37.06	684,526	11,898,000	40.23	8.83
Crown Point.....	May 1, 1865, to May 1, 1876....11 "	725,096	34,002,486	46.89	660,400	15,397,200	45.28	38.
Relcher.....	1863 to Dec. 31, 1876.....13 "	.....	.....	.....	.....	.....	.....	43.34
Totals.....	.....	.....	206,208,081	.....	16,226,572	81,446,580	39.49	31.63
The average yield per ton of.....	.....	3,939,297	.....	is \$44.92	.....	.....	.....	.....

In the foregoing table the stated yield of the ore includes only that derived from the first milling, by which process something more than 70 per cent. of the assay-value is obtained. The treatment of the tailings gives a further revenue from the ore. Of the total bullion value, about 40 per cent. is gold and 60 per cent. silver. In the value stated no allowance is made for the discount on silver—a considerable percentage in recent years. Besides the mines named in this statement, there have been other important sources of bullion, of which no complete records are now available. Among them are the old Mexican mine (now comprised in the Ophir ground); the early surface-workings of what is now the Chollar-Potosi; the old and now consolidated claims in the region of Gold Hill and other points. The Overman and some other less important mines have produced in the aggregate a considerable amount of bullion. The total bullion product of the Comstock Lode at the end of 1876 is not far from \$250,000,000.

**Future Prospects.**—The discovery of rich bodies of ore on the deeper levels has brought to notice the various difficulties incident to the execution of mining operations at such great depths. Of course, the economy of such work is of prime consideration. The Comstock in 1871 furnished employment to over 2000 miners; its daily "output" of ore was nearly 2000 tons, estimated to contain about one ton of bullion, valued at nearly \$56,000. To obtain this amount of ore, in addition to the labor of mining 15,000 tons of dead weight (cable, cages, and cars) must be hoisted daily; 8640 tons of water were pumped; and 1000 tons of waste rock must, in order to reach the surface, pass daily up shafts 2000 feet in depth. And to this must be added the expense of milling and reducing the ore. Moreover, the great heat experienced in the lower levels of the deeper mines is a very serious obstacle to future developments. "Currents of heated waters still penetrate the lode below, and are unquestionably the lingering traces of solfataric action;" "chemical decomposition is yet active here;" "nearly the whole interior of the lode is in a condition of gentle chemical activity." (*King*.) The unusually rapid augmentation of temperature with increasing depth thus produced is a feature which demands the most serious consideration. In some of these mines at the depth of 1700 feet the temperature has ranged from 110° to 120° F., thus converting the lower levels into a vast sweat-house. Although clothing is reduced to a minimum, it is impossible for the miners to continue operations for more than fifteen or twenty minutes at a time without cooling off preparatory to renewing their labors. The application of more efficient means of ventilation has recently mitigated this evil, but it still remains a serious difficulty. It seems to be evident that the construction of a deep adit is a necessary adjunct to safe, economical, and permanently successful mining on this lode. Whether the Suto Tunnel will perform in an efficient manner this twofold function of economy in mining and of thorough ventilation remains to be seen.

JOHN LE CONTE.

**Confederation, Articles of**, adopted in 1781, and forming the Constitution of the U. S. of America until 1788. (See UNITED STATES (*History*), in CYCLOPEDIA.)

**ARTICLES OF CONFEDERATION.**—To all to whom these presents shall come, we, the undersigned, delegates of the States affixed to our names, send greeting: Whereas the delegates of the United States of America in Congress assembled did, on the fifteenth day of November, in the year of our

Lord one thousand seven hundred and seventy-seven, and in the second year of the independence of America, agree to certain articles of confederation and perpetual Union between the States of New Hampshire, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia, in the words following, viz.:

*Articles of Confederation and perpetual Union between the States of New Hampshire, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia.*

ARTICLE 1. The style of this confederacy shall be "The United States of America."

ART. 2. Each State retains its sovereignty, freedom, and independence, and every power, jurisdiction, and right, which is not by this confederation expressly delegated to the United States in Congress assembled.

ART. 3. The said States hereby severally enter into a firm league of friendship with each other for their common defence, the security of their liberties, and their mutual and general welfare; binding themselves to assist each other against all force offered to, or attacks made upon them, or any of them, on account of religion, sovereignty, trade, or any other pretence whatever.

ART. 4. The better to secure and perpetuate mutual friendship and intercourse among the people of the different States in this Union, the free inhabitants of each of these States, paupers, vagabonds, and fugitives from justice excepted, shall be entitled to all privileges and immunities of free citizens in the several States; and the people of each State shall have free ingress and regress to and from any other State, and shall enjoy therein all the privileges of trade and commerce, subject to the same duties, impositions, and restrictions, as the inhabitants thereof respectively; provided that such restrictions shall not extend so far as to prevent the removal of property imported into any State to any other State, of which the owner is an inhabitant; provided also, that no imposition, duties, or restriction shall be laid by any State on the property of the United States or either of them.

If any person guilty of or charged with treason, felony, or other high misdemeanor, in any State, shall flee from justice, and be found in any of the United States, he shall, upon demand of the Governor or Executive power of the State from which he fled, be delivered up and removed to the State having jurisdiction of his offence.

Full faith and credit shall be given in each of these States to the records, acts, and judicial proceedings of the courts and magistrates of every other State.

ART. 5. For the more convenient management of the general interests of the United States, delegates shall be annually appointed in such manner as the Legislature of each State shall direct, to meet in Congress on the first Monday in November in every year, with a power reserved to each State to recall its delegates, or any of them, at any time within the year, and to send others in their stead for the remainder of the year.

No State shall be represented in Congress by less than two, nor by more than seven members; and no person shall be capable of being a delegate for more than three years in any term of six years; nor shall any person, being a dele-

gate, be capable of holding any office under the United States, for which he, or another for his benefit, receives any salary, fees, or emoluments of any kind.

Each State shall maintain its own delegates in a meeting of the States, and while they act as members of the committee of the States.

In determining questions in the United States in Congress assembled, each State shall have one vote.

Freedom of speech and debate in Congress shall not be impeached or questioned in any court or place out of Congress; and the members of Congress shall be protected in their persons from arrests and imprisonments during the time of their going to and from and attendance on Congress, except for treason, felony, or breach of the peace.

ART. 6. No State, without the consent of the United States in Congress assembled, shall send any embassy to, or receive any embassy from, or enter into any conference, agreement, alliance, or treaty, with any king, prince, or state; nor shall any person holding any office of profit or trust under the United States, or any of them, accept of any present, emolument, office, or title of any kind whatever, from any king, prince, or foreign state; nor shall the United States in Congress assembled, or any of them, grant any title of nobility.

No two or more States shall enter into any treaty, confederation, or alliance whatever, between them, without the consent of the United States in Congress assembled, specifying accurately the purposes for which the same is to be entered into, and how long it shall continue.

No State shall lay any imposts or duties which may interfere with any stipulations in treaties entered into by the United States in Congress assembled, with any king, prince, or state, in pursuance of any treaties already proposed by Congress to the courts of France and Spain.

No vessel of war shall be kept up in time of peace by any State, except such number only as shall be deemed necessary by the United States in Congress assembled for the defence of such State or its trade; nor shall any body of forces be kept up by any State in time of peace except such number only, as in the judgment of the United States in Congress assembled, shall be deemed requisite to garrison the forts necessary for the defence of such State; but every State shall always keep up a well-regulated and disciplined militia, sufficiently armed and accoutred, and shall provide and have constantly ready for use, in public stores, a due number of field-pieces and tents, and a proper quantity of arms, ammunition, and camp equipage.

No State shall engage in any war without the consent of the United States in Congress assembled, unless such State be actually invaded by enemies, or shall have received certain advice of a resolution being formed by some nation of Indians to invade such State, and the danger is so imminent as not to admit of a delay till the United States in Congress assembled can be consulted; nor shall any State grant commissions to any ships or vessels of war, nor letters of marque or reprisal, except it be after a declaration of war by the United States in Congress assembled, and then only against the kingdom or state, and the subjects thereof, against which war has been so declared, and under such regulations as shall be established by the United States in Congress assembled, unless such State be infested by pirates, in which case vessels of war may be fitted out for that occasion, and kept so long as the danger shall continue, or until the United States in Congress assembled shall determine otherwise.

ART. 7. When land forces are raised by any State for the common defence, all officers of or under the rank of colonel, shall be appointed by the legislature of each State respectively, by whom such forces shall be raised, or in such manner as such State shall direct, and all vacancies shall be filled up by the State which first made the appointment.

ART. 8. All charges of war, and all other expenses that shall be incurred for the common defence or general welfare, and allowed by the United States in Congress assembled, shall be defrayed out of a common treasury, which shall be supplied by the several States in proportion to the value of all land within each State granted to or surveyed for any person, as such land and the buildings and improvements thereon shall be estimated according to such mode as the United States in Congress assembled shall from time to time direct and appoint.

The taxes for paying that proportion shall be laid and levied by the authority and direction of the legislatures of the several States, within the time agreed upon by the United States in Congress assembled.

ART. 9. The United States in Congress assembled shall have the sole and exclusive right and power of determining on peace and war, except in the cases mentioned in the sixth article—of sending and receiving ambassadors—entering into treaties and alliances; provided, that no treaty of commerce shall be made whereby the legislative power of the

respective States shall be restrained from imposing such imposts and duties on foreigners as their own people are subjected to, or from prohibiting the exportation or importation of any species of goods or commodities whatsoever—of establishing rules for deciding in all cases what captures on land or water shall be legal, and in what manner prizes taken by land or naval forces in the service of the United States shall be divided or appropriated—of granting letters of marque and reprisal in times of peace—appointing courts for the trial of piracies and felonies committed on the high seas, and establishing courts for receiving and determining finally appeals in all cases of captures; provided, that no member of Congress shall be appointed a judge of any of the said courts.

The United States in Congress assembled shall also be the last resort on appeal in all disputes and differences now subsisting or that hereafter may arise between two or more States concerning boundary, jurisdiction, or any other cause whatever; which authority shall always be exercised in the manner following: whenever the legislative or executive authority or lawful agent of any State in controversy with another shall present a petition to Congress, stating the matter in question, and praying for a hearing, notice thereof shall be given by order of Congress to the legislative or executive authority of the other State in controversy, and a day assigned for the appearance of the parties, by their lawful agents, who shall then be directed to appoint by joint consent commissioners or judges to constitute a court for hearing and determining the matter in question; but if they cannot agree, Congress shall name three persons out of each of the United States, and from the list of such persons each party shall alternately strike out one, the petitioners beginning, until the number shall be reduced to thirteen; and from that number not less than seven nor more than nine names, as Congress shall direct, shall, in the presence of Congress, be drawn out by lot; and the persons whose names shall be so drawn, or any five of them, shall be commissioners or judges, to hear and finally determine the controversy, so always as a major part of the judges, who shall hear the cause, shall agree in the determination; and if either party shall neglect to attend at the day appointed, without showing reasons which Congress shall judge sufficient, or being present shall refuse to strike, the Congress shall proceed to nominate three persons out of each State, and the secretary of Congress shall strike in behalf of such party absent or refusing; and the judgment and sentence of the court, to be appointed in the manner before prescribed, shall be final and conclusive; and if any of the parties shall refuse to submit to the authority of such court, or to appear, or defend their claim or cause, the court shall, nevertheless, proceed to pronounce sentence or judgment, which shall, in like manner, be final and decisive, the judgment or sentence and other proceedings being in either case transmitted to Congress, and lodged among the acts of Congress for the security of the parties concerned; provided, that every commissioner, before he sits in judgment, shall take an oath, to be administered by one of the judges of the supreme or superior court of the State, where the cause shall be tried, "well and truly to hear and determine the matter in question, according to the best of his judgment, without favor, affection, or hope of reward;" provided, also, that no State shall be deprived of territory for the benefit of the United States.

All controversies concerning the private right of soil, claimed under different grants of two or more States, whose jurisdiction as they may respect such lands and the States which passed such grants are adjusted, the said grants or either of them being at the same time claimed to have originated antecedent to such settlement of jurisdiction, shall, on the petition of either party to the Congress of the United States, be finally determined, as near as may be, in the same manner as is before prescribed for deciding disputes respecting territorial jurisdiction between different States.

The United States in Congress assembled shall also have the sole and exclusive right and power of regulating the alloy and value of coin struck by their own authority, or by that of the respective States—fixing the standard of weights and measures throughout the United States—regulating the trade and managing all affairs with the Indians not members of any of the States; provided that the legislative right of any State within its own limits be not infringed or violated—establishing and regulating post-offices from one State to another throughout all the United States, and exacting such postage on the papers passing through the same, as may be requisite to defray the expenses of the said office—appointing all officers of the land forces in the service of the United States excepting regimental officers—appointing all the officers of the naval forces, and commissioning all officers whatever in the service of the United States—making rules for the government and regulation of the said land and naval forces, and directing their operations.

The United States in Congress assembled shall have authority to appoint a committee to sit in the recess of Congress, to be denominated "a committee of the States," and to consist of one delegate from each State; and to appoint such other committees and civil officers as may be necessary for managing the general affairs of the United States, under their direction—to appoint one of their number to preside, provided that no person be allowed to serve in the office of president more than one year in any term of three years—to ascertain the necessary sums of money to be raised for the service of the United States, and to appropriate and apply the same for defraying the public expenses—to borrow money or emit bills on the credit of the United States, transmitting every half year to the respective States an account of the sums of money so borrowed or emitted—to build and equip a navy—to agree upon the number of land forces, and to make requisitions from each State for its quota, in proportion to the number of white inhabitants in such State; which requisition shall be binding, and thereupon the legislature of each State shall appoint the regimental officers, raise the men, and clothe, arm, and equip them, in a soldier-like manner, at the expense of the United States; and the officers and men so clothed, armed, and equipped, shall march to the place appointed, and within the time agreed on by the United States in Congress assembled; but if the United States in Congress assembled shall, on consideration of circumstances, judge proper that any State should not raise men, or should raise a smaller number than its quota, and that any other State should raise a greater number of men than the quota thereof, such extra number shall be raised, officered, clothed, armed, and equipped, in the same manner as the quota of such State, unless the legislature of such State shall judge that such extra number cannot safely be spared out of the same; in which case they shall raise, officer, clothe, arm, and equip as many of such extra number as they judge can be safely spared. And the officers and men so clothed, armed, and equipped, shall march to the place appointed, and within the time agreed on by the United States in Congress assembled.

The United States in Congress assembled shall never engage in a war, nor grant letters of marque and reprisal in time of peace, nor enter into any treaties or alliances, nor coin money, nor regulate the value thereof, nor ascertain the sums and expenses necessary for the defence and welfare of the United States or any of them, nor emit bills, nor borrow money on the credit of the United States, nor appropriate money, nor agree upon the number of vessels-of-war to be built or purchased, or the number of land or sea forces to be raised, nor appoint a commander-in-chief of the army and navy, unless nine States assent to the same; nor shall a question on any other point, except for adjourning from day to day, be determined, unless by the votes of a majority of the United States in Congress assembled.

The Congress of the United States shall have power to adjourn to any time within the year, and to any place within the United States, so that no period of adjournment be for a longer duration than the space of six months; and shall publish the journal of their proceedings monthly, except such parts thereof relating to treaties, alliances, or military operations, as in their judgment require secrecy; and the yeas and nays of the delegates of each State on any question shall be entered on the journal, when it is desired by any delegate; and the delegates of a State, or any of them, at his or their request, shall be furnished with a transcript of the said journal, except such parts as are above excepted, to lay before the legislatures of the several States.

ART. 10. The committee of the States, or any nine of them, shall be authorized to execute, in the recess of Congress, such of the powers of Congress as the United States in Congress assembled, by the consent of nine States, shall from time to time think expedient to vest them with; provided that no power be delegated to the said committee, for the exercise of which, by the articles of confederation, the voice of nine States in the Congress of the United States assembled is requisite.

ART. 11. Canada, acceding to this confederation, and joining in the measures of the United States, shall be admitted into, and entitled to all the advantages of, this Union; but no other colony shall be admitted into the same unless such admission be agreed to by nine States.

ART. 12. All bills of credit emitted, moneys borrowed, and debts contracted, by or under the authority of Congress, before the assembling of the United States, in pursuance of the present confederation, shall be deemed and considered as a charge against the United States, for payment and satisfaction whereof the said United States and the public faith are hereby solemnly pledged.

ART. 13. Every State shall abide by the decision of the

United States, in Congress assembled, on all questions which, by this confederation, are submitted to them. And the articles of this confederation shall be inviolably observed by every State, and the Union shall be perpetual; nor shall any alteration at any time hereafter be made in any of them, unless such alteration be agreed to in a Congress of the United States, and be afterwards confirmed by the legislature of every State.

And whereas it has pleased the great Governor of the world to incline the hearts of the legislatures we respectively represent in Congress, to approve of and to authorize us to ratify the said articles of confederation and perpetual union; *know ye*, that we, the undersigned delegates, by virtue of the power and authority to us given for that purpose, do, by these presents, in the name and in behalf of our respective constituents, fully and entirely ratify and confirm each and every of the said articles of confederation and perpetual union, and all and singular the matters and things therein contained; and we do further solemnly pledge and engage the faith of our respective constituents, that they shall abide by the determinations of the United States in Congress assembled, on all questions which, by the said confederation, are submitted to them; and that the articles thereof shall be inviolably observed by the States we respectively represent; and that the Union be perpetual.

In witness whereof, we have hereunto set our hands, in Congress. Done at Philadelphia, in the State of Pennsylvania, the ninth day of July, in the year of our Lord one thousand seven hundred and seventy-eight, and in the third year of the independence of America.

<b>NEW HAMPSHIRE.</b>	<b>NEW YORK.</b>	<b>VIRGINIA.</b>
Josiah Bartlett,	James Duane,	Richard Henry Lee,
John Wentworth, Jr.	Francis Lewis,	John Banister,
	William Duer,	Thomas Adams,
	Gouverneur Morris,	John Harvie,
<b>MASSACHUSETTS BAY.</b>		Francis Lightfoot Lee.
John Hancock,	<b>NEW JERSEY.</b>	
Samuel Adams,	John Witherspoon.	<b>NORTH CAROLINA.</b>
Elbridge Gerry,	Nath. Scudder.	John Penn,
Francis Dana,		Cornelius Harnett,
James Lovell,	<b>PENNSYLVANIA.</b>	John Williams.
Samuel Hoiton.	Robert Morris,	
	Daniel Roberdeau,	<b>SOUTH CAROLINA.</b>
	Jonathan Bayard Smith,	Henry Laurens,
<b>RHODE ISLAND.</b>	William Ellery,	William Henry Drayton,
Henry Marchant,	Joseph Reed.	John Matthews,
John Collins.		Richard Hutson,
	<b>DELAWARE.</b>	Thomas Heyward, Jr.
	Thomas McKean,	
<b>CONNECTICUT.</b>	John Dickinson,	
Roger Sherman,	Nicholas Van Dyke.	<b>GEORGIA.</b>
Samuel Huntington,		George Walton,
Oliver Wolcott,	<b>MARYLAND.</b>	Edward Telfair,
Titus Hosmer,	John Hanson,	Edward Langworthy.
Andrew Adams.	Daniel Carroll.	

**Congo, or Zaire.** This river of Africa—of which a few years ago hardly more than its mouth and a small portion of its lower course was known—has been unexpectedly proved, by the latest investigations of Livingstone, Lieut. Cameron, and H. M. Stanley, to be one of the largest and most remarkable of that continent. Its most remote head-waters are found, like those of the Nile, in the high table-lands forming the main axis of Eastern Africa, 4500 feet above the sea, between 3° and 12° S. lat., and are collected in two large lakes—Tanganyika on the N. and Bangweolo (or Bemba) on the S. The main and longest branch, bearing the name of Chambezi, rises in the plateau S. of Lake Tanganyika, near the waters of the Zambezi, and enters the large lake of Bangweolo (3700 feet above the sea; area, about 8400 sq. miles), from which it flows northward, under the name of Luapula, into the smaller lake of Mweru (altitude, 3000 feet; area, 1800 sq. miles). Continuing its course, it takes the name of Lualaba, receives on the E. the Lukuga, an occasional outflow from Lake Tanganyika, and from the S.W. the Kamalondo, a large river which also passes through a series of lakes. Thence flowing to the N.W., the Lualaba enters its middle course near the city of Nyangwe (4° 16' S. lat. and 1500 feet alt.), below which it receives from the S. the Lumami, and then turning N. again forms numerous cataracts until it reaches the Equator. According to Stanley, who is the first and only traveller who has navigated it throughout its course to the sea, the Congo flows thence to the N.W., receives the Aruwimi from the N.E.; when near 2° N. lat., it gradually curves to the S.W., and, breaking through the coast-chains in a series of rapids to the cataracts of Yellala, enters the Atlantic in about 6° S. lat. During its long middle course many large affluents swell its waters, the most important of which are the Kassabi (or Ikelamba) and the Quango. The basin of the Congo seems thus to occupy a long central depression 1100 to 2000 feet above the sea, extending from E. to W. between the plateaus of 4000 to 5000 feet which sur-

round it on all sides. The main tributaries, however, come from its southern edge, which has been explored by Lient. Cameron. The northern border of the basin is still a *terra incognita*. Unlike the Nile, which, having its head-waters within the regions of the tropical rains, hastens to the N. through dry and desert tracts without receiving any affluent, the Congo throughout its course remains within the regions of frequent equatorial rains. This situation makes it a purely tropical river, and explains the superabundance of its waters, which are said to exceed three times those of any other of Africa. The Congo is for that continent what the Amazon is for South America, and its basin is a land of exuberant vegetation and great fertility. Stanley estimates the area of its basin at 952,000 sq. miles, and its length at 2900 miles. Its turbid waters are said to be still visible 100 miles from the coast. A. GUYOT.

**Congo, The New Free State of** (under government of the International African Association). Mr. H. M. Stanley's expedition across Central Africa (1875-77) was in its actual results and far-reaching consequences one of the most important in modern times, almost literally determining the future of a vast continent. After exploring, and greatly adding to our geographical knowledge of, the Victoria Nyanza, he started with a force of 150 porters for Nyangwa, the farthest northern point attained by Livingstone or Cameron, carrying his boat, the Lady Alice, with him in sections, and which point he reached in Nov., 1876, after a journey of 350 miles in forty days, in itself a remarkable geographical feat. Nyangwa was ascertained by observation to be  $4^{\circ} 15' 45''$  S. lat. and  $26^{\circ} 5' E.$  lon., and situated on the Lualaba of Livingstone, the river there having a width in the rainy season of about 2 miles, with a volume of water of 240,000 cubic feet. From this settlement Stanley determined to follow the stream and to ascertain whither it led. But, as with Livingstone and Cameron before him, he encountered the unwillingness of the natives to supply him with canoes. The people said that the tribes dwelling to the N. on the Lualaba were fierce and warlike cannibals, who would suffer no one to enter their territories, as the Arab traders have frequently found to their cost; that between Nyangwa and the cannibal region the natives were treacherous, and that the river ran through dreadful forests through which he would have to make his way; all of which proved true. Having obtained the necessary canoes and the service of an Arab chief, he started out on his great journey, and writing on the eve of his departure, "I am determined to stick to the Lualaba come fair or foul, fortune or misfortune. I have supplies for six months; beyond that, Heaven knows what will become of us if we should find the Lualaba running into some unknown river with not a single head or cowrie with which to buy food." Following the river to the N., the first three weeks of the journey were disheartening, confirming all the explorers had heard of the difficulty of passing northward along the river. Then they were obliged to abandon the stream and make their way through the dense and gloomy forest. This brought great discontent among Stanley's followers, and they began to talk of returning. By argument and promising to return and follow the river, they finally reached  $3^{\circ} 31' 17''$  S. lat., being 41 geographical miles N. of Nyangwa. Here he put together his little vessel, the Lady Alice, and here Stanley says he formed the inflexible resolution never to abandon the Lualaba until he learned its ultimate destination. Their attempt now to navigate the river verified what they had heard of the treacherous character of the natives. They invited the white men to what is known as "flood-brotherhood;" and after Stanley's associate, Pocock, had gone to an island to witness this rite, he ascertained that the native intent was hostile, discovering thirty armed canoes proceeding in the direction of the island and sounding the war-cry. By a vigorous movement he reached the island, rescued Pocock, and then went safely down the river with his force of 500 men. The expedition now passed along the river in two divisions—one by land, along the left bank, and one by water. The land-party was vigorously attacked, but succeeded in defending itself until the water-division approached, when the natives retired. They now reached a part of the river where it is obstructed by a long succession of cataracts, which Stanley calls the "Falls of Ukassa." There their progress was again disputed by a body of armed natives, but the expedition proceeded down stream without loss. Their continued descent was accompanied by hostile demonstrations and attacks. All of their attempts at friendly intercourse were met by showers of poisoned arrows, and the land-party was again attacked. To add to their trials, small-pox broke out among the Arab escort. There were eighteen deaths in three days, while others of the party were attacked by dysentery, and ulcers appeared on the limbs of many in consequence of severe marching. When they had reached 125 miles N. of Ny-

angwa, their boats were little less than floating hospitals. Seventy-two died of small-pox alone. While thus depleted they were again attacked by the natives continuously for two days and two nights, the whole country rising up in arms against them. These attacks were so persistent that they were unable to bury their dead or attend those who, having been wounded by the poisoned arrows, had become delirious from their effects. Having passed these perils, the Arab escort resolved to leave them; and Stanley feared that his own followers would also return, but they stood firmly by him. His own force now consisted of 146 persons. On Jan. 4, 1877, they approached a long series of cataracts—or, more properly, falls—and entered the dreaded cannibal regions. There, says Stanley, the explorers were hunted night and day like game, breaking four times through lines of hostile canoes massed to obstruct their passage down the river. They continued, submitting to these incessant attacks, until they reached what he calls "Baswa Falls," near the equator, in  $0^{\circ} 32' 36''$  S. lat. Return was impossible, as they could not pull against the flow of the stream and sustain the attacks of the natives. For twenty-four days they had fearful work in repelling these hostile assaults and in searching for food. In getting over a distance of 42 miles they had to go around six falls, to drag their canoes more than 30 miles by land, and to cut a track 13 miles through a dense forest to transport the Lady Alice around the cataracts. After this a short period of rest followed, when the river-journey was resumed through the hostile natives, whose ferocity was of a milder type than that of those left behind. In  $0^{\circ} 14' 52''$ , beyond the equator, the stream gradually widened until it became a noble river; and when they reached between  $24^{\circ}$  and  $25^{\circ}$  of E. lon. they came to a magnificent tributary flowing into the river with a width of 2000 feet, which Stanley took to be the Welle of Schweinfurth. As they approached the mouth of this large affluent they were suddenly attacked by a force of fifty-four armed canoes, that rushed down on them with such fury that four of Stanley's boats' crews became demoralized. One of these hostile canoes was of great size, propelled by eighty paddles, guided by eight steersmen, with a planking in front holding about ten men armed with spears, and a planking along its sides traversed by armed men. After a short contest, which at times seemed of doubtful result, the natives were repulsed, and the explorers proceeded down the river.

Stanley was now in doubt what to do—to go up the tributary or to continue on. At this point the main stream widened out and was dotted with many islands. Reaching near the second parallel of N. lat., Stanley found the river made a great curve to the W., and then flowed south-westerly with a width varying from 2 to 10 miles and was filled with small islands, between which he was enabled to pass with less danger. There a new trial awaited him. Attempts to communicate with the natives proved fruitless, and, having passed three days without food, starvation stared them in the face. They determined to risk a visit to a village, and they found the natives, who had had some intercourse with the Atlantic Ocean, friendly. Stanley asked the aged chief the name of the river and he replied, "*A Kita-ya Kongo*." The great problem was solved: the Lualaba of Livingstone and the Congo were one and the same river. They were yet 850 miles from the Atlantic Ocean, having journeyed along the river 900 miles from Nyangwa. With fresh supplies they set forth. Three days afterward, on entering the dominions of a powerful chief, fifty-four canoes more formidable than any they had yet seen were encountered. Their crews were armed with muskets, and they made a desperate attack upon the nineteen canoes of the expedition. The running fight continued for a distance of 12 miles down the river. The result was at times doubtful. This was the last of thirty-two separate attacks made upon them since leaving Nyangwa. Down the river perils of a different kind now awaited them. After having made 1480 miles, the stream straightened and became narrow between close-meeting cliffs of naked craggy rock, followed by a succession of cataracts and whirlpools. Stanley confidently proceeded along this part of the river, which has thirty falls and rapids, in descending which Pocock, Stanley's white companion, and the ten natives who were with him, lost their lives, being carried over the cataract. Stanley and those who were with him in the Lady Alice escaped a like fate almost by a miracle. After this they were again brought to the verge of destruction through the want of food, but a messenger whom they had sent in advance to Emboma reached the agency of some Liverpool merchants, who promptly sent abundant supplies, reaching the explorers when they were thoroughly broken down by exhaustion and fatigue and were famishing for food. Finally reaching Emboma, from which communication with the Atlantic coast is easy, they reached the Congo's mouth in Aug., 1877 having made



a journey from Nyangwa down the river to its mouth of about 1800 miles, passing over fifty-seven cataracts.

The geographical knowledge obtained by this original exploration is remarkable in extent and variety. The entire area drained by the Congo and its tributaries Stanley computes at 860,000 square miles, 450,000 square miles of which are taken up by the great basin and the maritime regions of the West. The source of the Congo, as ascertained by him, is in the high plateau S. of Lake Tanganyika, in a country called "Besa." It issues from Lake Bembo, called by Livingstone, who discovered it, "Bangweolo." This lake is a large body of shallow water. Afterward the river is known as Luapula for 200 miles, when it empties into Lake Moero, a body of water of about 2800 square miles in extent. Issuing from this lake, it takes the name "Lualaba," having an important tributary called the "Kamalonda." The river flows N. by W., with an average breadth of 1400 yards, to Nyangwa. Stanley estimates its entire length as 2900 miles. At 26° E. lon. the river begins to receive great affluents, and smaller ones farther on. It is supposed to drain the entire western portion of the lake-region as far as 4° N. lat. In these regions trading is limited from tribe to tribe, and the balance of power is pretty evenly maintained between them. On the left bank of the Congo, in about 20° E. lon., the Ikemba flows in from the S. and is regarded as the greatest affluent of the Congo. Descending beyond 17° E. lon., the river spreads out enormously, and then slowly contracts between hills, when it thunders down steep after steep for 180 miles and then flows as the majestic and calm Lower Congo. In this distance it has a fall of 585 feet. The Congo is navigable for 110 miles from its mouth, and beyond for 835 miles, while the great affluents increase this distance by over 1200 miles.

And thus Stanley solved the mystery of the Congo—an enigma that has engaged the attention of the world for ages—and has fixed his name in the foremost rank of geographers, explorers, and travellers.

Mr. Stanley has estimated the population of this fertile and salubrious region as high as 49,000,000, and Keith Johnson, the geographer, says, in taking a general survey of it from Lake Tanganyika to the western coast, that it is evident it is a country of enormous wealth. The oil-palm flourishes throughout the broad Valley of the Upper Congo, and cotton, coffee, tobacco, pepper, nutmeg, and india-rubber are among the vegetable productions that grow wild. Indian corn, wheat, rice, sweet potatoes, and other vegetable products, which have been introduced by the Portuguese, grow everywhere, and, as respects the metals, iron and copper exist in abundance, iron being very skillfully worked by the natives. The ivory trade is a very important one, ivory being brought to the coast by caravans. The natives laugh at the idea of its becoming scarce, so that the number of elephants slaughtered must be small in comparison with the living herds roaming over the interior. The western coast abounds in fish, some of which, like the pungu, are found in the cold season—from June to August—weighing nearly 100 pounds, and as many as forty or fifty a day are caught with hook and line. Fish is an article of trade, but few natives engage in the traffic, as other fields of barter are more remunerative. There is a remarkable deposit of malachite in Angola, S. of the Congo. It is often found in large, solid blocks, one resting on two smaller ones, all together weighing over 3 tons. It is found mostly in flat veins, sometimes 2 feet in thickness and much fissured. The plant that produces the india-rubber is the giant tree-creeper, which covers the highest trees. The stem is sometimes as thick as a man's thigh. Forests are festooned by it to a large extent in all directions, the thick stems tying the trees together like great hawsers. When cut, every part of the creeper exudes a milky juice, which dries so quickly that it stops the further flow. The blacks collect this by smearing it on their arms, shoulders, and breasts until a thick covering is formed, when it is peeled off their bodies and cut into small squares. Gum-copal is likewise found of the finest quality, but the natives are not disposed to dig for it. Very little of the coffee produced is cultivated, the greater proportion being the product of coffee trees growing spontaneously. Coffee is found wild in the virgin forests of the interior; it is not believed to be native to the country, but to have been originally introduced by the old Portuguese missionaries, and to have been spread by the agency of monkeys and of birds. Cotton is sparingly grown everywhere. It is picked from the seeds, and beaten on the ground with a switch. It is then spun by hand, and the cotton thread is woven by the natives into strong, thick cloth. Food is abundant everywhere and exceedingly cheap, growing with the greatest luxuriance in the fertile regions of the interior. Cattle are easily reared, except in the regions farther S., where they are exposed to the tsetse-fly. Sheep, goats, and

poultry also thrive, but the prevailing indolence of the natives prevents them from availing themselves of the facilities for an increase. Among the available vegetable production is the baobab tree, one of the giants of the vegetable kingdom, which grows to the height of 40 feet and has a trunk the diameter of which is from 20 to 30 feet. The fibre is used to manufacture paper, cordage, and other like material. Millions of these trees are found S. of the Congo. In the grass-region the grass grows to a great height, and journeys have to be made through it in the wet season, the traveller lying in a hammock, which is slung to a pole and carried by negro bearers. As one lies in the hammock below the surface of the grass nothing is seen but a small part of the sky above him. It is of course at this time intensely hot, and human beings are obliged to endure what animals will sometimes turn away from—the disagreeable odor arising from the bodies of the hardy-worked negro bearers. The curse of this favored land is the internal slave-trade, of which the Portuguese are still the principal abettors.

The condition of the Congo region discovered by Stanley attracted the sympathetic interest of King Leopold of Belgium, and that sovereign invited such African travellers as were in Europe to become his special guests at a conference on Africa, which took place in the royal palace in Sept., 1876. It was there resolved that a systematic and scientific exploration was necessary from sea to sea, but this would involve the establishment of a series of stations, or settlements, from the E. to the W. coast near the line of the equator. Accordingly, in 1877, was formed the International African Association, composed of representatives from Belgium, Germany, France, Spain, the U. S., Italy, the Netherlands, and Switzerland. The work of carrying out its object was entrusted to an executive committee, of which the king of the Belgians remains the head. The committee consisted of three representatives—the English-speaking, the German, and the Latin races. They were Sir Bartle Frere, Dr. Nachtgal, the African explorer, and M. de Quatrefages, of the French Institute. Sir Bartle Frere was subsequently replaced by Hon. Henry S. Sanford of Florida, formerly U. S. minister to Belgium. Another committee was afterward (1878) formed (Comité d'Etude au Haut Congo) to establish communication across the continent with Karema, on Lake Tanganyika, and a line of stations thence to the E. coast, thus completing a perfect line of communication from Zanzibar to the Atlantic Ocean. Since that date vast and complicated operations, involving great expenditure and loss of life, have been carried on under the direction of Mr. Stanley under a general flag of the association. The main purpose has been not to engage in any commercial operations, but in those purely scientific, geographical, and philanthropic; so that every traveller, whatever his nationality; every missionary, whatever his faith; every legitimate trader, whatever his commerce,—may claim assistance at the stations and be certain of hospitable treatment. To secure this great pathway to civilization, and that protection to life and property indispensable in the use of it, seventy-nine treaties have been made with the independent chiefs, the tribal sovereignties being very numerous over this part of Africa. These covenants cover 2000 miles of the river-banks of the Congo and neighboring streams, and twenty-two stations, or settlements, have been established, the principal extending from the Lower Congo to the equator—a distance of about 700 miles.

The Congo, at its mouth, is 6 miles wide, 150 fathoms deep, and from there to Vivi, the first settlement, or station, of the International Association, the distance is 115 miles. Two steamers now ply (January, 1885) this distance. Seven miles above Vivi the river is obstructed by thirty cataracts for about 40 miles, to overcome which a road has been constructed for land-travel to Insaugalia, a distance of 52 miles, from which point the river is again navigable for 73 miles, and upon which the association has placed a steamer to Manyanga. From Manyanga the river is again obstructed for 95 miles, along which another road is constructed to the fourth station, Leopoldville, upon Stanley Pool, 135 miles from Manyanga, where the river forms a great basin 25 miles long and 16 miles wide, with seventeen islands upon it. From this point, Leopoldville—named in honor of the king of the Belgians—there is an uninterrupted navigation through a magnificent and thickly-populated country for a distance of 940 miles, where the organization now has three steamers. The river is again obstructed below the equator for 16 miles at Stanley Falls, after which there is again uninterrupted navigation of 220 miles. At the end of this distance the river is obstructed by a fall 50 miles below Nyangwa, and by another 50 miles above it. Beyond this the stream to its source, in Lake Bangweolo, is imperfectly known, and is supposed not to be navigable.

In the beginning of 1879, Stanley, scarcely recovered from the hardships of his memorable journey, started once more for Africa, accompanied by an able corps of Americans, Englishmen, Belgians, Danes, and Frenchmen. Upon his arrival he placed his command at work in building stations, cutting roads, and doing feats of engineering which soon set the wave of civilization rolling toward the interior. It took eleven months to construct the highway to Stanley Pool, and there he built a large dwelling-house, a brick storehouse, huts for negroes, and an enclosed garden. When Stanley, in the month of July, 1881, arrived at the lake where the navigable part of the Congo commences, he found that the French explorer M. de Brazza had in the previous October concluded a treaty with the chief Makoko, who had ceded to France the sovereignty of the northern shore of the lake; and this was the beginning of the international conference on the condition of the Congo region in its relation to the Western powers which convened in Berlin in Nov., 1884, under the presidency of Prince Bismarck.

The great future of the equatorial belt of Central Africa, densely populated and highly favored by nature as it is, seems certain beyond a doubt; for the unique experiment of undertaking to open the way to civilization by treaty, purchase, and humane methods, rather than by aggression, plunder, and death, has borne fruits far beyond the dreams of its original projectors.

*Boundaries of the Congo Free State as defined by the Berlin Conference.*—The commerce of all nations shall enjoy complete freedom: 1st. In all the territories which constitute the basin of the Congo and its tributary waters. This basin is marked off by the crests of the contiguous basins—to wit, the basins of the Niari, of the Ogowé, of the Shari, and of the Nile, on the N.; by Lake Tanganyika, on the E.; by the crests of the basins of the Zambesi and of the Logé, on the S. It comprises, therefore, all the territories drained by the Congo and its tributaries, including among these Lake Tanganyika and its eastern tributaries. 2d. In the maritime zone extending along the Atlantic Ocean from the parallel of 2° 30' S. lat. to the mouth of the Logé. The northern boundary shall follow the parallel of 2° 30' S. lat. from the coast to the point where it meets the geographical basin of the Congo, and avoiding the basin of the Ogowé, to which the stipulations of the present act do not apply. The southern boundary shall follow the course of the Logé River as far as its source, and shall thence continue toward the E. to the junction with the geographical basin of the Congo. 3d. In the zone stretching to the E. of basin of the Congo, as above defined, to the Indian Ocean, from 5° N. lat. to the mouth of the Zambesi on the S. From this point the line of demarkation shall follow the Zambesi to a point 5 miles above its junction with the Shire, and shall continue by the line of the heights separating the waters which flow toward Lake Nyassa from the waters tributary to the Zambesi till it meets the dividing-line between the waters of the Zambesi and those of the Congo. The State of Congo joined the Postal Union Jan. 1, 1886. CHARLES P. DALY.

**Congressional Term, Limits of.** The Constitution of the U. S. provides that members of the House of Representatives in Congress shall be elected every second year. This determines the duration of each succeeding Congress. By a law of the Congress elected under the Articles of Confederation, passed Sept. 13, 1788, Wednesday, the 4th day of March, 1789, was appointed for the assembling of the first constitutional Congress and the inauguration of the new government. No quorum, however, was obtained in the House of Representatives on that day, or until the 1st of April following, and the President was not inaugurated till the 30th of the same month. Subsequently, by an act of the constitutional Congress, passed Mar. 1, 1792, it was declared that "the term of four years for which a President and Vice-President shall be elected, shall in all cases commence on the 4th day of March next succeeding the day on which the votes of the electors shall have been given." At Washington's second inauguration, and at the inauguration of every President since his time, the oath of office has been administered, in each fourth succeeding year, on the 4th of March, at 12 o'clock m.; and until 1851 it was understood that his term of service expired on the 3d of March at midnight of the fourth year following. The limit of the Congressional term was supposed to be the same; so that the legislative powers of each succeeding Congress were presumed to cease at midnight of the 3d of March of each alternate odd-numbered year. At the close of the 31st Congress, however, in 1851, a discussion arose in which the propriety of this limitation was called in question, and the point was made that, since in the Presidential years, a new administration is not inaugurated until 12 o'clock on the 4th of March, the interpretation of law commonly received would create an interreg-

num of twelve hours' duration. In conclusion, Mr. Speaker Howell Cobb of Georgia ruled that the term of an outgoing Congress did not expire until 12 o'clock noon of the 4th of March, and that rule has since stood. In conformity with this rule, on the 25th Feb., 1853, Pres. Fillmore, in calling a special session of the Senate to organize the administration of his successor, Franklin Pierce, issued a proclamation in the following words: "The attention of the President having been called to the proceedings of Congress at the close of its session on the 4th of Mar., 1851, from which it appears that the constitutional term of that body was held not to have expired until 12 o'clock at noon of that day; and a notice having been issued, agreeably to former usage, to convene the Senate at 11 o'clock A. M. on the 4th of March next, it is apparent that such call is in conflict with the decision aforesaid. Now, therefore, as well for the purpose of removing all doubt as to the legality of such call, as of establishing a precedent of what is deemed a proper mode of convening the Senate, I, Millard Fillmore, President of the United States, do issue this my proclamation," etc. etc. (convening the Senate for the 4th of March at 12 o'clock noon).

In 1867 a statute was passed declaring the rule specifically as follows: "In addition to the present regular times of the meeting of Congress, there shall be a meeting of the Fortieth Congress of the United States, and of each succeeding Congress thereafter, at 12 o'clock, meridian, on the fourth day of March, the day on which the term begins for which the Congress is elected, except that, when the fourth of March occurs on Sunday, then the meeting shall take place at the same hour on the succeeding day." (Approved Jan. 22, 1867.) This act was repealed Apr. 20, 1871, but as an authoritative declaration of the limits of the Congressional term it must be regarded as still of force. A new Congress, therefore, comes into existence at 12 o'clock at noon on the 4th of March of each odd-numbered year, and ceases to exist at the same hour of the same day in the second year next following, unless one or the other of those days happens to be Sunday, when the 5th of March is taken instead of the 4th of March. Under this rule it further appears that the political day throughout the sessions of Congress properly begins, for legislative purposes, at 12 o'clock m. of the calendar day of the same name. This rule was enforced in a manner to attract public attention during the progress of the count of the Presidential vote in February, 1877, when the Speaker, in the midst of an exciting debate, repeatedly arrested the discussion at 12 m. by announcing the beginning of a new political day, and the chaplain appeared and opened the new session with prayer. F. A. P. BARNARD.

**Congressman at Large**, a member elected to the House of Representatives by the voters of the entire State, instead of by districts in accordance with the ordinary plan. By the act of Feb. 2, 1872, a new apportionment was made of members of that House, the number being fixed at 292. A specific number of members was assigned to each State. It was then provided that in each State entitled under the apportionment to more than one Representative the number to which such State may be entitled in the Forty-third and each subsequent Congress shall be elected by districts composed of contiguous territory, and containing as nearly as possible an equal number of inhabitants, etc.; but on the election of members to the Forty-third Congress in any State to which an increased number of Representatives is given by this apportionment, the additional Representative or Representatives may be elected by the State at large. (*Revised Statutes Congress*, § 20-22.) It will thus be seen that the office of "Congressman at large" was a mere makeshift, devised in order to carry into effect the Apportionment act of 1872. The purpose having been accomplished, the office has ceased to exist. T. W. DWIGHT.

**Conneautville**, on R. R., Crawford co., Pa. (see map of Pennsylvania, ref. 2-A, for location of county), 35 miles S. S. W. of Erie. Pop. in 1870, 1000; in 1880, 941.

**Con'way** (MONCURE DANIEL), b. in Stafford co., Va., Mar. 17, 1832; graduated in 1849 at Dickinson College, Carlisle, Pa.; became a Methodist minister, and afterward a Unitarian pastor; in 1863 went to England, and in 1867 became a minister at Camden Town; published *The Earthward Pilgrimage* (1870), etc. He resigned the pastorate of the South-Place chapel, London, in 1884, and soon after returned to the U. S.

**Cook** (MARTHA WALKER), sister of Robert James Walker, b. in Pennsylvania in 1807; married to Lieut. (afterward Gen.) William Cook 1825. D. at Hoboken, N. J., Sept. 15, 1874. In 1864 she published the hymn, "In some way or other the Lord will provide." R. D. HITCHCOCK.

**Cook** (PHILIP), b. in Twiggs co., Ga., July 31, 1817; studied at Oglethorpe University and the University of Virginia; was admitted to the bar in Georgia; in 1861

joined the Confederate service as a private, and at the end of the war was a brigadier-general. In 1865 he was elected to the State convention; was subsequently elected to the 39th Congress, and, after the removal of all disabilities, to the 43d, 44th, and 45th Congresses.

**Cooke** (JOHN ESTEN), b. at Boston, Mass., Mar. 2, 1783; graduated in medicine at the Pennsylvania University 1805; professor at Transylvania University in 1827, and at the Louisville Medical Institute in 1837. D. near Louisville Oct. 19, 1853. He published a *Treatise on Pathology and Therapeutics* (2 vols., 1827-28), and a number of minor essays.

PAUL F. EVE.

**Cooperstown**, cap. of Griggs co., Dak. (see map of Dakota, ref. 3-F, for location of county). Pop. in 1885, 318.

**Coryphodon** [from Gr. *κορυφή*, "point," and *ὄδους*, "tooth"], an extinct genus of ungulate mammals from the lowest Eocene of Europe and America. The skull in this genus presents many perissodactyl features. It is elongated in the facial region, and the nasal opening is large. The dental formula is—incisors, 3; canines, 1; premolars, 3; molars, 3 × 2 = 44. The brain-cavity is quite small, as in all Eocene mammals, and indicates that the brain itself was of a very inferior type. Its most striking features were the small size of the hemispheres and the large expanded cerebellum. The limbs were short, and the femur had a third trochanter. The feet are especially interesting, as they present a primitive or generalized type, having five toes both before and behind. The first known species was described by Prof. Owen under the name *C. Eocenus*, and was from the London clay. *C. Oweni* is from the lowest Eocene of France. *C. hamatus*, the best-known American species, is from the base of the Eocene in Wyoming, and other species occur in the lowest Eocene of Utah and New Mexico. The genus is thus of great importance, as indicating the parallelism of European and American strata. The animals were about the size of the tapir. O. C. MARSH.

**Cotton** (Sir ARTHUR T.), b. 1803; entered the British service as second lieutenant of royal engineers (late Madras) in 1820; served throughout the Burmese war of 1824-26; became colonel and colonel-commandant (late Madras) engineers in 1854. In recognition of his services in promoting the growth of cotton in India he was knighted in 1861, and in 1866 was nominated K. C. of Star of India; major-general in 1862; lieutenant-general in 1867; gen. 1876.

**Cotulla**, on R. R., cap. of La Salle co., Tex. (see map of Texas, ref. 6-G, for location of county). Pop. not in census of 1880.

**Cones** (ELLIOTT), M. D., b. at Portsmouth, N. H., Sept. 9, 1842, has published numerous works on ornithology, mammalogy, herpetology, bibliography, and comparative anatomy. He graduated in 1861 from Columbian University, Washington, D. C., and has since received the degree of A. M. (1862), M. D. (1863), and Ph.D. (honorary) (1869) from the same institution. From 1863-81 he was assistant surgeon U. S. army, and has held various positions on government surveys and in government medical institutions. In 1877 he was appointed professor of anatomy in the medical department of Columbian University. Dr. Cones is chiefly known to ornithologists by his renowned *Key to North American Birds* (1872), the *New Key*, etc. (1884), and his *Field Ornithology*. Besides this, he has published other original works upon birds, rodents, and mammals. He is also author of several hundred minor monographs, and editor, or associate editor, of *American Naturalist*, *Standard Natural History*, *The Auk*, etc. He is a member of the American National Academy of Sciences and many other scientific societies in the U. S. and Europe. As a lecturer Dr. Cones is very eloquent, and his popular books are written in the same interesting style; while as a naturalist he ranks among the first class in America.

RALPH S. TARR.

**Coupeville**, cap. of Island co., W. T. (see map of Washington Territory, ref. 3-B, for location of county). Pop. in 1880, 90.

**Covington**, on R. R., Miami co., O. (see map of Ohio, ref. 5-C, for location of county), 79 miles W. of Columbus. Pop. in 1870, 1010; in 1880, 1458.

**Cox** (GEORGE WILLIAM), b. in 1827; was educated in Trinity College, Oxford, England; took holy orders in 1850; was a curate for several years; received an assistant mastership in Cheltenham College in 1860, and published *Tales of Ancient Greece* (1868), *A History of Greece* (2 vols., 1874), *Latin and Teutonic Christendom* (1870), *The Mythology of the Aryan Nations* (2 vols., 1870). In connection with W. T. Brande he edited the new edition of the *Dictionary of Science, Literature, and Art* (London, 3 vols., 1865-67).

**Cra'po** (HENRY H.), b. in Dartmouth, Mass.; was police-justice and tax-collector of New Bedford; removed to

Michigan in 1857; engaged in the manufacture of lumber, and also in farming; was mayor of Flint, State senator, and performed great service as governor near the close of the civil war. D. at Flint, Mich., July 23, 1869.

**Crested Butte**, Gunnison co., Col. (see map of Colorado, ref. 4-C, for location of county), on branch of Denver and Rio Grande R. R., 18 miles N. of Gunnison. Pop. about 1000.

**Creston**, R. R. junction, Union co., Ia. (see map of Iowa, ref. 7-F, for location of county), 190 miles W. of Burlington. Pop. in 1870, 411; in 1880, 5081.

**Crichton** (JAMES). The evidence of the extraordinary accomplishments of this remarkable person is very strong, and it is contradicted by little but its extreme improbability. But the close coincidence of the accounts of Crichton and another young literary prodigy of an earlier age—a fact not hitherto noticed, so far as we are aware—suggests a doubt whether his panegyrists have not borrowed their eulogiums, at least in part, from a chronicler of the preceding century. In the *Journal d'un Bourgeois de Paris de 1409 à 1449*, published in one of the volumes of Buchon's collection, *Choix de Chroniques, etc., XVe Siècle* (Paris, 1838), under the year 1446 is a narrative of the appearance at Paris of "a young man of about twenty, who, according to the testimony of all the clerks of the university, knew the seven liberal arts, played all instruments, practised chant and disant, painted and illuminated, better than any other at Paris or elsewhere. In military exercises none so dexterous; he wielded a two-handed sword incomparably, and sprang upon his opponent with a leap of twenty or more paces; he was a master in the arts and in medicine, a doctor of canon law and theology; he disputed publicly with more than fifty perfect clerks of the University of Paris and more than 3000 other clerks, and answered admirably all questions; he spoke excellently Latin, Greek, Hebrew, Chaldean, Arabic, and all other tongues. He was a dubbed knight, he surpassed the four doctors of the Church, and in fine was the nonpareil of the world." His knowledge, of course, came from the Evil One, though he himself was unaware of this diabolic possession, and thought his acquirements merely natural. The chronicler gives the predictions as to his future history, ending with his being carried off by devils at the age of thirty-three. (See CRICHTON, in CYCLOPÆDIA.) GEORGE P. MARSH.

**Croes** (JOHN), S. T. D., first Protestant Episcopal bishop of the diocese of New Jersey, was b. in Elizabethtown (now Elizabeth), N. J., June 1, 1762; served in the Continental army 1778-81, then engaged in teaching in Newark, N. J.; was ordained deacon Feb. 28, 1790, and priest Mar. 4, 1792. He was rector of Trinity church, Swedesborough, 1790-1801; of Christ church, New Brunswick, 1801-32. Queen's College, chartered in 1770, had been suspended in 1790. Mr. Croes reopened the school in 1801, and conducted it so successfully that on his resignation, in 1808, there were 70 scholars, and the trustees were encouraged to reorganize the college, which since 1826 has been known as Rutgers College. In 1811 he received the degree of S. T. D. from Columbia College; in June, 1815, was elected bishop of Connecticut, but declined; in August, 1815, was elected bishop of New Jersey, and consecrated Nov. 19, 1815. He died July 26, 1832. His published writings were his annual addresses as bishop and sermons on Christian unity and on the duty of contributing liberally to religious and benevolent institutions. He left two sons in the Protestant Episcopal ministry, John (d. 1849) and Robert Brown (d. 1878).

**Cro'ly** (DAVID G.), b. in New York City Nov. 3, 1829; learned the trade of silversmith; was for a time a student in New York University; taught phonography; was employed on the *Evening Post* and New York *Herald* from 1854 to 1858; was editor and proprietor of Rockford *Daily News*; city editor upon the New York *World* when it first started, subsequently managing editor; resigned in 1871, and has been since then managing editor of the *Graphic*, an illustrated newspaper. He is the writer of a *Life of Horatio Seymour*, and the author of a brochure entitled *The Positivist's Primer*; issued two numbers of the *Modern Thinker*; was the first to introduce the subject of minority representation to the American public in the *Galaxy* in 1866; has written on journalism in the magazines. In 1856 married the lady now known as "Jennie June."

**Croly** (JENNIE CUNNINGHAM), "Jennie June," b. in Leicestershire, England, came early to the U. S. with her parents, and in 1856 married David G. Croly of New York. She began her literary career as a contributor to daily, weekly, and monthly periodicals, her first published article appearing in the New York *Tribune*. She was a regular contributor to the New York *World* for thirteen years, to the New York *Times* and Noah's *Sunday Times* and

*Messenger* for ten years, and the weekly correspondent of the New Orleans *Delta*, Baltimore *American*, and other papers. The amount of her journalistic work, covering a period of thirty years, has been enormous, and she has, besides, published three books, *For Better or Worse*, *Talks on Women's Topics*, and a cookery-book. She inaugurated the system of duplicate correspondence, and has been connected editorially with Demorest's *Illustrated Monthly* since its start. Mrs. Croly called the first women's congress in New York, 1856, and also the second, 1869, and in 1868 inaugurated the Sorosis (see in *CYCLOPÆDIA*), and has won a reputation as an organizer as well as a literary woman and journalist of singular ability and untiring energy.

**Crowe** (BYRE), A. R. A., b. in London, England, Oct., 1824; studied painting under Paul Delaroche at Paris and Rome; was amanuensis for W. M. Thackeray in the U. S. 1852-53. Among his paintings are *Goldsmith's Mourners* (1863), *Queen of the May* (1879), and *Wood-Notes Wild* (1883).

**Crowther** (SAMUEL ADJAI), D. D., was a native of Africa; sold as a slave; captured by an English ship-of-war and left at Sierra Leone in 1822; received an education in Africa; taught school there at Regent's Town; baptized in 1822; accompanied first and second Niger expeditions, and wrote an able description of the latter; studied at Church Missionary College, Islington, England; ordained by bishop of London; was afterward actively engaged as a clergyman at Akessa, Africa; translated the Bible into Yoruba; was consecrated first bishop of Niger territory June 29, 1864; received a gold watch in 1880 from the Royal Geographical Society for his services to geography.

**Cru'se** (CHRISTIAN FREDERIC), b. in Philadelphia, Pa., in 1794; in 1817 graduated with honor in the University of Pennsylvania, having been the first moderator of the Philomathean Society of that college; after several years as Lutheran minister he was ordained in the Episcopal Church by Bishop White; was elected to a chair in the university in which he had been educated, and then held several pastoral cures, finishing his official service as librarian of the General Theological Seminary of the Episcopal Church, New York, Sept., 1865. "He was a library in himself," says the writer in an obituary notice of him at the time, "especially in theology and sacred literature in all their departments and languages, and of history extensively, both ancient and modern. Never have I known one who in my judgment understood his Bible so well. He was my living commentator, always ready on the most difficult texts, often original, yet strikingly natural in their interpretation. He was a true Christian philosopher, serene and patient as philosophy itself. Modest, meek, and reverential, in a saintly degree, he was yet a most independent thinker. Profound in his affection for the truth of God, but most impatient of the glosses of men. He had a strong aversion to ecclesiasticism, and yet was equally free from rationalism. He was simply and entirely a disciple of Christ; in patience, gentleness, and in loving acquiescence with the Divine will, he benignly reflected the spirit of his Master. . . . When the end came the saint, the scholar, and the sage, in the fulness of his years, gently glided to his rest among the beatified within the veil." He translated the *Ecclesiastical History of Eusebius Pamphilus* (Philadelphia, 1833) and the whole of Eschenburg's *Classical Manual*, only the part relating to Roman literature being incorporated in N. W. Fiske's translation (Philadelphia, 1836).

W. A. MUELENBERG.

**Cuba**, R. R. junction, Allegany co., N. Y. (see map of New York, ref. 6-D, for location of county). Pop. in 1880, 1261.

**Cul'om** (SHELBY M.), b. in Kentucky in 1829; studied law, was admitted to the bar, and began to practise at Springfield, Ill., in 1848; was elected to the State legislature in 1856, and re-elected in 1860; was a member of the war commission which sat in Cairo in 1862, and of the 39th and 40th Congresses; was again elected to the State legislature in 1872, and re-elected in 1874. He was governor of Illinois 1877-83; elected U. S. Senator Jan. 17, 1883, for term 1883-89.

**Cuero**, city, on R. R., De Witt co., Tex. (see map of Texas, ref. 6-I, for location of county). Pop. in 1880, 1333.

**Cumberland**, Barron co., Wis. (see map of Wisconsin, ref. 3-B, for location of county). Pop. in 1880, 246.

**Curtis** (EDWARD), A. B., M. D., b. at Providence, R. I., June 4, 1838; was educated in New York; graduated in 1859 at Harvard College; studied medicine at the University of Pennsylvania, where he took his degree in 1861; served in the regular army as a surgeon 1861-70; was appointed professor of materia medica and therapeutics at Columbia College, New York, in 1872; has devoted him-

self much to the study of photographing microscopic objects by means of the microscope, and has published various papers on the subject.

**Custer**, city, cap. of Custer co., Dak. (see map of Dakota, ref. 7-A, for location of county). Pop. in 1880, 271.

**Cut'ler** (HANNAH CONANT TRACY), b. Dec. 25, 1815; married in 1834 the Rev. J. M. Tracy, who died in 1843; prepared herself for the office of teaching; was appointed matron of a deaf and dumb asylum in Ohio; went in 1851 to Europe as a correspondent of the *Ohio Statesman*, and lectured in London on woman's rights; married in 1852 Samuel Cutler, and settled in Illinois, where she worked assiduously for the reform of the laws concerning women; was president of the Union Aid Commission in the war; graduated in 1869 at the Women's Medical College, Cleveland, O.; visited Europe again 1873-75, and settled at Cobden, Ill., where she is practising.

**Cyclostomoi'dea** [from *Cyclostomus*—κύκλος, "circle," στόμα, "mouth"—the typical genus], an extensive group of gasteropod mollusks of the order Pectinibranchiata and sub-order Tænioglossa, containing numerous species distinguished by a modification of the breathing apparatus for the respiration of air direct, and consequently for life on land, and by the circular mouth or peristome of the shell. The animal has its chief viscera contained in a spiral hernia-like sac, and a corresponding large shell to protect it; the mantle has a simple margin, and the pulmonary cavity is quite open above the neck; the branchiæ are vascular and branched, and analogous to the lungs; the head is rather broad; the muzzle quite long, extensible at the extremity, and frequently used to assist in progression; the tentacles are clavate or attenuated, and simply contractile; the eyes sessile on the outer sides of the bases of the tentacles; the lingual ribbon is narrow, and the teeth in seven rows (3-1-3), and recurved at their apices; the foot is broad, and with the sole frequently divided by a longitudinal groove; the shell is spiral and well developed, so as to perfectly include the animal on retraction, and the aperture is always nearly or quite circular, and with the peristome continuous; an operculum is developed, and has a median nucleus. The forms thus distinguished are not only not at all related, as was formerly generally thought, to the typical land shells and slugs (Helicidæ, etc.) of the temperate regions, but belong even to a different order. Their affinities are certainly with forms that are for the most part dwellers in the salt or fresh waters, and especially with the family Littorinidæ. The characters of the species combined under the general head above designated, and which by most authors, until within a few years, have been considered to constitute a simple family, are quite various; recent writers have therefore admitted several distinct families. These are—(1) Cyclostomidæ, (2) Cyclophoridæ, and (3) Pomatiidæ. The chief differences between these families are to be found in the modifications of the armature of the lingual ribbon or odontophore (and especially of the external lateral teeth), and modifications of the operculum. (1) In the Cyclostomidæ the external lateral teeth are very large and broad, and their recurved free margin deeply and finely pectinated; no jaws are developed. (2) In the Cyclophoridæ the external lateral teeth are of the same type as those of the innermost and median rows—i. e. rather narrow or simply lobate at the extremities; two lateral jaws of goodly size exist. (3) In the Pomatiidæ the external lateral teeth are atrophied or very small, and liable to be overlooked; jaws are present; other differences are coincident with these, but less obvious and universal. The genera recognized by recent authors are very numerous, and many of them are chiefly based upon modifications of the operculum: this may be paucispinal, as in the typical Cyclostomidæ and Pomatiidæ, or multispiral, as in the Cyclophoridæ; other characters exist in the structure, texture, and sculpture; e. g. whether provided with one or two layers, whether thick or thin, etc. The chief modifications have been used for the segregation of the genera into distinct sub-families. (1) The Cyclostomidæ, for example, have been divided into the sub-families Cyclostominæ, Cistulinæ, and Licineinæ; (2) the Cyclophoridæ into the sub-families Cyclophorinæ, Cyclotinæ, Pupininæ, and Diplommatinina: the Pomatiidæ are monotypic. The numbers of genera recognized by the best authors are from thirty to fifty, according to the degree of knowledge or conservatism of the individuals. Over 600 species have been described. These are mostly inhabitants of tropical or subtropical countries: numerous species, especially of Cyclostomidæ, are inhabitants of the West Indian islands, and in India and the neighboring regions the Cyclophoridæ are predominant. Very few species extend into the north temperate region, but more in Europe than in America.

THEODORE GILL.

## D.

**Dacres** (Sir SYDNEY C.), b. at Totnes, Devonshire, England, Jan. 9, 1804; entered the British navy 1817; became captain 1832, rear-admiral 1858, vice-admiral 1865, and admiral 1870; was distinguished as lieutenant in the reduction of the Morea Castle in 1828; as captain in the Crimean war; and as rear-admiral commanded the first iron-clad squadron, and in 1861, when trouble between England and America was imminent on account of the Trent affair, was selected as second in command on the North American and West India station; was senior lord of the admiralty 1868-72; governor of Greenwich Hospital 1872-76; in 1874 was placed on the retired list. In 1865 he was created a K. C. B.; was decorated with numerous foreign orders and medals. D. Mar., 1884.

**Dale** (SAMUEL), b. in 1772 in Rockbridge co., Va.; became a famous Indian fighter and trader among the Creeks and Cherokees; was major of Kentucky volunteers in the Creek war 1814, and brevetted brigadier-general; became a merchant at Dale's Ferry, on Alabama River, and was much in public life. D. in Lauderdale co., Miss., May 23, 1841.

**Dall** (CAROLINE HEALY), b. in Boston, Mass., 1824; engaged very early in literary pursuits; was married in 1844 to Charles Henry Apple Dall, a Unitarian minister; became in 1850 a regular contributor to *The Liberty Bell*, and in 1852 corresponding editor of *The Una*; lectured frequently, and published *The College, the Market, and the Court*, *Life of Marie E. Zakrzewska*, *Historical Pictures retouched*, and *Egypt's Place in History*.

**Dall** (WILLIAM HEALEY), son of Caroline Dall, b. Aug. 21, 1845, at Boston, Mass., educated in private and public schools in Boston; in 1863 a special pupil of Prof. Louis Agassiz and of Jeffries Wyman and Dr. A. A. Gould; served in Massachusetts militia in riots of July, 1863, but was not accepted for service in the field because of delicacy of physique. He held several positions on geological surveys, in 1866 going to Eastern Siberia in charge of the works of the Western Union telegraph expedition for an international line to Europe *via* Bering Straits. Since then he has made several expeditions to Alaska, making explorations for the U. S. coast survey. In 1884 he accepted the position of paleontologist to the U. S. geological survey. He is also honorary curator of Mollusca in the National Museum and a member of many scientific societies at home and abroad; published (1866-84) numerous scientific papers on brachiopods, molluscs, and the ethnology and general natural history of Alaska, and has prepared for the coast survey numerous charts. Besides his smaller papers, he is author of *Alaska and its Resources* (1870), *Meteorology and Bibliography of Alaska* (U. S. coast survey, 1879), *Coast Pilot of Alaska* (U. S. coast survey, 1884), and edited the *marquis de Nadaillac's Prehistoric Man*, with notes. RALPH S. TARR.

**Dalton**, Berkshire co., Mass. (see map of Massachusetts, ref. 2-C, for location of county), on Boston and Albany R. R., 146 miles W. of Boston, has important manufactures of paper, machinery, woollens, and cotton goods. Pop. of tp. in 1870, 1252; in 1880, 2052; in 1885, 2113.

**Damrosch** (LEOPOLD), b. at Posen, East Prussia, Oct. 22, 1832, studied medicine in Berlin and took his degree in 1854, but at the same time cultivated music with great ardor, and made his first public appearance as a violin virtuoso in Magdeburg in 1856. In the same year he obtained a position in the court orchestra of Weimar through the influence of Liszt, and in 1858 he was appointed leader of the Philharmonic Society in Breslau. There he remained until 1871, when he accepted a call from the Arion Society of New York to become its conductor. In 1873 he organized the Oratorio Society of New York, and in 1878 the Symphony Society of New York. In 1884 he was chosen director of the Metropolitan opera-house. D. Feb. 15, 1885. He published, besides a concerto and several minor pieces for the violin, a *Fest Overture*, *Ruth and Naomi*, a biblical idyl for solos and chorus, and twelve books of songs.

**Daniel** (WILLIAM), b. in Deal's Island, Somerset co., Md., Jan. 24, 1826, entered Dickinson College in 1844; studied law, and was admitted to the bar in 1856. Though the son of a slave-owner and educated among customs and laws maintaining slavery, he never gave his consent or support to the institution. He belonged to the Republican party, though living in a Democratic State, until, in

1884, he openly severed his allegiance to it and became the candidate of the Prohibition party for Vice-President. He is the president of the Maryland Temperance Society, and was instrumental in the enactment of the so-called Option law in that State.

**Dan'iel** (WILLIAM COFFEE), M. D., b. in Greene co., Ga., 1792. In 1821-22 he originated the revulsive stimulating treatment in opposition to calomel and purgatives. He is the author of extension by weights in fractures of the thigh; was a collaborator several years to the *Philadelphia Journal of Medical and Physical Sciences*; was also editor of the *Savannah Daily Republican*; in 1825 published a monograph on autumnal fevers; in 1866-67 wrote several articles on fish-culture; in 1818 was health officer of Savannah; in 1823-24 was mayor of that city. He was also member of the Georgia legislature, and during the war was receiver for that State. D. in Liberty co., Ga., 1868. PAUL F. EVE.

**Dark Day.** In New England and in the neighboring States of New York and New Jersey the term "Dark Day" is usually understood to refer to the dark day of 1780, notices of which are found in Barber's (J. W.) *Historical Collections of Connecticut* (New Haven, 1838) and of New England and New York (Worcester, 1841); in Webster's (N.) *History of Pestilential Diseases* (Hartford, 1799); in Munsell's (J.) *Every-Day Book of History and Chronology* (New York, 1858), and in the *Collections of the Massachusetts Historical Society* (1st series, vol. i.). Except the last, these notices are brief, and none of them, with the same exception, give any description of the meteorological phenomena accompanying the approach of the darkness or prevailing during its continuance. Meagre as they are, however, they are more full than those we have of any of the not very rare similar occurrences of earlier or later date. In 1678, Munsell records "a remarkable darkness at noon in England," and in a paper by Dr. W. Derham, published in the *Philosophical Transactions of the Royal Society*, vol. xxxvii., the 1st of Jan., 1807, is said to have been a "cloudy dark day" at Upminster in Essex co., England. In the same paper the author makes the 1st of Oct., 1816, also a "close dark day." He presents, in addition to this, a meteorological table kept at Cambridge, Mass., by Mr. Thomas Robie, by concert with himself in England, for the years 1815 and 1816, and cites the following from Mr. Robie's annotations: "On Oct. 21 (1816) the day was so dark that people were forced to light candles to eat their dinners by; which could not be from an eclipse, the solar eclipse being the 4th of that month." This day is also referred to by Webster, who says that "in Oct., 1816, a dark day occurred after a severe winter in Europe." Barber also mentions this day as "a remarkable dark day in New England and New York." The 9th of Aug., 1732, is mentioned by Webster as another dark day (apparently in Europe), followed by an earthquake and a winter of unusual severity. In Munsell we find the 19th of Oct., 1762, set down as a "dark day at Detroit—one of the darkest days that ever was known." This is likewise spoken of by Webster, who adds that "there was a dark-red or yellowish tinge in the heavens [before sunrise], which gave to the sun when it appeared the color of blood. Rain fell, and the water was of a dirty sulphurous smell." A very remarkable instance of intense darkness of only brief duration, occurring by day, is mentioned by Munsell as having taken place in Canada Oct. 16, 1783. Webster also refers to this, adding that "thunder-squalls and a meteor followed the great darkness in Canada in 1783." In Howard's *Climate of London*, vol. ii., we find the following relating to a dark day in London: "1812, May 10, London was this day involved for several hours in palpable darkness. The shops, offices, etc., were necessarily lighted up, but the streets not being lighted as at night, it required no small care in the passenger to find his way and avoid accidents." Less than two years later than the occurrence here described the same city was visited by a succession of dark days, beginning with an extremely dark night caused by a great fog which came on with the evening of Dec. 27, 1813. (See Hone's *Every-Day Book*, under the title of "Great Frost, 1814.") In Howard's *Climate of London*, above referred to, the 26th Nov., 1816, is entered with the annotation, "Very misty A.M.; cirro-stratus sweeps the ground."

The several hypotheses which have been suggested in explanation of this subject, and which seem to exhaust the



limited list of possibilities, are as follow: (1) The smoke of vast burning forests, loading the atmosphere and shutting out the light of the sun. (2) Dense exhalations of smoke and ashes from volcanoes, transported by the upper currents of the air. (3) Vapors generated by the internal heat of the earth, and escaping through fissures in its crust. (4) Smoke produced by the combustion of large meteors traversing the atmosphere. (5) Cosmical dust drifting into the atmosphere from the regions of outer space. (6) Terrestrial dust raised in clouds from deserts, and swept to great distances by atmospheric currents. (7) Ordinary clouds of extraordinary density, reinforced in the neighborhood of large towns by the smokes of countless fires, as well as by those of furnaces and factories.

The first of these hypotheses is disposed of by Dr. Webster very summarily, by presenting two conclusive considerations, which are—(1) that there has been no evidence of the occurrence of great forest conflagrations immediately before these days of darkness or simultaneously with them; and (2) that if such conflagrations had existed, the cause is not adequate to the observed effect, "Had the woods," he remarks, "from the 40th to the 50th parallel of latitude been consumed in a day, the smoke would have been insufficient to produce the darkness of the 19th May, 1780." And as a further confirmation of this conclusion, he adds that the color of smoke is very different from that of the obscuring stratum on the day referred to.

The second hypothesis above mentioned is equally untenable with the first. It is not indeed to be questioned that the exhalations of volcanoes are often dense enough and voluminous enough to shut out the light of the sun from the regions which they overhang. During the eruption in which Pompeii was destroyed the whole country surrounding Vesuvius was involved in the darkness of night. But the dark days we have described above occurred in localities far distant from any volcanic crater, and it is not conceivable that the fumes of volcanic eruptions should have been borne so far and maintained in density sufficient to produce the observed effect without obscuring the intermediate region. There have been, nevertheless, some examples, not indeed of darkness, but of a very remarkable haziness widely diffused through the atmosphere, and involving a whole hemisphere or perhaps the entire globe at once, to which such exhalations may have contributed; as, for instance, the so-called dry fog of 1783. But though it appears that volcanic fumes, or exhalations from fissures in the earth, or the smoke of burning meteors, or accessions of impalpable dust from the regions of space may be presumed with reason sometimes to affect the general transparency of the atmosphere, no one of these causes suggests an explanation applicable to a case of darkness like that of May 19, 1780.

We must equally reject the hypothesis which finds an explanation of these phenomena in the smoke of meteoric bodies consumed in the atmosphere. It is surprising that it did not occur to men like Franklin and Arago that a fire-ball large enough to leave behind it so voluminous and permanent traces of its passage must have been altogether too bright to escape observation somewhere in its flight, if not indeed over half a continent.

Nor is it possible to speak more favorably of that which ascribes the darkness to a cloud of dust falling into the atmosphere from the regions of space; inasmuch as, except the fact of the darkness itself, there is no evidence to sustain this notion, while the circumstances attending the cessation of the phenomena seem decidedly to contradict it. Such a cloud could disappear only by subsidence, or by dissipation through the agency of atmospheric currents, or by the joint effect of these causes combined. A cloud so dense could not subside without leaving a deposit on all exposed surfaces; and a cloud so extensive could not be dispersed without exhibiting a succession of phases of gradually diminishing darkness extending probably through many days, and producing at the same time a greater or less amount of obscuration over the adjacent territory; none of which phenomena are recorded as having been observed after any of the dark days we have been considering.

The hypothesis which ascribes the darkness to clouds of terrestrial dust or sand transported by atmospheric currents must also be dismissed. The cause is no doubt a sufficient one, since, when the sand-storms of Northern Africa are at their height, the light of the sun is often completely extinguished; but in these cases the cloud sweeps along the earth's surface and fills the lower air, so as to produce literally "a darkness which may be felt." But there is no source within New England or the adjacent States from which a dust-cloud could have been raised adequate to produce the darkness of May 19, 1780, nor was there in that instance any mixture of such dust in the lower air, nor any deposit left behind.

In the absence, therefore, of any other supposable cause, we are compelled to attribute these examples of extraordinary darkness simply to the presence of ordinary clouds of very unusual volume and density. Nor will this explanation appear insufficient, when we consider that in the experience of every one occasions are not of very rare occurrence when, for intervals of a few minutes, the darkness produced by heavy rain-clouds is so great as to make it impossible to read or write without artificial light. In such cases it would be only necessary that the cloud should be a little more dense, more general, and more persistent to reproduce the dark day of 1780. The circumstances attending the cessation of the darkness are moreover in harmony with this theory. The immense volume of precipitated vapors discharges itself in torrents of rain or heavy falls of snow, or is re-vaporized by the solar heat, and the atmosphere resumes its previous transparency. No deposit of dust or sediment appears upon the earth, and no lasting haziness lingers in the air. In reference to the dark days of London, it may be remarked that the truth of the explanation here proposed is unquestionable. In the most remarkable of those instances the fog was the obvious cause of the darkness, and fog is but a cloud resting on the earth. The smoke of countless fires, of course, contributed to the effect, but this alone could not have sufficed; otherwise, during winter London would never enjoy the natural light of day.

F. A. P. BARNARD.

**Da'sent** (GEORGE WEBBE), b. about 1818; graduated in 1840 from Magdalen Hall, Oxford; was called to the bar at the Middle Temple in 1852, and appointed civil service commissioner in 1870; was for many years a steady contributor to the *London Times*, and became in 1871 editor of *Fraser's Magazine*. He has translated *The Younger Edda* (1842), and published *The Norsemen in Ireland* (1855), *The Story of Burnt Njal* (1861), *Selection of Norse Tales* (1862), etc.; also edited *An Icelandic-English Dictionary*, based on the MS. collections of the late Richard Cleasby, enlarged and completed by Gudbrand Vigfusson (1874).

**Davenport**, cap. of Lincoln co., W. T. (see map of Washington Territory, ref. 3-E, for location of county). Pop. not in census of 1880.

**Davenport** (IRA), b. at Hornellsville, N. Y., June 28, 1841; removed to Bath, Steuben co., N. Y., when only six years old; educated there and at New Haven, Conn.; was elected to New York Senate in 1877, and re-elected in 1879; served during both terms as chairman of committee on commerce and navigation; in 1881 he was elected controller of the State of New York, and in 1884 was chosen to represent Steuben, Yates, and Ontario cos., N. Y., in Congress. Sept. 23, 1885, he was nominated for governor of New York by the Republican State convention at Saratoga.

**Da'vidson** (GEORGE), A. M., Ph. D., b. at Nottingham, England, May 9, 1825, of Scottish parents; came to the U. S. in 1832, and graduated in 1845 at the Central High School of Philadelphia; entered the U. S. Coast Survey; served in the States bordering the Atlantic and Gulf coasts until 1850, when selected to take charge of a party to the Pacific coast; worked continuously upon the western coast, except during the civil war, when he served on the Atlantic and Gulf coasts; was appointed chief engineer of an expedition for the survey of a ship-canal route across the Isthmus of Darien; in 1867 made a geographical reconnaissance of the coast of Alaska, and reported upon its products, etc., to Congress; in 1868 returned to the Pacific coast, and had charge of the field-work of the parties there; in 1869 brought the San Francisco observatory in telegraphic longitude connection with Greenwich; in 1869 took charge of the expedition to Alaska to observe the total solar eclipse of August; in 1873 determined the 120th meridian; in 1874 conducted the U. S. transit-of-Venus party to Japan; at Nagasaki connected the American and French transit-of-Venus stations by triangulation; visited China, India, Egypt, and Europe for scientific study, the results of which have been embodied in a special report to the superintendent of the Coast Survey; returned to the Pacific coast, and is now in charge of the telegraph-longitude work and of the main triangulation and astronomical party carrying the geodetic work across the continent. During the last twenty-seven years he has continued determinations of the magnetic elements from lat. 32° to 60°; and in 1874 carried a series of dip and declination observations across the Pacific; has improved the character of the instruments used in his observations; published numerous works on transit instruments and observations, irrigation, harbor and river improvements, and many communications in the *Proceedings* of the California Academy of Sciences, of which he has been president for several years, and is a member of various scientific societies.

**Davidson** (SAMUEL), D. D., LL.D., b. in 1807 near Ballymena, Ireland; studied at the Royal College of Belfast, where he was appointed professor of biblical criticism and literature in 1835; removed in 1842 to Manchester as professor of biblical literature and Oriental languages at the Lancashire Independent College, but subsequently resigned this position and settled in London. Of his numerous works the most remarkable are—*Introduction to the New Testament* (3 vols., 1848–51; new ed. in 2 vols., 1868), *Introduction to the Old Testament* (3 vols., 1862), *The Doctrine of Last Things contained in the New Testament* (1883).

**Davidson** (THOMAS), M. A., b. Oct. 25, 1840, near Fetterangus, parish of Deer, Aberdeenshire, Scotland; graduated with highest classical honors and the Simpson Greek prize at Aberdeen in 1860; was for several years rector of the grammar (Latin) school of Old Aberdeen, and subsequently master in several English schools; spent considerable time in France and Germany; came to Canada in 1866, and to the U. S. in 1867, and after spending eight years in St. Louis, removed to Cambridge, Mass., in 1875. Mr. Davidson has contributed to various periodicals numerous philological and philosophical articles. He was for several years connected with the *Round Table*, and at the same time edited the *Western Educational Monthly*, which afterward, under his conduct, changed its name and became *The Western*. He undertook a translation of the complete works of Aristotle.

**Davis** (PAULINA WRIGHT), b. at Blumfield, N. Y., Aug. 7, 1813; was married in 1831 to Francis Wright of Utica, N. Y., and after his death in 1844 was married in 1849 to Thomas Davis of Providence, R. I. D. Aug. 24, 1876. She was an uncompromising advocate of the enfranchisement of women, established *The Una*, wrote a history of the woman-suffrage reform, and gave lectures frequently.

**Dawes** (REV. WILLIAM RUTTER), b. at Christ's Hospital, London, Mar. 19, 1799, where his father was mathematical master. Educated for the Church, but dissatisfied with some of its tenets, he studied medicine under Abernethy and Sir William Lawrence; gave up practice in 1826, and assumed charge of a small Independent church at Ormskirk, where was his first small observatory, though previously he had done much work privately with a telescope supposed to be but 1.6 inches aperture; took charge of Mr. Bishop's observatory, Regent's Park, 1839, where he remained until 1844; in 1846 began work in his own observatory at Cranbrook, in Kent, which he finally (1857) removed to Hopefield, Haddenham-near-Thame, where he resided until his death, Feb. 15, 1868. His work was mostly with the double stars, and is justly distinguished for its accuracy. It is mostly contained in *Memoirs R. A. S.*, vols. viii., ix., and xxxiv., and the separate volume published by Mr. Bishop. (For a catalogue of his scientific papers, see *Royal Society's Index of Scientific Papers*.) Elected F. R. A. S. in 1830; received the gold medal R. A. S. 1855; elected F. R. S. 1865. L. WALDO.

**Death Valley**, California, so called because a party of emigrants, on their way to California, perished there from thirst and starvation in 1849. About eleven years afterward Dr. I. R. N. Owen, of the U. S. and California boundary survey, followed the marks of their wagon-wheels, and discovered the remains of their fires and the iron of their wagons on the spot where they had camped, these remains being perfectly preserved in this rainless region. This valley is the most northern of a chain of desert basins extending from the head of the Gulf of California northward, embracing the Colorado Desert, the Mohave Desert, and the Amargosa Desert, or "Death Valley." It is situated in the south-eastern portion of Inyo co., Cal., about lat. 36° 15' N. and lon. 116° 50' W. The basin or sink is about 39 miles long and 11 miles wide, extending in a direction nearly N. and S. It is surrounded on all sides by very high and precipitous mountains, the most conspicuous of which are the Panamint Mountains on the W. and the Amargosa Mountains on the E. It is a dreary and desolate region, nearly destitute of water and vegetation, fearfully hot in summer, and occasionally swept by terrible sand-storms. The Amargosa River flows into the southern end of the valley, and Furnace Creek runs into the eastern side of its northern extremity; all the waters sink when they reach the valley. The soil is covered with a white alkaline efflorescence, but in winter it is somewhat marshy near the centre. The formations surrounding it are, to a large extent, volcanic, obsidian being abundant on the W. slope of the Amargosa Mountains. One of the most interesting features connected with the topography of this portion of California is the fact that this valley, although far in the interior of the continent—being on the E. side of the lofty Sierra Nevada range and 200 miles from any sea—is from

150 to 200 feet below the sea-level. This fact has been established by careful barometric measurements. Until recently this was supposed to be true of no other part of the North American continent at any considerable distance from the coast; but it is now known, by means of careful levellings, that a large portion of the Colorado Desert in San Diego county, about 200 miles farther S., is below the level of the sea, the greatest depression near the northern extremity, Dry Lake, being from 250 to 300 feet below the sea-level. It may be interesting to add that the remarkable depression of Death Valley occurs in comparative proximity to the loftiest peaks of the Sierra Nevada Mountains, the crowning peak, Mount Whitney, being about 75 miles to the W. of it.

JOHN LE CONTE.

**Decalcomanie** [Fr. *décalquer*, to "counterdraw," and *manie*, "fancy"], the art of transferring pictures and designs permanently upon fabrics of various descriptions, china, glass, marble, wood, leather, etc. The process is very simple. The article to be decorated is carefully washed from grease or dust; the picture to be applied is coated thinly with prepared cement. The picture is then placed in the position required and pressed tightly with a cloth or rolled over with a heavy roller. Finally, a damp sponge is applied to the upper surface till the paper becomes sufficiently moist, after which it can be easily removed, and the picture will remain firmly and permanently upon the object.

**Decatur**, R. R. junction, Morgan co., Ala. (see map of Alabama, ref. 2-C, for location of county), on Tennessee River. Pop. in 1870, 671; in 1880, 1063.

**Deep River**, Middlesex co., Conn. (see map of Connecticut, ref. 6-E, for location of county), on R. R. Pop. not in census of 1880.

**De Ko'ven** (JAMES), b. at Middletown, Conn., Sept. 19, 1831; graduated at Columbia College, New York, in 1851, and at the General Theological Seminary in the same city in 1854; was admitted to the diaconate of the Protestant Episcopal Church the same year, and to the priesthood the year following; was rector of a church at Delafield, Wis., for five years, and became warden of Racine College in the same State in 1859; in Feb., 1875, was elected bishop of Illinois, but failed to be confirmed on account of his extreme High Church views. D. at Racine, Wis., Mar. 19, 1879. J. B. BISHOP.

**DeLafield** (EDWARD), b. in the city of New York in 1794; had every advantage of education, and graduated at Yale College at the age of eighteen in 1812; began the study of medicine in the office of Dr. Samuel Borrowe of New York, and at the age of twenty-one graduated at the College of Physicians and Surgeons in 1815. Soon after this he went to London for clinical study, and became a pupil of Sir Astley Cooper and Mr. Abernethy; remained abroad about a year, and on his return to New York he, in conjunction with Dr. J. Kearny Rodgers, established the New York Eye and Ear Infirmary in 1820. He was attending surgeon to the same till 1850, when he resigned and was made one of its consulting surgeons; in 1825 was appointed professor of obstetrics and diseases of women and children in the College of Physicians and Surgeons, and resigned in 1838; in 1834 was appointed physician to the New York Hospital; in 1842 organized the Society for the Relief of the Widows and Orphans of Medical Men, and was its first president; in 1855 was elected consulting surgeon to the Woman's Hospital, and in 1866 was elected president of its medical board; in 1858 was elected president of the College of Physicians and Surgeons; in 1870 became, by virtue of his presidency of the College of Physicians and Surgeons, one of the governors of the Roosevelt Hospital, was elected first president of the board of governors, and was chairman of the building committee. D. Feb. 13, 1875. J. MARION SIMS.

**DeLafield** (FRANCIS), M. D., b. in the city of New York Aug. 3, 1841; graduated at Yale College in 1860; was appointed adjunct professor of pathology and practical medicine in the College of Physicians and Surgeons of New York, and published a *Handbook of Post-mortem Examination*.

**De Land**, city, on R. R., Volusia co., Fla. (see map of Florida, ref. 2-F, for location of county), 5 miles E. of landing on St. John's River, is in the centre of a great orange belt and about 25 miles from the Atlantic Ocean, and has several churches and an academy. Pop. not in census.

**Delta**, cap. of Delta co., Col. (see map of Colorado, ref. 4-B, for location of county), on R. R. and Gunnison River. Pop. not in census of 1880.

**Deming**, R. R. junction, Grant co., N. M. (see map of New Mexico, ref. 8-I, for location of county). Pop. not in census of 1880.

**Dempster**, cap. of Hamlin co., Dak. (see map of Dakota, ref. 6-G, for location of county). Pop. not in census of 1880.

**De Pauw University.** In 1832 the Indiana Conference of the M. E. Church determined to establish an institution of advanced instruction. Two years afterward this was founded at Greencastle, the county-seat of Putnam county, under the name of "The Indiana Asbury University." A preparatory school was opened in the fall of 1836, under Rev. Cyrus Nutt. A well-devised and liberal charter was secured from the legislature, and obtained the signature of the governor of Indiana Jan. 10, 1837. Sept. 23, 1839, the first faculty of instruction and government was constituted. The first class was graduated in 1840. Such was the unpretentious beginning of what has already risen to the front rank among institutions of learning established and maintained by the Methodist Church. From a small hired building of but two rooms, it now (1885) possesses nine large buildings. At the beginning it did not own a foot of land; now its grounds embrace 150 acres, 30 in the very centre of Greencastle, and the remaining 120 acres within three squares of the centre of the city. From a faculty of four members, its present staff of instruction comprises 35 professors and teachers, besides occasional lecturers, with libraries, biological, chemical, and physical laboratories, and all the appliances of advanced instruction. It is now so well endowed as to afford instruction without any charge for tuition in its preparatory school, its Asbury college of liberal arts, and its theological seminary, while the charges in the law school, conservatory of music, etc. are very moderate. Beginning with 39 students, mostly from the immediate neighborhood, its attendance now exceeds 600, and from nearly all parts of the world. Its advancement during the past few years has been especially marked, mainly owing to wise administration in its halls, and to the princely liberality of Hon. W. C. De Pauw, whose name it now bears. Located in the centre of the Upper Mississippi Valley, in a city easily accessible and remarkably healthy, and admitting all, without distinction of sex, party, color, religion, or nationality, to equal privileges in its halls, its future is unusually promising.

ALEXANDER MARTIN.

**Depuy' (HENRY WALTER)**, b. at Pompey Hill, Onondaga co., N. Y., in 1820; studied law, and was admitted to the bar, but adopted the profession of journalism, and settled in Indianapolis; was private secretary to Gov. Seymour 1853-54; then secretary of legation at Berlin, but returned in 1860, and was appointed secretary of Nebraska, and subsequently Indian agent to the Pawnees. D. in New York Feb. 2, 1876. He wrote *Kossuth and his Generals*, *Louis Napoleon and his Times*, *Ethan Allen*, etc.

**Derby**, R. R. junction, New Haven co., Conn. (see map of Connecticut, ref. 6-D, for location of county), at the confluence of the Naugatuck and Housatonic rivers, has extensive and varied manufactures. Pop. of tp. in 1870, including Derby village, Ansonia, and Birmingham, 8020; in 1880, 11,650.

**D'Escot, Esclot, or Sclot (BERNAT)**, an important Catalan historian, whose *Chronicle* was first published in the original text by Buchon, together with a translation of Muntaner and other matter in his *Collection of Chroniques étrangères relatives aux Expéditions françaises pendant le XIIIe Siècle* (Paris, 1841, 8vo). The years of D'Escot's birth and death are unknown, but his *Cronica del Rey En Pere e dels seus antecessors passats* appears to have been composed in 1285. It embraces a summary view of the earlier history of the Aragonese kings of the family of the counts of Barcelona, but its proper subject is the reign of King Don Pedro, extending from 1276 to 1285. This period comprises the Sicilian Vespers and the expulsion of the French from that island, the intended duel between Charles of Anjou and Pedro, the excommunication of Pedro and the bestowal of his kingdom upon Charles de Valois by the "apostle" or pope, the invasion of Catalonia by Philip the Bold, and the death of that monarch at Perpignan; respecting all which stirring events D'Escot is one of the best authorities. D'Escot's *Chronicle* has not the fervor, the "wrath and partiality," of Muntaner's chivalric narrative, but it is not therefore less trustworthy; and it often contains piquant details which Muntaner sacrificed to his rhetoric. Buchon praises with justice D'Escot's account of the Sicilian Vespers, his description of the wild soldiery called *Almogavars*, and of the arrival of Roger de Loria's fleet at Barcelona, and other passages; but in the opinion of the present writer the narrative of the challenge to Charles d'Anjou by Pedro (chap. xcix.), its acceptance by Charles (chap. c.), and the journey of Pedro to Bordeaux, where the duel was to be fought (chaps. civ. and cv.), is surpassed by nothing in the *Chronicle*; and indeed a more striking historical recital of an actual occurrence of the "age of chivalry" is not to be found in any other mediæval annalist. D'Escot's is the oldest histor-

ical composition of any moment which remains to us from the early stage of the Catalan language, and it is therefore of great linguistic as well as literary interest.

GEORGE P. MARSH.

**Des'eret, University of**, located in Salt Lake City, Ut., was incorporated in 1850 by an act of the legislative assembly of the State of Deseret, and in 1851, after the organization of the present Territory of Utah, this act of incorporation was legalized by the Territorial legislature. The government of the institution is vested in a chancellor and twelve regents, and in Nov., 1851, it was opened for the reception of students under the supervision of Orson Pratt, Sr. Owing to lack of patronage, the school was discontinued till 1867, when, under the leadership of David O. Caldee, it was started as a commercial college. In 1869, under the presidency of John R. Park, M. D., a scientific, a classical, and a normal department were added to the commercial, and in 1870 were established an academical and a model school department, preparing the students for the college course; which two departments have been in very successful operation since that time.

**De Smet**, cap. of Kingsbury co., Dak. (see map of Dakota, ref. 6-G, for location of county), on Chicago and North-western R. R. Pop. in 1880, 116.

**Desmoulins' (BÉNOT CAMILLE)**, b. at Guise, Aisne, France, Mar. 2, 1760; studied law in Paris, and embraced the ideas of the Revolution with boundless enthusiasm. His two pamphlets, *La Philosophie au Peuple français* (1788) and *La France libre* (1789), not only attracted attention, but exercised influence; and his wild, passionate addresses in the gardens of the Palais Royal (July 12, 1789) raised the public excitement to a point where it could not be controlled, and became the immediate introduction to the Revolution. In his periodical, *Révolution de France et de Brabant*, which was reprinted in 1833, and is still read with a singular mixture of horror and admiration, he gave to the passion of the moment some of its most brilliant and some of its most revolting catchwords, and the Reign of Terror, although enacted by other persons and overtaking him as one of its first victims, was nevertheless begotten within his brain. He was one of the founders of the Jacobin Club and one of the leaders of the rising Aug. 10, 1792; as a member of the Convention he voted for the death of the king without appeal, and he dealt the party of the Girondists the decisive blow by his *Histoire des Brissotins*, which covered them with ridicule and contempt. But when, after the fall of the Girondists, the Jacobins separated into two parties, the *Enragés* under Hébert, and the *Indulgents* under Danton, Camille Desmoulins joined the latter, and his paper, *Le vieux Cordelier*, is a courageous, often a noble, denunciation of the excesses of the Revolution. These excesses, however, were in reality simply the consequences of his own ideas, and it seems not unnatural that he should fall a victim to them. He was twice accused as a traitor, but saved by Robespierre, his former school-mate, who felt a kind of personal attachment for him, and who gave in his speeches some very striking characterizations of his noble enthusiasm and dangerous talent, of the peculiar tenderness and waywardness of his character. But when at last it became necessary for Robespierre to crush Danton, Camille Desmoulins could not be saved. He was arrested Mar. 30, 1794, sentenced to death without being allowed to defend himself, and dragged to the guillotine Apr. 5, while tearing his clothes in agonies of terror and despair, and making the most piteous appeals to the surrounding populace. His young wife, whom he loved tenderly, tried to rouse the mass in his defence, but was arrested and guillotined about two weeks afterward.

CLEMENS PETERSEN.

**De Soto**, city, on R. R., Jefferson co., Mo. (see map of Missouri, ref. 5-J, for location of county), 43 miles S. W. of St. Louis. Pop. in 1880, 989.

**Det'mold (WILLIAM)**, M. D., b. in 1808 in Hanover, where his father was court-physician; studied medicine in Göttingen, where he graduated in 1830, and soon after entered the Hanoverian army as surgeon. After visiting England and France, he came in 1837 to New York, where he settled after resigning his commission in the army. He introduced orthopædic surgery in this country, and held the chair of clinical and military surgery in the College of Physicians and Surgeons, Columbia College. During the war of the rebellion he volunteered his services on most of the large battle-fields in Virginia. He introduced an improved knife for the use of one-armed men, which under the name of "Dr. Detmold's knife" is furnished by the government to all men who have lost an arm or hand in the line of duty. He has largely contributed to the periodical medical literature of this country.

**Devereux' (JOHN HENRY)**, b. in Boston, Mass., Apr. 5, 1832; was educated at Portsmouth, N. H., as a civil engi-

neer, and began to work at once upon the construction of railroads. From 1848 to 1861 he was engaged in the building of railroads in Ohio and Tennessee. He was called to Washington by the government Mar. 31, 1862, and in April following was appointed superintendent of military railroads. In Mar., 1864, he resigned the charge of Virginia railroads, and became superintendent, and subsequently vice-president, of the Cleveland and Pittsburgh R. R.; resigned the latter position in 1868, and became president of the Lake Shore R. R., and afterward became general manager of the consolidated Lake Shore and Michigan Southern R. R. Resigning in June, 1873, he was elected president of the Cleveland Columbus Cincinnati and Indianapolis R. R. Co., and president of the Atlantic and Great Western Railway Co.; he became president of the former and receiver for the latter. J. B. BISHOP.

**Devil's Lake**, on R. R., cap. of Ramsey co., Dak. (see map of Dakota, ref. 2-E, for location of county). Pop. in 1885, 900.

**De Witt** (THOMAS), D. D., b. at Kingston, N. Y., Dec. 13, 1791; graduated in 1812 at the theological seminary, New Brunswick, N. J.; entered the Dutch Reformed ministry; was minister of the Collegiate church, New York, 1827-74. He was a man of profound learning, and an able preacher in the English and Dutch languages. Among the important positions held by him were the presidency of the board of publication of his own denomination; the presidency of the New York Historical Society, of the New York City Mission and Tract Society, etc. He was connected with many educational and charitable enterprises, and was widely known. D. in New York May 18, 1874.

**Dexip'pus** [Δέξιππος], a Greek philosopher, pupil of Iamblichus, lived about A. D. 355. He wrote commentaries on Plato and Aristotle, and sought to defend the latter against the attacks of Plotinus. There is extant a treatise of his on the *Categories* of Aristotle, but only in a Latin translation, which was printed at Paris (8vo, 1549).

HENRY DRISLER.

**Dexippus** (PUBLIUS HERENNIUS), (Δέξιππος Ἡρηνίους Ἡρηνίος), son of Ptolemæus, an Athenian of the deme Hermus, a celebrated rhetorician, historian, and soldier; lived in the third century after Christ. He was a man of great learning, and attained the highest honors in his native state. He also was appointed commander of the army against the Goths (Seythians), who had invaded Attica, and defeated them. Though Athens was captured by the Goths, yet they were driven out of Attica by Dexippus, and their fleet was destroyed at the Piræus. A public statue was erected to his honor, the base of which, with its inscription, still exists. Photius gives the titles of three historical works by Dexippus: (1) *Tὰ μετὰ Ἀλέξανδρον*, the history of Macedonia after Alexander, in 4 books; (2) a chronological history (*Χρονικὴ Ἱστορία*) from the beginnings of history to 268 A. D., which was continued by Eunapius; (3) *Σκυθικά*, history of the war with the Scythians (Goths), in which he himself had taken part. The style of Dexippus, though not at all superior to that of the rhetoricians of the day, is highly praised by Photius, who even compares him to Thucydides. The fragments of Dexippus have been published under the editorial care of Niebuhr in the 1st vol. of the *Byzantine Historians* (Bonn, 1829), and most recently by Müller, *Fragm. Hist. Græc.* (vol. iii. pp. 666-687).

HENRY DRISLER.

**Dick'son** (Sir COLLINGWOOD), b. 1817; entered the royal artillery as second lieutenant in 1835; became captain in 1846 and colonel in 1866; served during the Eastern campaign of 1854-55 on the staff of Lord Raglan, and was present at the actions of Bulganac and McKenzie's Farm, battles of Alma and Inkerman, capture of Balaklava, expedition to Kertch, siege of Sebastopol; wounded Feb. 4, 1855; commanded the right siege-train, and was present at the bombardment, gaining the Victoria Cross for gallantry Oct. 17; was brevetted lieutenant-colonel and colonel; received medal with four clasps from his own government, also the Turkish medal, and was appointed aide-de-camp to the queen, officer of the Legion of Honor, and created a C. B. He is also a knight of the order of Charles III. and of Isabella the Catholic. In 1870 he was appointed inspector-general of artillery, and in 1871 nominated a K. C. B. In 1875 he was made a colonel-commandant of the 9th brigade of royal artillery; general 1877.

**Dimitry** (ALEXANDER), LL.D., b. at New Orleans, La., Feb. 7, 1805, of Greek descent, was graduated from Georgetown College, D. C., and soon after became editor of the New Orleans *Bee*, and subsequently professor in the College of Baton Rouge. In 1834 he obtained a position in the general post-office department, and wrote a series of letters in the Philadelphia *North American* descriptive of monuments, scenery, social customs, etc. in the chief cities

of Italy. Having returned to Louisiana in 1842, he was in 1845 appointed State superintendent of public schools, in which position he, possessed of consummate scholarship, developed much energy for the organization and improvement of the school system of the State. To this period belong also his lectures on Grecian and Italian history. In 1856 he was appointed translator to the state department, in Washington, as he understood eleven languages, reading and speaking four, and in 1858 he was sent as U. S. minister to Nicaragua and Costa Rica. But this mission was closed in 1861, he entering the service of the government at Richmond. In 1868 he was made assistant superintendent of the public schools of the city of New Orleans, and in 1870 professor of ancient languages in Christian College, at Pass Christian. D. in New Orleans Jan. 30, 1893. ROBERT M. LUSHER.

**Dobbs Ferry**, Westchester co., N. Y. (see map of New York, ref. 8-J, for location of county), on R. R. and Hudson River, 20 miles N. of New York City, is a place of summer residence, and has remains of military works erected during the Revolutionary war. Pop. not in census of 1880.

**Dog'gett** (KATE NEWELL), b. in Charlotte, Vt.; educated at Castleton, Vt., and at the Albany (N. Y.) Female Academy; was married to William E. Doggett of Chicago, Ill., in 1858; invited to take charge of the herbarium belonging to the Academy of Science in that city, and was elected member of the academy in 1869; Nov. 9, 1869, she attended the Frauen Conferenz at Berlin as delegate of the National Woman Suffrage Association, and has since delivered several series of lectures on art; established French and German clubs and a literary society of ladies called the Fortnightly, of which she is the president; and translated *The Grammar of Painting*.

**Dole** (Rev. GEORGE THURLOW), b. Oct. 30, 1808, in (Byfield) Newbury, Essex co., Mass. Having spent eight years in the Lowell Machine-Shop and become master of the arts, he left in 1833, and graduated at Yale College in 1838; spent the three succeeding years in the theological seminaries of New Haven and Andover, Mass.; ordained pastor of the Washington street Congregational church in Beverly, Mass., Oct., 1842; dismissed in 1851; pastor in North Woburn, Mass., from Oct., 1852, to Oct., 1855; pastor in Lanesboro', Mass., 1856 to 1863; principal of Williams Academy, Stockbridge, 1863-64; pastor in Stockbridge 1864-72.

**Donaldson** (JOHN WILLIAM), an English philologist and biblical critic, b. in 1812, was educated at London University and Trinity College; wrote the *New Cratylus*; was head-master of King Edward's School at Bury St. Edmunds from 1841 for more than ten years. In 1854 he published *Jashar*; or, *Fragments of Original Hebrew Songs inserted in the Masoretic Text of the Old Testament*. He also published *The Theatre of the Greeks, The History of the Literature of Ancient Greece*, etc., and grammars of Hebrew, Greek, and Latin. D. Feb. 10, 1861.

**Donnelly** (IGNATIUS), an American statesman and author; b. in Philadelphia, Nov. 3, 1831; educated in the public schools; graduated from the Philadelphia high school July, 1849; studied law with Hon. B. H. Brewster; admitted to the Philadelphia bar in 1853; married in 1855; emigrated to Minnesota in 1856; elected lieutenant-governor of the State by the Republicans in 1859; re-elected in 1861; elected to Congress in 1862 to represent the northern half of the State; re-elected in 1864, and again in 1866; elected as an Independent to the State senate in 1873; re-elected in 1875, and again in 1877. He was the candidate of a coalition of anti-monopolists and Democrats in 1878 and again in 1884, and was the editor and publisher of the *Anti-Monopolist* newspaper from 1873 to 1878. His career in Congress was of marked distinction. He was especially celebrated as a racy and cogent speaker. He was the first to advocate the encouragement by the government of tree-culture on the great prairies—a measure of continental importance—and he was one of the principal advocates of the establishment of the National Bureau of Education. As a member of the Minnesota senate he secured the passage of a law to prevent usury and another to give the people cheap school-books, and he was conspicuous as an opponent of the aggressions of corporate power. His success has been most marked in the domain of authorship. In 1882 he published his first book, *Atlantis*, which in two years passed through twelve editions. It is an exhaustive collation from all sources of the legend of the lost continent mentioned by Plato, the aim being to show that the story is true, and that Atlantis was the antediluvian world and its submergence the real flood on which all the flood-legends of the earth are based. In 1883 he published *Ragnarok*, which has also commanded an extensive sale. Its acceptance by the sci-

entific world would tend to subvert the current theories of geology, its thesis being that the earth has grown by accretions from space, and that its surface has been many times fused by cometary action, one of the last visits of these destructive meteors having given it that comparatively thin coating of gravel and gravel-dust which is called "the drift." Mr. Donnelly's third work, the subject of which has already been given to the public through the press in advance of its publication, is of the most startling character, and bids fair to be an event in literature. By applying Lord Bacon's word-cipher, referred to in the *De Augmentis*, he has found imbedded in the First Folio of the Shakespeare plays a narrative history of Bacon's life and times, written by himself, manifestly in his own vindication to posterity. The revelations of Bacon's connection with Shakespeare and the stage, of the court-life of the period, and of the characters and actions of Queen Elizabeth, Essex, Anthony Bacon, Marlowe, Shakespeare himself, etc., are strange and striking in the extreme. Incidentally the narrative definitely settles the question of the authorship of the Shakespeare drama, proving it to be the work of Bacon. The cipher is simple and indisputable, though involving prodigious labor for its translation.

WM. D. O'CONNOR.

**Doremus** (SARAH PLATT), b. in New York Aug. 3, 1802; married Sept. 11, 1821, to Thomas C. Doremus; in 1828, with eight other ladies, organized the Greek Relief Society; in 1836 aided Madame Feller in her Grande Ligue mission to the French peasantry of Canada; in 1840 began to visit the female prisoners in the city prison, and with Miss Catherine Sedgwick established in 1842 the Home for Women from Prison, now called the Isaac T. Hopper Home; was one of the founders of the House and School of Industry, and a manager of the City Bible Society and of the City Mission and Tract Society from their beginning; in 1849 labored efficiently for the relief of the famine-stricken people of Ireland; in 1854 became vice-president of the Nursery and Child's Hospital; in 1855 aided the writer in organizing the Woman's Hospital Association, and was first directress from 1864 till her death; in 1863 assisted in organizing the Presbyterian Home for Aged Women. For fifty years she labored in behalf of foreign missions with untiring zeal. Her labors in behalf of the sick and wounded soldiers from North and South during the civil war were not excelled by those of any other woman in the land. Measured by the practical results of her labors, Mrs. Doremus was the most remarkable woman of her time. D. Feb. 5, 1877.—Her son, Prof. R. Ogden Doremus, three daughters, and her husband, survive her. J. MARION SIMS.

**Dorsheimer** (WILLIAM), b. at Lyons, Wayne co., N. Y., Feb. 5, 1832; was educated at Harvard University; studied law, and was admitted to the bar in 1854; practised law in the city of Buffalo, and formed a partnership in 1859 with the late Salomon G. Haven; served in 1861 as aide-de-camp to Gen. Fremont in Missouri; was appointed U. S. district attorney for the northern district of the State of New York in 1867, and became lieutenant-governor of New York in 1877.

**Doyle** (Sir C. HASTINGS), entered the British army as ensign in 1819; became captain 1825, colonel 1854; has served in the East and West Indies; was on the staff as assistant adjutant-general and assistant quartermaster-general 1847-56, serving as A. A. G. 3d division of the army of the Crimea; was inspector-general of the militia of Ireland 1856-61; appointed to command of troops in Nova Scotia in 1861, and in 1867 made lieutenant-governor of that province upon the confederation of the British provinces in North America, and placed in command of Her Majesty's forces in North America. For his services in these capacities he was rewarded by the appointment of knight-commander of the order of St. Michael and St. George. In 1874 he was assigned to the command of the southern district, head-quarters at Portsmouth, England. In 1860 he became a major-general, and lieutenant-general in 1870. He was also colonel of the 87th regiment (Royal Irish Fusiliers). D. Mar., 1883.

**Draper** (HENRY), M. D., LL.D., b. in Prince Edward co., Va., son of John William Draper, Mar. 7, 1837; graduated at the medical dept. of the University of the City of New York in 1858; became professor of physiology there in 1860, and also professor of physiology and analytical chemistry in the scientific department, and published *On the Construction of a Silvered-Glass Telescope and Textbook of Chemistry* (1864). He devoted much attention to photographic and spectroscopic examination of the moon and other heavenly bodies, and had, at Hastings on the Hudson, one of the largest telescopes in the U. S. D. Nov. 20, 1882.

**Draper** (JOHN CHRISTOPHER), b. in Prince Edward co., Va., Mar. 31, 1835, a son of John William Draper; grad-

uated in 1857 in the medical department of the University of the City of New York; was professor of physiology there 1858-60; subsequently professor of chemistry in the Cooper Union, professor of chemistry in the University Medical College, and of physiology and natural history in the College of the City of New York; published *On Respiration and Textbook on Anatomy, Physiology, and Hygiene*.

**Drown** (THOMAS MESSINGER), M. D., b. in Philadelphia Mar. 19, 1842; graduated in 1859 at the Philadelphia High School; studied at the University of Pennsylvania, whence he graduated M. D. in 1862; at the Sheffield Scientific School, New Haven, 1862-63; at the Lawrence Scientific School 1863-65; at Freiberg and Heidelberg 1865-68; and was appointed professor of analytical chemistry in Lafayette College, Easton, Pa.

**Dubois**, on R. R., Clearfield co., Pa. (see map of Pennsylvania, ref. 4-D, for location of county). Pop. in 1880, 2718.

**Ducis** (JEAN FRANÇOIS), b. at Versailles Aug. 22, 1733; devoted himself entirely to poetry; declined the seat in the senate which Napoleon offered, and lived in deep retirement in his native city, where he d. Mar. 31, 1816. Of his original works, the tragedy *Abufar* (1795) became very celebrated, but he is now best known from his having translated and arranged for the French stage *Hamlet* (1769), *Romeo and Juliet* (1772), *Lear* (1783), *Macbeth* (1784), *King John* (1791), and *Othello* (1792).

**Dudley** (THOMAS U.), b. in Richmond, Va., in 1837; graduated at the University of Virginia; served in the Southern army during the civil war; studied theology after the close of the war, and was ordained deacon in the Protestant Episcopal Church in 1867. He became rector of Christ church in Baltimore in 1869, and in 1874 he was chosen assistant bishop of Kentucky. J. B. BISHOP.

**Du'niway** (ABIGAIL SCOTT), b. Oct. 22, 1834, at Pleasant Grove, Ill.; removed to Oregon in 1852 with her parents; was married in 1853; lived on a farm nine years; taught school and music six years; was milliner and dressmaker five years; established the *New North-west* at Portland, Or., in 1871, a paper devoted to woman's enfranchisement, of which she is the editor and her boys the type-setters, and published an epic entitled *David and Anna Matson*.

**Du Pont** (HENRY), b. in Delaware; graduated at the U. S. Military Academy, and entered the army as brevet second lieutenant of artillery in 1833, from which he resigned in 1834, and became proprietor of the celebrated powder-mills bearing his name near Wilmington, Del. For many years he was adjutant-general of the State of Delaware, and during the civil war served as major-general of militia in command of the home guards.

**Du Pont** (HENRY A.), son of Henry Du Pont, b. in Delaware; graduated at the U. S. Military Academy, and entered the army as second lieutenant of engineers May, 1861; during the same month was transferred to the 5th Artillery as first lieutenant; promoted to be captain in 1864; served in camp and garrison 1861-63; in command of battery in West Virginia 1863-64; chief of artillery Army of West Virginia 1864-65, being engaged at Opequan, Fisher's Hill, and Cedar Creek, besides numerous skirmishes and engagements; chief of artillery department of West Virginia, Jan.-July, 1865; served as instructor in the Artillery School at Fort Monroe and on special duty at West Point. Resigned Mar. 1, 1875.

**Durango**, cap. of La Plata co., Col. (see map of Colorado, ref. 6-B, for location of county), is on Denver and Rio Grande R. R. Pop. not in census of 1880.

**Dur'yea** (JOSEPH TUTHILL), D. D., b. at Jamaica, Long Island, N. Y., Dec. 9, 1832; graduated with the highest honors in 1856 at the College of New Jersey, where he afterward taught Greek and rhetoric 1857-59; graduated at the Princeton Theological Seminary 1859; was pastor of the Second Presbyterian church, Troy, N. Y., 1859-62; associate pastor of the Collegiate Reformed church, N. Y., 1862-68; and from 1868 to 1879 was pastor of the Classon Avenue Presbyterian church, Brooklyn, N. Y. In 1879 he became pastor of Central Cong. church, Boston, Mass.

**Dus'ton** (HANNAH), wife of Thomas Duston of Haverhill, Mass.; was married Dec. 3, 1677, and became the mother of thirteen children. She was taken prisoner by the Indians in the attack on Haverhill, Mar. 15, 1698, her nurse and infant one week old being also taken, but the child was soon after killed. She was placed in an Indian family of twelve persons on an island (Duston's Island) in the Merrimack River, near the mouth of the Contoocook, in New Hampshire, and with the aid of the nurse and a white captive boy she killed all the Indians in their sleep except a squaw and a boy who escaped. She returned to Haverhill with their scalps.



## E.

**Eads** (JAMES B.), LL.D., civil engineer, b. at Lawrenceburg, Ind., May 20, 1820; in 1833, with his parents, moved to St. Louis, Mo., where he has ever since resided; in 1839 clerk on a Mississippi steamer; in 1842 formed a company to recover sunken property and raise wrecked steamers on the Mississippi and its tributaries. He thus acquired that practical knowledge of the laws controlling hydrodynamic phenomena which has enabled him to detect and expose several erroneous theories previously accepted by scientists. In 1856 he proposed to the U. S. government to remove by contract the snags and wrecks obstructing the Mississippi, Missouri, and Ohio rivers; this proposal was accepted by the House, but failed to be acted upon in the Senate. At the outbreak of the civil war his advice was sought by the President and Cabinet, and at their request he submitted a plan for the defence of the Western rivers. He designed and constructed in 1862-63 the first eight iron-clad steamers in the U. S. navy. He afterward designed and built six iron-clad gunboats with rotating turrets, in which the guns were worked by steam devices; 1867-74 he designed and built the great steel bridge at St. Louis, over the Mississippi, which at the time comprised the largest arches and the deepest foundations in the world. In 1874 he proposed to the U. S. government for \$5,250,000 to deepen the mouth of the Mississippi River by jetties, at the sole risk of himself and associates, from 8 feet to 30 feet, payment to be made only in case of success, opposing and defeating the counter-project of the Fort St. Philip Canal, advocated by the engineers of the U. S. army. He completed this work July, 1879. Since then a 30-foot depth through the bar at South Pass has been maintained. On the completion of the bridge the University of Missouri conferred upon him the degree of LL.D. From 1874 to 1882 he urged in various essays, public addresses, and arguments before Congressional committees the system now being carried out by the government for the improvement of the Mississippi River throughout its alluvial basin (1300 miles). For the benefits he has conferred on commerce the Royal Society of Arts voted him the Albert medal in 1884. He is now engaged in building a ship-railway across the Isthmus of Tehuantepec.

**East Portland**, city and R. R. junction, Multnomah co., Or. (see map of Oregon, ref. 5-B, for location of county). Pop. in 1880, 2934.

**Ec'cleston** (JAMES HOUSTON), b. in Baltimore, Md., in 1838; graduated at Princeton College in 1856; studied law for three years, when he was admitted to the bar. After practising law for two years, he began the study of theology at the Philadelphia Divinity School, where he was graduated in 1864. He was rector of St. Matthew's parish in Philadelphia for a time after graduation, and subsequently became rector of the Church of the Saviour in the same city. In the spring of 1875 he was elected bishop of the diocese of Iowa. J. B. BISHOP.

**Echeneid'idæ** [from *Echeneis*—Gr. *ἐχένη*, *ἵδω*, "stopping" or "retarding vessels"—the typical genus], a family of fishes of the order Teleostei and sub-order Acanthopteri, particularized by the development of a broad oval sucking-disk on the top of the head. The body is more or less elongated, and the scales very small and imbedded in the skin; the lateral line is continuous; the head oblong and very depressed; the eyes lateral, and just under the disk; the opercular bones are normally developed and unarmed; the mouth is moderate, slightly oblique, and cleft laterally, and the lower jaw projects considerably beyond the upper; the upper jaw is scarcely protractile; teeth are developed in bands on the jaws, vomer, and palatine bones; the branchial apertures are large and continuous below; the branchiostegal rays generally nine in number; the dorsal fin exhibits, in part, a perfectly anomalous structure—viz. the anterior portion, instead of being a fin, is developed into the broad oval disk characteristic of the group; of this the skeletal portion is constituted by the spines, whose dichotomous elements divaricate, and are depressed sideward in opposite directions and otherwise modified; the cutaneous portion is a leathery development of the membrane which completely invests the skeleton, and gives rise at the spines, or cross-pieces, to numerous denticles; the structure is surrounded by a smooth, broad leathery margin; by means of this disk the fishes are en-

abled to adhere to various objects; the posterior portion of the dorsal is normally developed as a true rayed fin; the anal fin corresponds in form and structure with the soft dorsal; the caudal fin is distinctly developed; the pectorals are broad, and low on the scapular arch; the ventral fins are thoracic, and formed each of a spine and several rays; the skeleton is composed of vertebrae in increased number (e. g. D. 12-14 + C. 15-16); the pyloric appendages are in moderate number. The fishes comprised in this family are among the most singular of the class, and are familiar to all seafaring people. By sailors and shoremen they are generally designated as suckers; but this name is given to so many different animals that, unfortunately, it is not at all characteristic, although so applicable in other respects to the species. Their peculiar aspect and the depression of their head induce persons unfamiliar with ichthyology to believe that the back is the abdominal surface, and, *vice versa*, that the belly is the true back. They are sluggish in their movements, and depend for transportation rather upon others than their own exertions. They are to a large extent commensals, or parasitic upon other fishes, and, to a considerable degree, they seem to restrict their attentions to special animals. Thus, of the common species, one (*Echeneis remora*) chiefly attaches itself to large sharks (e. g. *Eulamia*, *Galeocerdo*, etc.), and another (*Leptecheneis naucrates*) is partial to the sea-turtles. These are the most common; the former is a short, stout species, with about seventeen or eighteen transverse laminae in the disk; and the latter are elongated, slender species, with about twenty to twenty-six transverse laminae. Both of the species particularized are cosmopolitan; the others are more limited and much rarer. The more notable are *Remoropsis brachyptera*, which is a parasite of sword-fishes, and *Phtheichthys lineatus*, which is parasitic upon the barracuda (a large *Sphyræna*). (See also SUCKER, in CYCLOPEDIA, and REMORA.) THEODORE GILL.

**Edgar**, on R. R., Clay co., Neb. (see map of Nebraska, ref. 11-F., for location of county). Pop. in 1880, 577; in 1885, 894.

**Edgerton**, on R. R., Rock co., Wis. (see map of Wisconsin, ref. 7-B, for location of county), 25 miles S. E. of Madison. Pop. in 1880, 869.

**Edison** (THOMAS ALVA), PH. D., b. at Milan, O., Feb. 11, 1847; educated himself while a train-boy on the road between Port Huron and Detroit; received instruction in telegraphy, and became an operator successively in Port Huron, Memphis, Louisville, Cincinnati, and Boston; but became suddenly famous as an inventor by his gold-indicator, 1871, duplex transmission, 1872, etc., and built in 1876 a magnificent laboratory at Menlo Park, N. J., from which he has sent out the telephone, the phonograph, etc.

**Edmore**, R. R. junction, Montcalm co., Mich. (see map of Michigan, ref. 6-I, for location of county), 33 miles N. of Ionia, Mich. Pop. in 1880, 704.

**Eg'leston** (THOMAS), A. M., E. M., PH. D., LL.D., b. in the city of New York Dec. 9, 1832; graduated in 1854 from Yale College; went in 1855 to Europe; was assistant in the laboratory of geology at the Garden of Plants, and in the palæontological laboratory at the School of Mines in Paris; graduated at the latter institution in 1860; was appointed mineralogist at the Smithsonian Institution in 1861; formed in 1863 the plan for the School of Mines in Washington, and was appointed professor of mineralogy and metallurgy at the School of Mines in New York in 1864; has published a number of papers on mineralogy and metallurgy.

**Elasmobran'chiates** [from *ελασμα*, a "thin plate," and *βράγχια*, "gills"], or **Sela'chians** [from *σέλαχος*, pl. *σέλᾱχη*, "cartilaginous fishes"], the class of vertebrates containing the sharks, rays, and chimæras; the fifth, in a descending series, of recently-proposed classifications of vertebrates, and intermediate between the true fishes and the Marsipobranchiates. They may be briefly defined as lyriiferous vertebrates, destitute of membrane or dermal bones, and with the branchial chambers separate from each other.

**Geographical Distribution.**—The class, which appears to have been a predominant one, and of which the members outnumbered those of the true fishes, is now on the wane, and not much more than 300 species exist at the present

day. These 300 are quite generally distributed, and have the following systematic relations: Of the Squali nearly 150 species are known; of the Raia about 165 have been described; and of the Holocephali but 4 or 5 species are inhabitants of the waters of the present epoch. The class, as a whole, is developed in the greatest perfection in the tropical and warm oceans, but representatives extend toward both poles, and some are found in the high polar regions. Many of the Squali are animals of great activity, and endowed with the power and will for extensive wandering, and are met with in mid-ocean: the species, therefore, sometimes have a great range and approach widely distant coasts. Among the most cosmopolitan are the typical sharks of the family Galeorhinids or Carchariids; these are, in some respects, the highest and most wide-ranging of the class, and to the family belong several of the most common species of the eastern American coasts. Equally wide-ranging, and perhaps still more admirably adapted for a wandering life, and even more formidable in their armature, are the Lamniids, which include the mackerel sharks and the formidable man-eater (*Carcharodon Rondeletii*, etc.). The families at present of more limited distribution are the Scylliids, which are chiefly represented along the shores of the Old World and Australia; the Pristiphorids, which are peculiar to the oceans of China, Japan, and the neighboring seas; and the Heterodontids, which are at present confined to the Pacific. The representatives of the order Raia are distributed in an analogous manner. The most widely diffused of the types is the family of Raia; all the others are more limited in their range, at least toward the northward and southward, and are, on the whole, less richly represented by species as well as individuals in the regions where they occur at all. The Chimærids of the present epoch are rather cold-water types; and of the generic or super-generic types one (*Chimera*) is represented by species in the northern seas, and another (*Callorhynchus*) by species in southern waters. The oceans and salt water are the stations for which all the members of the class are most fitted; but although, on the whole, they are essentially marine types, nevertheless some are found at times, and a few permanently, in fresh waters. THEODORE GILL.

**Elbow Lake**, cap. of Grant co., Minn. (see map of Minnesota, ref. 7-B, for location of county). Pop. of township in 1880, 375.

**Eldred**, R. R. junction, McKean co., Pa. (see map of Pennsylvania, ref. 2-D, for location of county), 24 miles E. of Bradford, Pa. Pop. in 1880, 1165.

**Electric Railways.** The transmission of power by dynamo-electric machines, and their application to elevated railways, were first discussed by Dr. Werner Siemens in 1867, but it was not till 1879 that the idea took shape in the form of a model exhibited by Messrs. Siemens and Halske at Berlin, and which is now in operation at the Crystal Palace, Sydenham. It consists essentially of a dynamo-machine, mounted on a carriage by itself, which draws three carriages holding six persons each. The electric current comes by a third rail from the primary machine (stationed at some convenient point), and is taken off by brushes fixed to the machine and sliding on the centre rail, returning to the primary machine by the outer or bearing rails. The speed is about ten miles per hour. In May, 1881, a line one and a half miles in length was opened in one of the suburbs of Berlin, essentially the same as the above, except that the current reaches the dynamo by one of the bearing rails and returns by the other. In the Siemens tramway, so successful at the Paris electrical exhibition, the direct and return currents are transmitted through copper tubes split longitudinally on the under side and slung securely above the track. They are connected with the machine in the vehicle by two small copper blocks sliding in the tubes, each of which has attached to it a light frame carrying a wheel, whose close contact with the outer side of the tube is ensured by springs.

The success of the Brighton electric railroad stirred up general interest in London, and the work of building similar ones is rapidly progressing. The original Brighton road ran only from the Aquarium to the chain pier. It was operated from Aug. 2, 1883, to Jan. 4, 1884, and in that time carried about thirty thousand passengers. It had a gauge of two feet and a Siemens motor, ran by an Otto gas-engine of two-horse power. In order to continue the road a mile farther on, it was decided to relay the track and use a gauge of 2 feet 9 inches. As before, the current is furnished by a Siemens dynamo ran by an Otto gas-engine, but the latter of a considerably increased strength. There is an electric railroad seven miles long connecting Portrush, on the N. coast of Ireland, with Bushmills, near the Giants' Causeway, the power for which is derived from a confluent of the river Bush. This is the most important work of the kind as yet (1885) in existence. F. N. OWEN.

**Electrolysis** [from *electricity* and the Gr. *λύω*, to "set free"], the chemical decomposition of a substance by means of electricity. If the poles of a galvanic battery are terminated by slips of platinum, and these are immersed in water slightly acidulated with sulphuric acid, they will immediately become covered with bubbles of gas, which soon begin to rise through the water, and these gases will be found to be oxygen and hydrogen, the two components of water; the oxygen rising from the positive and the hydrogen from the negative pole. This process can only take place when the substance to be decomposed is in the liquid state; for it includes, if it does not wholly depend on, a convective action, during which the parts of the body are transferred, one to one side, the other to the other; and it therefore requires the free mobility of the liquid form. During electrolysis the components of the electrolyte are resolved into two groups, one of which goes to the positive pole, and the other to the negative pole; and the electrolytic action of the current is the same at all parts of the circuit. The quantity of the electrolyte decomposed in a given time is in simple proportion to the strength of the current; and the same quantity of electricity decomposes chemically equivalent quantities of different electrolytes. When several electrolytes are mixed, a strong current will generally act a little on all of them, and the quantity in which the elementary bodies appear will depend upon the quantities of the compounds in the mixture, and on the relative ease with which they yield to decomposition.

**Electroph'orus** [from *electricity* and the Gr. *φέρω*, to "produce"] is an instrument for obtaining electricity by means of induction. A shallow brass or tin tray, called the form, is filled with a compound of equal parts of shell-lac, resin, and Venetian turpentine. A tin plate with well-rounded edges and a glass handle is made to cover the resinous plate very nearly, without approaching too closely to the edges of the form. The resinous plate is then struck or rubbed with warm and dry catkin or flannel, and thus becomes negatively electrified. The tin plate is placed on the resin and touched by the finger, which conducts off a certain amount of the natural negative electricity of the tin plate; the latter has therefore become positively electrified, and on withdrawing the finger and raising it will furnish a positive spark. As the negative electricity of the resin acts only inductively, the process may be repeated indefinitely.

**Eli'jah**, a Hebrew prophet, appeared before King Ahab and announced a terrible drought as a punishment for the introduction of the idolatry of Baal, and fled then to Cherith, and subsequently to Zarephath, to avoid the wrath of the king. Three years afterward, when the drought had devastated the whole country, and the king had gathered all the priests of Baal at Mount Carmel to make a huge sacrifice, Eli'jah again appeared before Ahab; and this time the idolatrous priests were massacred and the people returned to the true worship; but the prophet was compelled to flee and seek refuge in a cavern in the wilderness of Mount Horeb, in order to escape the revenge of Jezebel. Once more, however, he returned to public life, appointed Elisha his pupil and successor, and announced to Ahaziah, the son and successor of Ahab, who lay sick in Samaria, that his illness should end with death; visited the school of prophets at Bethel, and retired then with Elisha to the other side of the Jordan, whose waters he divided by smiting them with his mantle; and while stopping there he was taken up into heaven in a chariot of fire. See books of Kings, I. and II.

**Eli'sha**, a Hebrew prophet, was called to the prophetic office by Eli'jah, and received his mantle when he was taken up into heaven; was recognized by the other prophets as their spiritual head, and enjoyed great respect throughout his whole life from the people of Israel. His history is told in the second book of Kings, and his death is commonly fixed at 840 B. C.

**Elizabeth**, cap. of Wirt co., W. Va. (see map of West Virginia, ref. 4-C, for location of county). Pop. in 1880, 395.

**Ellendale**, cap. of Dickey co., Dak. (see map of Dakota, ref. 4-F, for location of county), on James River line, Chicago Milwaukee and St. Paul R. R. Pop. in 1885, 701.

**Ellensburg**, cap. of Kittitas co., W. T. (see map of Washington Territory, ref. 4-C, for location of county), on Yakima River. Pop. not in census of 1880.

**El'liot** (GEORGE THOMSON), b. in the city of New York May 11, 1827; was educated at Columbia College; studied medicine at the University of New York, in Dublin, and Edinburgh; was appointed resident physician to the New York Lying-in Asylum in 1852, and attending physician to Bellevue Hospital in 1854; lectured on operative midwifery in the College of Physicians and Surgeons 1858-59, and became professor of obstetrics and diseases of women

and children in Bellevue Hospital medical college in 1861. D. Jan. 29, 1871. Besides contributions to various medical journals, he published *Obstetric Clinic* (1868).

**Elliott** (ROBERT WOODWARD BARNWELL), S. T. D., b. at Beaufort, S. C., Aug. 16, 1840; was educated at South Carolina College, whence he graduated in 1861; was aide-de-camp 1861-62 to Brig.-Gen. Lawton of the Confederate States army, and wounded in the second battle of Manassas, and adjutant-general of McLaw's division 1864-65; was ordained a deacon in 1868, priest in 1871, and bishop of Western Texas in 1874, and has published a number of essays and sermons.

**Elliott** (SAMUEL MACKENZIE), b. at Inverness, Scotland, Apr. 9, 1811; studied at the Royal College of Surgeons in Glasgow, where he graduated in 1828, and in London, where he made the treatment of diseases of the eye his specialty; came in 1833 to America; visited Cincinnati and Philadelphia, and settled finally in New York, where he acquired a great reputation as an oculist. At the outbreak of the civil war he was lieutenant-colonel of the Highland Guard, and was wounded in the first battle of Bull Run. He was subsequently commissioned to raise the Highland brigade, which commission he fulfilled with great personal sacrifices, and was made a brigadier-general. D. at Elliottville, Staten Island, May 1, 1873.

**Elliott** (WASHINGTON L.), b. in Pennsylvania; was appointed second lieutenant in 1846, first lieutenant in 1847, captain in 1854, major of 1st Cavalry in 1862; chief of the cavalry of the Army of the Potomac; wounded in the second battle of Bull Run; chief of the cavalry of the Army of the Cumberland; commander of the 4th corps Dec., 1864-Apr., 1865; engaged in battles around Nashville, Tenn.; brevet brigadier- and major-general, colonel 3d cavalry, 1878; retired 1879. Author of *Manual for Cavalry*.

**Ellis** (ALEXANDER JOHN), F. R. S., F. S. A., b. at Hoxton, a suburb of London, June 14, 1814; graduated at Trinity College, Cambridge, in 1837; studied law at the Middle Temple for some time, but devoted himself finally to the study of phonetics, and published *Alphabet of Nature* (1845), *Essentials of Phonetics* (1848), *Plea for Phonetic Spelling* (1848), *Universal Writing and Printing* (1856), *Early English Pronunciation* (parts i.-iv., 1869-75), *Glossic* (1870), *Practical Hints on the Quantitative Pronunciation of Latin* (1874), besides papers on various subjects.

**Ely** (SMITH, JR.), b. in New Jersey in 1825; studied law, and was admitted to the bar in 1846; did not practise, but entered a wholesale leather business in New York; was elected a school trustee in 1856; member of the State senate in 1857; county supervisor from 1866 to 1870; Representative from New York to the 42d and 44th Congresses; commissioner of public instruction in 1872; chairman of the committee on expenditures in the treasury department in 1875; mayor of New York 1877.

**Embioticidae** [from *Embiotica*—ἐμβιος, "living," and *tokos*, "bringing forth"—the typical genus], a remarkable family of fishes limited to the northern Pacific Ocean, and especially represented on the shores of the Pacific States, and distinguished by their viviparity. It belongs to the order Teleostei and sub-order Acanthopteri. The body is compressed and oblong; the scales are cycloid and of moderate size, and cover the entire trunk as well as head; on the back they form a sheath of from one to three rows wide at the base of the dorsal fin; this sheath diminishes backward to the end of the fin, and is separated from the back by a well-defined groove; the lateral line is continuous, and parallel with the back; the head is compressed and moderate; the nostrils double; the eyes lateral; the mouth has a moderate or slight lateral cleft; the lips simple, and more or less developed; teeth are present on the jaws, but absent from the palate; the branchial apertures are ample, and continuous below; branchiostegal rays five or six on each side; the dorsal fin is oblong, and modified in two ways, severally characteristic of distinct sub-families; the anal fin is oblong, and armed in front with three slender spines; the anterior portion of the anal fin is developed in a peculiar way as a conduit for the milt and eggs; the pectoral fins are produced and more or less angulated; and the rays branched; the ventrals are inserted behind the bases of the pectorals, and each has a spine and five branched rays; the vertebral column has an increased number of vertebrae; the lower pharyngeal bones are confluent together; the stomach is simple, and pyloric caeca are absent. The family exhibits two distinct modifications of structure; in one (*Embioticinae*) the dorsal has its spinous portion rather less developed than the soft, and only composed of from nine to eleven spines. In the other (*Hysteroecarpinae*) the dorsal has the spinous portion much longer than the soft, and sustained by about fifteen

or more spines. (1) The *Embioticinae* are by far the most numerous in forms, and the species are marine. By American naturalists fourteen genera are admitted—viz. *Ditrema*, *Hypnerus*, *Phanerodon*, *Embiotica*, *Tanistotia*, *Damalichthys*, *Rhacochilus*, *Amphistichus*, *Holconotus*, *Cymatogaster*, *Hypocritichthys*, *Hyperprosopon*, *Brachystius*, and *Abeona*. (2) The *Hysteroecarpinae* are, as far as known, represented by but one species (*Hysteroecarpus Traskii*), which is peculiar to the fresh waters of the Sacramento River. All the species are viviparous, and the young are developed in small number in special uterine sacs. Some of the species are among the most common of the Californian fishes, and are brought to the markets in large numbers: they are known to the inhabitants of the coast indicated under the name of "perch," although they have no relation whatever with the perches properly so called of Europe and the Eastern U. S. On the whole they are mostly nearly related to the Labridae and Gerridae, but their differential characters are very positive. THEODORE GILL.

**Emerton** (EPHRAIM), b. Feb. 18, 1851, at Salem, Mass., was educated at the public schools, and graduated from Harvard College in 1871. He spent two years in journalism and the study of law, and 1873-76 was in Europe, spending two years at the universities of Berlin and Leipsic, from the latter of which he received (1876) the degree Ph. D. Since 1876 he has been instructor in history in Harvard University, and in 1882 received the appointment of professor of ecclesiastical history. He has published pamphlets entitled *Synopsis of the History of Continental Europe*, *The Study of Church History*, *Sir William Temple und die tripleallianz vom jahre 1668* (pp. 93), and other papers. RALPH S. TARR.

**Emerton** (JAMES HENRY), b. 1847 at Salem, Mass., began his natural-history studies at the museum of the Essex Institute in Salem 1862; was assistant at the museum of the Boston Society of Natural History 1873-74; had charge of the Salem Museum 1879, and since the summer of 1880 has been an assistant at the Yale College Museum, New Haven, Conn., and also an assistant on the U. S. fish commission. He is author of *Notes and Additions to a Second Edition of Hentz's Spiders of the United States* (1875), *Structures and Habits of Spiders* (1877), *Life on the Seashore* (1880), and is now engaged in a very extensive revision of the spiders of the U. S., a part of which has been published. He is author of many smaller papers, is the best living American natural-history artist, and has drawn the illustrations for many works, such as Packard's *Guide to the Study of Insects* and most of Prof. Verrell's recent papers.

**Emott** (JAMES), an eminent jurist of New York, b. at Albany in 1770, was a representative in Eleventh Congress, also the Twelfth; member of State assembly 37th, 38th, and 40th sessions; speaker of the 37th assembly; county judge 1817-23; circuit judge 1827-31. D. in Poughkeepsie, N. Y., Apr. 7, 1850.

**Emott** (JAMES), son of the above, b. 1821; read law with his father; president of Merchants' Bank 1852-54; first mayor of Poughkeepsie, N. Y., 1849; district attorney, justice of supreme court, 1855-63; 1863-84 lawyer in New York City. D. at Poughkeepsie Sept. 11, 1884.

**Endicott** (WILLIAM CROWNSHIELD), a lineal descendant of John Endicott, first governor of Massachusetts under the charter of 1629, and of Jacob Crowninshield, secretary of the navy in Jefferson's Cabinet 1805-09, was born at Salem, Mass., in 1827; studied law, and was admitted to the Massachusetts bar in 1850; was a judge of the supreme court 1873-82; was appointed secretary of war in the Cabinet of President Cleveland 1885, and is one of the board of overseers of Harvard College.

**Ennis**, city, on R. R., Ellis co., Tex. (see map of Texas, ref. 3-I, for location of county), 20 miles N. by W. of Corsicana. Pop. in 1880, 1351.

**Enomoto**, or **Inomoto**, b. in the province of Shizuoka, Japan, but known as a Yedo-man; went to Holland when quite young as a naval student under the tycoon's government; was appointed an admiral under the old government; toward the close of the rebellion in 1868 he took a fleet of seven ships to Yesso for the purpose of making a last stand against the imperial government; was forced to capitulate at Hakodadi; was imprisoned for three years; on his release in 1872 was appointed to a position of the fourth rank in the *Kai-ta-kushi*, or colonization department of Yesso; and in 1874 was appointed vice-admiral of the imperial navy, and also envoy extraordinary and minister plenipotentiary to Russia.

**Eohippus** [Gr. *ἠώς*, "dawn," and *ἵππος*, "horse"], an extinct genus of the horse family, occurring in the Lower Eocene deposits of the West, and allied to *Orohippus* (see HORSE, FOSSIL, in CYCLOPEDIA), but of a less specialized

form, and apparently in the direct ancestral line. The feet had four toes in front and three behind, with a rudiment of the outer or fifth metatarsal, and may have had a rudiment of the first toe in the fore foot. This genus is represented by species from the lowest Eocene beds of New Mexico and Wyoming.

O. C. MARSH.

**Ernst** (OSWALD H.), b. June 27, 1842, near Cincinnati, O.; entered Harvard College July, 1858; graduated at the U. S. Military Academy in June, 1864, and was commissioned first lieutenant in the corps of engineers; served as assistant chief engineer of the Army of the Tennessee to the close of the Atlanta campaign; as assistant engineer in construction of fortifications on the Pacific coast 1864-68, having the immediate superintendence of the great blast at Lime Point, Cal., 1868; commanded a company of engineer troops at Willett's Point, N. Y., 1868-71, being detached to serve as astronomer with the commission sent by the U. S. government to Spain to observe the solar eclipse of Dec., 1870; instructor of practical military engineering and military signalling and telegraphy at the U. S. Military Academy, performing also the duties of architect for the more important structures at that place, 1871-78; assistant engineer on Western river improvements 1878-80; since 1880 has had charge of the district for river and harbor improvements of which the headquarters is at St. Louis, Mo., among the more important works in which are the improvement of the Mississippi River between the Illinois and the Ohio rivers, the Osage River, and the harbors of Alton, St. Louis, and Cape Girardeau; has served also since 1880 as member of various boards of engineers, and has directed various surveys and examinations of rivers. He was brevetted captain for "faithful and meritorious services" in 1865, commissioned captain of engineers in 1867, and major of engineers May 5, 1882. His principal publication is a *Manual of Practical Military Engineering* (1873).

**Esocidae** [from *Esox*, an ancient name, later applied to species of this family], a family of fishes of the order Teleostei and sub-order Haplomi, containing the true pikes. The body is elongated, with the back and abdomen nearly straight and parallel; the scales are cycloid and of small size, and cover the whole of the body and more or less of the head; the lateral line is nearly straight and continuous; the head is oblong, and produced into a broad, depressed, and flattened snout; the eyes are lateral; the opercular bones developed in normal number and proportions; the nostrils double; the mouth is large, and has a deep lateral cleft; the upper jaw formed toward the middle by the intermaxillaries, and at the sides, backward, by the supramaxillaries; the teeth are developed on the jaws, vomer, palatine, and hyoid bones: on the jaws they are enlarged and sharp, and on the other bones are aggregated in cardiform bands; the branchial apertures are wide and confluent below; the branchiostegal rays in large number (11-19); the dorsal and anal fins are situated far behind, opposite each other, and higher than long; the caudal fin is well developed and more or less emarginated; the pectorals are inserted near the breast, and moderately developed; the ventrals are abdominal; the skeleton has numerous vertebrae, and the abdominal ones are much more numerous than the caudal (e. g. D. 41-43 + C. 20-21); the stomach is siphonal, and has no pyloric appendages; the air-bladder is simple, and connected by a duct with the oesophagus. The family, as thus limited, is entirely confined to the northern hemisphere, and is characteristic of the "arctogean" division of the globe. It is chiefly represented in America, where about ten species are known,

while in Europe only a single species—and that also common to the two continents—is found. All the members of the family are very voracious, and by the nature of their dentition well adapted for making havoc among their co-habitants of the water. The most notable species of the U. S. are the *Esox nobilior*, or true mascalonge, which is pre-eminent among the species of the family for the delicacy of its flesh; the *E. lucius*, or *E. estor*, which is the same as the common pike of Europe; and the *E. reticulatus*, or ordinary pickerel, of the Middle and Eastern States. The *Esox nobilior* is not only the best, but also the largest, species of the family, and is the most distinctly differentiated of them all, and perhaps entitled to generic distinction. In England the name "pike" is bestowed on the *Esox lucius* as a specific term, as well as a designation implying maturity, while the name "pickerel" is restricted to the young. In the U. S., however, both these appellations are very diversely applied. (See PIKE and PICKEREL, in CYCLOPÆDIA.)

THEODORE GILL.

**Estelline**, on R. R., cap. of Hamlin co., Dak. (see map of Dakota, ref. 6-G, for location of county). Pop. not in census of 1880.

**Etchers' and Engravers' Proofs.** It was formerly universally believed—and Gilbert Hamerton, in his treatise on *Etching*, holds—that there is no other mode of getting a good proof of etchings and engravings than by means of a press. Mr. T. C. Chapman, however, an American artist living in Rome, and a distinguished etcher himself, has succeeded in taking perfect proofs without the use of a press—by pouring over the inked plate a solution of gelatine (isinglass) in alcohol. When hard it is easily removed, and resembles an India proof. The proof may be backed with paper, and preserved or not at pleasure.

**Eureka Springs**, cap. of Carroll co., Ark. (see map of Arkansas, ref. 1-B, for location of county), on Eureka Springs R. R., 19 miles E. by S. of Seligman, Mo., which is on St. Louis and San Francisco R. R. Pop. in 1880, 3984.

**Eustis**, Orange co., Fla. (see map of Florida, ref. 3-F, for location of county), is on Lake Eustis and near Fort Mason, which is on St. John's and Lake Eustis R. R. Pop. not in census of 1880.

**Evans** (EDWARD P.), b. at Remsen, N. Y., Dec. 8, 1833; graduated at the University of Michigan in 1854; studied at Göttingen, Berlin, and Munich 1858-62; was appointed professor of modern languages in the University of Michigan in 1862, and visited Europe again in 1870. He published *Abries der deutschen Literaturgeschichte* (1869), and translations of Stahr's life of Lessing and Coquerel's *First Historical Transformations of Christianity*.

**Everett**, on R. R., Bedford co., Pa. (see map of Pennsylvania, ref. 6-D, for location of county), 9 miles E. of Bedford. Pop. in 1880, 1247.

**Everett** (CHARLES CARROLL), D. D., an American philosopher, b. in Brunswick, Me., 1829, graduated at Bowdoin College in 1850; studied in Germany; librarian, tutor, and professor of modern languages at Bowdoin for four years; after graduating at Harvard divinity school, in 1859, settled over a Unitarian church in Bangor; in 1869 became professor of theology, and in 1878 dean of Harvard divinity school, a position he still holds; published *The Science of Thought* (Boston, 1869), *Religions before Christianity* (Boston, 1883), *Fichte's Science of Knowledge* (Chicago, 1884).

W. T. HARRIS.

## F.

**Fal'lows** (SAMUEL), D. D., b. at Pendleton, near Manchester, England, Dec. 13, 1835; removed with his parents to Wisconsin 1845; graduated as valedictorian at the University of Wisconsin 1859; became a minister of the Methodist Episcopal Church; entered the army as chaplain 1861; afterward engaged in active military service; reached the rank of colonel and brevet brigadier-general; was seven years a regent of the University of Wisconsin; was State superintendent of public instruction 1870-72; became president of the Illinois Wesleyan University at Bloomington 1874; rector of St. Paul's Reformed Episcopal church, Chicago, May, 1875; editor-in-chief of the *Appeal*, the organ of the Reformed Episcopal Church, Jan., 1876, and was chosen a bishop July 15, 1876, at the fourth general council of that new organization, held at Ottawa, Canada.

**Farlow** (WILLIAM GILSON), M. D., b. Dec. 14, 1844, at Boston, Mass., graduated A. B. at Harvard 1866; M. D. at Harvard Medical 1870; spent two years and a half in Europe; returning, was appointed assistant professor of botany at Harvard University 1874-79, and in 1879 received the appointment of professor of cryptogamic botany. He is a member of the National Academy of Sciences, the American Academy, and several European societies. His principal work has been upon the diseases of plants, and his publications upon this subject have given him the position of leading American cryptogamic botanist. He has published many papers on this subject, and, besides, *Marine Algae of New England*, etc. (1881), *Reports on Water Supply*, and numerous papers on dry-rot and other plant-diseases.

RALPH S. TARR.













